TO 00-25-172CL-4

TECHNICAL MANUAL
CHECKLIST

AIRCRAFT FUEL SERVICING WITH R-9, R-11, AND COMMERCIAL FUEL SERVICING TRUCKS AND WITH FUELS OPERATIONAL READINESS CAPABILITY EQUIPMENT (FORCE)

BASIC AND ALL UPDATES HAVE BEEN MERGED TO MAKE THIS A COMPLETE PUBLICATION.

Published Under Authority of the Secretary of the Air Force

21 NOVEMBER 2013 **CHANGE 14 - 6 SEPTEMBER 2024**

TABLE OF CONTENTS

TABLE OF CONTENTS - CONTINUED

FOREWORD

1 PURPOSE.

This checklist is a step by step guide in abbreviated form for use as a reference to ensure accomplishment of selected tasks by a predetermined sequence procedure. The intent of this checklist is to eliminate the probability of omission of a step in accomplishment of the intended task. The procedures contained herein are presented for use by qualified personnel and are not intended to provide full technical instructions.

2 SCOPE.

This checklist provides sequenced procedures for servicing aircraft using USAF fuel servicing vehicles and commercial fuel servicing trucks designed to the requirements of the National Fire Protection Association (NFPA) Standard 407. These instructions will be used by refueling unit operators as an aid to safe and efficient aircraft servicing.

3 ABBREVIATIONS.

All abbreviations used in this manual are in accordance with ASME Y14.38, Abbreviations and Acronyms for Use in Product Definition and Related Documents.

AF	Air Force
AFTO	Air Force Technical Order
ARFF	Aircraft Rescue and Fire Fighting
CSO	Concurrent Servicing Operations
CSS	Chief Servicing Supervisor
DoD	Department of Defense
FCC	Fuels Control Center
FSC	Fuels Service Center
ft	Feet
GPM	Gallons Per Minute
HAS	Hardened Aircraft Shelters
HCSO	Hot Concurrent Servicing Operation
ICT	Integrated Combat Turnaround

lb	Pound
MAJCOM	Major Command
NAOC	National Airborne Operation Center
NFPA	National Fire Protection Association
PAS	Protective Aircraft Shelters
PTO	Power Take Off
PSI	Pounds Per Square Inch
REO	Refueling Equipment Operator
TO	Technical order
WWD	Wet Wing Defuel

4 RELATED PUBLICATIONS.

The following publications contain information in support of this technical manual.

List of Related Publications

Number	Title
ASME Y14.38	Abbreviations and Acronyms for Use in Product Definition and Related Documents
TO 00-5-1	AF Technical Order System
TO 00-25-172	Ground Servicing of Aircraft and Static Grounding/Bonding
TO 00-25-234	General Shop Practice Requirements for the Repair, Maintenance, and Test of Electrical Equipment
TO 37A-1-101	General Operation and Inspection of Installed Fuel Storage and Dispensing Systems

5 RECORD OF APPLICABLE TIME COMPLIANCE TECHNICAL ORDERS (TCTOs).

List of Time Compliance Technical Orders

TCTO Number	TCTO Title	TCTO Date
None		

6 HCI HARDNESS CRITICAL ITEMS (HCI).

CAUTION

The HCI symbol (HCI) establishes special requirements limiting changes and substitutions and that the specific parts listed must be used to ensure hardness is not degraded.

If included, items with nuclear survivability requirements are marked with the HCI symbol (HCI). All changes to, or proposed substitutions of, HCIs must be approved by the acquiring activity.

7 ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) ITEMS.

CAUTION

All ESDS parts shall be handled in accordance with the ESDS device handling procedures in TO 00-25-234.

If included, items containing ESDS parts are marked with the ESDS symbol ().

8 IMPROVEMENT REPORTS.

Recommended changes to this manual shall be submitted in accordance with TO 00-5-1.

SAFETY SUMMARY

1 GENERAL SAFETY INSTRUCTIONS.

This manual describes physical and/or chemical processes which may cause injury or death to personnel, or damage to equipment, if not properly followed. This safety summary includes general safety precautions and instructions that must be understood and applied during operation and maintenance to ensure personnel safety and protection of equipment. Prior to performing any specific task, the WARNINGs, CAUTIONs, and NOTEs included in that task shall be reviewed and understood.

2 WARNINGS, CAUTIONS, AND NOTES.

WARNINGs and CAUTIONs are used in this manual to highlight operating or maintenance procedures, practices, conditions, or statements which are considered essential to protection of personnel (WARNING) or equipment (CAUTION). WARNINGs and CAUTIONs immediately precede the step or procedure to which they apply. WARNINGs and CAUTIONs consist of four parts: heading (WARNING, CAUTION, or icon), a statement of the hazard, minimum precautions, and possible results if disregarded. NOTEs are used in this manual to highlight operating or maintenance procedures, practices, conditions, or statements which are not essential to protection of personnel or equipment. NOTEs may precede or follow the step or procedure, depending upon the information to be highlighted. The headings used and their definitions are as follows:

WARNING

Highlights an essential operating or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in injury to, or death of, personnel or long term health hazards.

CAUTION

Highlights an essential operating or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in damage to, or destruction of, equipment or loss of mission effectiveness.

NOTE

Highlights an essential operating or maintenance procedure, condition, or statement.

CHAPTER 1
EMERGENCY SHUTDOWN PROCEDURES

INTRODUCTION.

This checklist is a step by step guide in abbreviated form for use as a reference to ensure accomplishment of selected tasks by a predetermined sequence procedure. The intent of this checklist is to eliminate the probability of omission of a step in accomplishment of the intended task. The procedures contained herein are presented for use by qualified personnel and are not intended to provide full technical instructions. This checklist provides sequenced procedures for servicing aircraft using USAF fuel servicing vehicles and commercial fuel servicing trucks designed to the requirements of the National Fire Protection Association (NFPA) Standard 407. These instructions will be used by refueling unit operators as an aid to safe and efficient aircraft servicing.

EMERGENCY SHUTDOWN PROCEDURES.

During aircraft servicing, the refueling unit operator will monitor the refueler for fuel leaks, ignition sources and other indications of a possible malfunction. In the event of an emergency, shutdown the unit as follows:

a. Release deadman control.

b. Push engine auxiliary throttle control all the way in.

c. Turn off emergency switch.

d. Close hose reel shut off valve.

e. Close main tank emergency shut off valve.

f. Notify aircraft servicing supervisor, operations expediter and Fuels Control Center (FCC), if possible.

g. Evacuate area if instructed by servicing supervisor or fire department personnel.

NOTE

In case of fuel spill other than normal aircraft venting, do not evacuate fuel servicing vehicle until area is declared safe by fire department personnel.

HAND SIGNALS.

a. **OK or Transfer Fuel:** Hand raised thumb up.

b. **Negative or Malfunction or Not Clear:** Hand raised thumb down.

c. **Stop or Cut Engine/Power:** Movement of either hand across throat.

CHAPTER 2
AIRCRAFT SERVICING

GENERAL PROCEDURES.

a. Stop 25 or more feet from aircraft.

b. Approach upon direction of servicing crew member.

c. Ensure servicing crew member prepositions wheel chock and uses a spotter when backing toward aircraft and keeps sight of spotter in mirror prior to and during backing operation.

d. Position vehicle for servicing.

e. Set parking brake, transmission and PTO as required.

f. Shut off radio, if defueling. (Intrinsically safe radios can remain on.)

g. Deleted.

h. Bond fuel servicing vehicle to aircraft.

i. Unlock control panel and clear meters, if applicable.

j. Get verification of proper fuel grade, if applicable.

NOTE

Meter rotation with the hose reel valves closed and the selector lever in any mode other than DEFUEL or EVACUATION, indicates a defective defuel control valve. This condition must be reported immediately and the refueler withdrawn from service until the condition is corrected.

WARNING

If movement of the vehicle is indicated when the auxiliary throttle is pulled out, shut down unit by pushing the throttle "in" and placing the emergency switch to "OFF" position.

k. Prepare vehicle for appropriate servicing operation.

WARNING

- Servicing crew member shall not to exceed 175 GPM unassisted and 300 GPM assisted by no more than two A/C boost pumps when defueling aircraft with Kovatch R-11 and Oshkosh R-11 fuel servicing vehicles. Failure to follow this guidance may result in overfilling the vehicle's cargo tank.

- During multiple source refueling, operators must continuously monitor refueling flow meters for correct indication of fuel flow. If backflow is detected, immediately stop all refueling operations. In addition, if using 1st or 2nd generation Kovatch R-11s, operator must monitor the tank wet/dry sensor indicator lights on the main control panel. If the wet (RED) indicator light illuminates during operation, the operator will immediately stop refuel (releasing deadman).

- When multiple refueling trucks are located on the same side or wing of an aircraft, the vehicles must be positioned at the aircraft prior to initiating any fuel flow and remain positioned and bonded until fuel flow is terminated on all trucks on that side of the aircraft.

CAUTION

- During defueling with Condiesel (1981) R-9, Kovatch R-9, and Oshkosh R-11 fuel servicing vehicles, verify via precheck/pretest that the high level shutoff is operational. This is accomplished by using the Defuel High Level Pretest button on the main control panel. For Kovatch R-11 fuel servicing vehicles equipped with the electronically controlled high level shutoff system, observe the cargo tank sensor green light on the main control panel is illuminated prior to initiating the operation.

- Refueling operator shall ensure nozzles equipped ball strainer valves are in the correct refuel/defuel position. The ball valve strainer must be inspected and cleaned as required every time the ball valve position is switched from the re-

fuel to defuel or defuel to refuel position. When required to switch the refuel/defuel status of fuel servicing equipment (to include set up for RTB operations), available 2F0X1 (or civilian equivalent) shall provide secondary visual verification for the proper placement and condition of the ball valve strainer prior to commencing the next operation. This strainer is the last line of protection for preventing solid contaminates from entering aircraft or the refueling vehicle components. If the strainer is not inspected and cleaned if required, damage to aircraft fuel systems/refueling vehicle components and fuel spill may occur. Failure to comply could result in damage to, or destruction of, equipment or loss of mission effectiveness.

NOTE

Defueling in the evacuation mode is not permitted because the fuel is not filtered.

l. Extend hose and, if equipped with a ball strainer, ensure valve is in the correct refuel/defuel position. Ensure the servicing crew member connects the SPR nozzle to the aircraft and if equipped with a strainer coupling quick disconnect, prior to pressuring the hose, servicing crew member must test the strainer coupling quick disconnect locking device for positive engagement.

m. Test nozzle to be certain the single point servicing nozzle cannot be removed from aircraft when valve handle is in the open and locked position.

n. Begin pumping operation upon direction of the servicing crew member. Fuels servicing equipment operator activates deadman control valve during fuel transfer.

o. Closely monitor control panel during operation.

CAUTION

The pump will cavitate when the fuel level in the tank is reduced to approximately 500 gallons. Attempting to pump fuel beyond this point will eliminate the pump prime, prevent hose evacuation and may result in overheating/damage of the pump seal. Shut down the pump immediately when the pump tempo increases indicating a loss of pump prime.

p. Record differential pressure reading if required.

q. Upon completion of fuel servicing operation, stow fuel servicing hoses, bonding wires, and deadman control.

r. Complete accounting forms, ensure identaplate is returned to servicing crew member, and obtain signature.

s. Perform walkaround inspection and depart area.

CHAPTER 3

SIMULTANEOUS FUEL SERVICING AND MUNITIONS LOADING, CONCURRENT SERVICING OPERATIONS (CSO)

INTRODUCTION.

This checklist is a step-by-step guide in abbreviated form for use as a reference to ensure accomplishment of selected tasks by a predetermined sequence procedure. The intent of this checklist is to eliminate the probability of omission of a step in the accomplishment of CSO. The procedures contained herein are presented for use by qualified personnel and are not intended to provide full technical instructions. CSO-qualified fuels specialists will have a thorough working knowledge of these precautions, making it unnecessary for a check off of each step.

a. This procedure will be utilized to conduct cold refueling and simultaneous munitions loading.

b. Refuelers when equipped with deadman controls are authorized for use in CSO operations.

c. Perform a pressurized serviceability check of the refueling equipment once every 24 hours or when returned to service after maintenance.

AIRCRAFT SERVICING.

a. Unless prepositioned, stop 25 feet or more from aircraft and then approach only upon direction from servicing crew member.

b. Position vehicle for servicing operation; maintain at least a minimum 10-foot distance between refueling unit and aircraft.

c. Set parking brake, transmission and PTO, as required.

d. Bond fuel servicing vehicle to aircraft.

e. Unlock control panel and clear meters, if applicable.

f. Get verification of proper fuel grade, if applicable.

CAUTION

Do not change selector valve from one mode or operation to another without returning engine throttle to idle speed.

g. Prepare vehicle for servicing operation.

h. Fuel Servicing Equipment Operator will operate deadman control valve during fuel transfer.

CAUTION

Refueling Operator shall ensure nozzles equipped ball strainer valves are in the correct refuel/defuel position. The ball valve strainer must be inspected and cleaned as required every time the ball valve position is switched from the refuel to defuel or defuel to refuel position. This strainer is the last line of protection for preventing solid contaminates from entering AC or the refueling vehicle components. If the strainer is not inspected and cleaned if required, damage to AC fuel systems/refueling vehicle components and fuel spills may occur.

NOTE

The refueling unit operator will be provided with an intercom headset to enable monitoring of the intercom conversation to expedite rapid shutdown of the refueling unit in the event of an emergency. (NUCLEAR ONLY)

i. Extend hose and if equipped with a ball strainer, ensure valve is in the correct refuel/defuel position. Ensure the servicing crew member connects the SPR nozzle to the aircraft and if equipped with a strainer coupling quick disconnect, prior to pressuring the hose, servicing crew member must test the strainer coupling quick disconnect locking device for positive engagement.

j. Test nozzle to be certain the single point servicing nozzle cannot be removed from aircraft when valve handle is in the open and locked position.

k. Begin pumping operation upon direction of the servicing crew member.

CAUTION

Be ready to push auxiliary throttle in and shut off emergency switch if any vehicle movement is noted or an unsafe condition or situation develops.

l. During refueling, monitor control panel, aircraft fuel vent outlets, and aircraft servicing supervisor signals; be prepared to shut down equipment in case of leak or other malfunction.

m. Stow fuel servicing equipment and bonding wires after refueling is completed.

n. Complete paper work and obtain signature of servicing crew member on AF Form 1994 after aircraft departs; lock control panel, if applicable.

o. Perform walkaround inspection and depart area.

CHAPTER 3A
C-130 HOT CONCURRENT SERVICING OPERATION (HCSO)

INTRODUCTION.

This chapter is a step-by-step guide for use as a reference by 2F0X1 fuels specialists (Refueling Equipment Operator (REO)) who is certified to conduct hot refuel operations and Concurrent Servicing Operations (CSO) in accordance with Technical Order (TO) 00-25-172 and Major Command (MAJCOM) directives. This checklist is intended to prevent the omission of a sequential task in the accomplishment of authorized hot refueling with CSO but does not provide detailed technical instruction. These procedures are to be used in conjunction with the general and emergency aircraft refueling procedures outlined in Chapter 1 and Chapter 2 of this checklist.

a. This procedure will be utilized to conduct hot refueling with simultaneous cargo or passenger loading/unloading, performance of minor maintenance, or fleet servicing.

b. Ensure all equipped and installed hoses on fuel servicing vehicle meets the requirements listed in TO 37A-1-101.

c. Fuel servicing equipment when equipped with servicing controls are authorized for use in hot concurrent servicing operations.

d. Perform a pressurized serviceability check of the fuel servicing equipment once every 24 hours or when returned to service after maintenance.

REFUELING SITE SET UP.

a. Preposition equipment for fuel servicing operation at designated hot refueling pad allowing for maximum separation between refueling vehicle and aircraft. Wind direction should be a consideration for this portion. Setup truck downwind of the aircraft parking location, if possible.

b. Maintain a minimum distance between fuel servicing equipment and aircraft, as outlined in TO 00-25-172.

c. Ensure one flightline fire extinguisher is positioned within 100 feet of the aircraft as outlined in TO 00-25-172, Table 3-1.

d. An Aircraft Rescue and Fire Fighting (ARFF) vehicle will be on a standby position. The Base Fire Chief determines positioning for optimum response.

e. Secure line badges and other loose items inside pockets.

f. Aircraft servicing crew member will provide a safety briefing, including emergency procedures, prior to arrival of aircraft.

g. Ensure all personnel have proper hearing protection.

NOTE

The REO will have an intercom headset to enable monitoring of the intercom conversation to expedite shutdown of the refueling equipment in the event of an emergency.

HOT CONCURRENT SERVICING PROCEDURES.

a. Emergency Shutdown Procedures. During aircraft servicing, the REO will monitor the refueler for leaks, ignition sources and other indications of a possible malfunction. In the event of an emergency, shutdown the unit as follows:

(1) Release servicing control.

(2) If applicable, activate emergency shutoff. Vehicles will not be able to move once activated.

(3) Close Main Tank shut off valve.

(4) Notify aircraft servicing crew member, operations expediter, and Fuels Service Center (FSC), if possible

(5) Evacuate area

b. Emergency Aircraft Egress. Emergency Aircraft Egress as follows:

(1) Stop fuel flow.

(2) Aircraft servicing crew member disconnects refueling hose and bond wires.

(3) Aircraft servicing crew member clears aircraft for taxi.

(4) Depending upon urgency, fuel servicing equipment may/may not have time to move away from aircraft.

NOTE

In case of fuel spill do not evacuate fuel servicing equipment until area is declared safe by fire department personnel.

c. Hand Signals. Hand Signals are as follows:

(1) OK or Transfer Fuel: Hand raised, thumb up.

(2) A Negative Flow, Malfunction, or Not Clear: Hand raised, thumb down.

(3) Stop Fuel Flow/Servicing Complete: Movement of either hand across throat.

d. General Procedures. General Procedures as follows:

(1) Position fuel servicing equipment clear of the taxiway and aircraft parking location, await the arrival of the aircraft to be serviced.

(2) Once the aircraft is in position, relocate fuel servicing equipment at rear of the aircraft, stopping 50 feet or more from the aircraft and ensure cab windows are closed; then approach only upon direction from the servicing crew member.

NOTE

If aircraft engines on the servicing side of the aircraft are to remain on for the operation, the servicing crew member is responsible for verifying operating engines are in "Hotel Mode" prior to directing fuel servicing vehicle into position.

(3) Position vehicle for servicing. Ensure unit has a clear exit.

(4) Set parking brake, transmission, and Power Take off (PTO).

(5) Secure line badge, headgear, and loose items inside pocket(s), don dust goggles, gloves, and hearing protection prior to exiting the vehicle. Close cab door upon exiting vehicle.

(6) When the servicing crew member arrives, obtain the appropriate fuel billing card/information, verify the fuel grade to be issued with aircrew and conduct a safety briefing.

(7) Ensure one flightline fire extinguisher is positioned between the fuel servicing equipment and the refueling crew members position.

(8) Give servicing hose and bonding wire (if required by MDS specific technical orders) to aircrew member for deployment.

NOTE

Refueling equipment operator shall ensure nozzles equipped ball strainer valves are in the correct refuel/defuel position. The ball valve strainer must be inspected and cleaned as required every time the ball valve position is switched from the refuel to defuel or defuel to refuel position. This strainer is the last line of protection for preventing solid contaminates from entering aircraft fuel systems/refuel equipment components and fuel spills may occur.

(9) Ensure the servicing crew member bonds fuel servicing equipment to aircraft.

(10) If not already in possession of an intercom headset, obtain one from the servicing crew member.

(11) Prepare equipment for refueling.

CAUTION

At NO time will the refueling equipment operator (2F0X1) enter the area directly behind operating aircraft engines, unless engines are verified to be in “Hotel Mode” by the servicing crew member prior to refueling unit arrival. Failure to comply could result in injury, or damage to or destruction of equipment or loss of mission effectiveness.

(12) Prior to pressurizing the hose, servicing crew member must test the strainer coupling quick disconnect locking device for positive engagement and test nozzle to be certain the single point servicing nozzle cannot be removed from aircraft when valve handle is in the open and locked position.

(13) Upon notification from the servicing crew member, activate the servicing control to begin pumping operation. The refueling equipment operator maintains the servicing control.

CAUTION

Be ready to release the servicing control, push in auxiliary throttle, and shut off emergency switch if any vehicle movement is noted or an unsafe condition and/or situation develops. Failure to comply could result in injury, or damage to or destruction of equipment or loss of mission effectiveness.

(14) During refueling, monitor control panel, aircraft fuel vent outlets, and always pay close attention to the aircraft servicing crew member for signals; be prepared to shut down equipment in case of leak or any other malfunction.

(15) Upon completion of the operation, close all valves, stow hose, and bonding cable.

(16) Complete paperwork with appropriate signatures and accounting documentation as required.

(17) Perform walk-around inspection and depart the area.

CHAPTER 4
KC-10/135 HOT DEFUELING

INTRODUCTION.

When performing hot defueling, all members of the fueling team except fire guard will be in contact with each other via the intercom system. This includes the fuel truck operator. Tasks designated by an asterisk (*) will be performed by the fuel servicing equipment operator (2F0X1) and all other tasks will be performed by a servicing crew member. It cannot be overemphasized that these procedures must be followed in the proper sequence to ensure a safe operation. These procedures are applicable only to fuel servicing vehicles that have operable automatic high-level cutoffs. Hot Defueling of JP-4 into fuel servicing vehicles is authorized only under emergency conditions or combat situations and is not permitted for normal day-to-day operations.

AIRCRAFT SERVICING.

NOTE

Due to the fire hazards associated with hot defueling operations, the preferred distance between aircraft wingtips is 50 feet. However, at those installations where aircraft parking space is limited, therefore not permitting a 50 foot wing tip clearance, the wing tip separation distance can be reduced to a minimum of 35 feet. Whenever a distance of less than 50 feet is maintained between aircraft, wing tips a crash fire rescue vehicle must be at the aircraft during hot defueling operations.

a. *Stop 25 or more feet from aircraft.

b. *Approach upon direction of servicing crew member.

c. Preposition wheel chock and use a spotter when backing toward aircraft.

d. *Position vehicle for servicing.

e. *Set parking brake, transmission and PTO as required.

f. *Shut off radio, if defueling.

g. Deleted.

h. Bond fuel servicing vehicle to aircraft.

i. *Get verification of proper fuel grade, if applicable.

CAUTION

Refueling Operator shall ensure nozzles equipped ball strainer valves are in the correct refuel/defuel position. The ball valve strainer must be inspected and cleaned as required every time the ball valve position is switched from the refuel to defuel or defuel to refuel position. This strainer is the last line of protection for preventing solid contaminates from entering AC or the refueling vehicle components. If the strainer is not inspected and cleaned if required, damage to AC fuel systems/refueling vehicle components and fuel spills may occur.

j. *Fuels servicing equipment operator will connect defueling hose to bottom loader. If hose is equipped with a ball strainer, ensure valve is in the correct refuel/defuel position. If hose is equipped with a strainer coupling quick disconnect, prior to pressuring the hose, fuels servicing equipment operator must test the strainer coupling quick disconnect locking device for positive engagement. Open vehicle loading and vent valves. Leave single point nozzle valve closed.

k. Test nozzle to be certain the single point servicing nozzle cannot be removed from aircraft when valve handle is in the open and locked position.

l. Ensure the servicing crew member connects the SPR nozzle to the aircraft. If hose is equipped with a ball strainer, ensure valve is in the correct refuel/defuel position. If hose is equipped with a strainer coupling quick disconnect, prior to pressuring the hose, servicing crew member must test the strainer coupling quick disconnect locking device for positive engagement.

m. *Perform intercom check with aircraft servicing supervisor and all members of the fuel servicing team.

n. Start aircraft engine farthest removed from the fuel servicing vehicle (Number 1 or 4 engine.)

o. Open SPR nozzle(s) on the aircraft.

p. *Open SPR nozzle on bottom loader.

q. Start aircraft aerial refueling off-load pumps.

r. *After fuel flow begins from aircraft, coordinate with servicing crew member and perform a bottom loading automatic shut-off valve check.

WARNING

If shut-off valve is inoperative, terminate the operation immediately. Personnel are not authorized on top of the fuel servicing vehicle during hot defueling.

s. Complete the operation.

t. *Stow defueling hose.

u. *Obtain required signatures, perform walkaround inspection and depart area.

EMERGENCY PROCEDURE.

In the event of a fire and/or fuel spillage within the hot defueling area, immediately cease operations and evacuate the area.

CHAPTER 5

H-1, H-53, H-60, AND H-139 HELICOPTER HOT REFUELING PROCEDURES

INTRODUCTION.

This chapter is a step-by-step guide in abbreviated form for use as a reference to ensure accomplishment of selected tasks by a predetermined sequence procedure. The intent of this chapter is to eliminate the probability of omission of a step in the accomplishment of helicopter hot refueling. The procedures contained herein are presented for use by a 2F0X1 fuels specialist who is certified to hot refuel aircraft in accordance with TO 00-25-172 and MAJCOM directives. This checklist does not provide detailed technical instructions.

a. This procedure will be utilized to conduct hot refueling of H-1, H-53, H-60, and H-139 helicopters.

b. Refer to TO 00-25-172, Table 5-2 for approved/authorized single point refueling (SPR) nozzles.

c. Perform a pressurized serviceability check of the refueling equipment once every 24 hours or when returned to service after maintenance.

AIRCRAFT SERVICING.

a. Stop 50 ft or more from aircraft and then approach only upon direction from the servicing crew member. Maintain 25-foot minimum separation from any part of the aircraft.

b. Position vehicle for servicing operation; maintain maximum distance between refueling unit and aircraft.

c. Set parking brake, transmission and PTO.

d. Secure line badge, headgear and loose items inside pocket.

e. Ensure that servicing crew member bonds vehicle to aircraft.

f. Unlock control panel and clear meters, if applicable.

g. Get verification of proper fuel grade, if applicable.

h. Prepare vehicle for refueling.

CAUTION

- Do not change selector valve from one mode or operation to another without returning engine throttle to idle speed.
- Refueling Operator shall ensure nozzles equipped ball strainer valves are in the correct refuel/defuel position. The ball valve strainer must be inspected and cleaned as required every time the ball valve position is switched from the refuel to defuel or defuel to refuel position. This strainer is the last line of protection for preventing solid contaminates from entering AC or the refueling vehicle components. If the strainer is not inspected and cleaned if required, damage to AC fuel systems/refueling vehicle components and fuel spills may occur.

i. Extend hose and, if equipped with a ball strainer, ensure valve is in the correct refuel/defuel position. Ensure the servicing crew member connects the SPR nozzle to the aircraft and if equipped with a strainer coupling quick disconnect, prior to pressuring the hose, servicing crew member must test the strainer coupling quick disconnect locking device for positive engagement.

j. Test nozzle to be certain the single point servicing nozzle or closed circuit refueling nozzle cannot be removed from aircraft when valve handle is in the open and locked position.

k. Aircraft servicing supervisor will advise refueling equipment operator of fuel flow pressure restrictions. Aircraft servicing supervisor will operate the deadman control valve during fuel transfer.

l. Begin pumping operation upon direction of the servicing crew member by actuating throttle to increase engine RPM. Pressure will not exceed 25 PSI when hot refueling H-1 and H-60 helicopters unless a pantograph or API 1529 hard hose is used. Pressure will not exceed 20 PSI when hot refueling H-139 helicopters.

WARNING

To prevent injury to personnel or damage to equipment, be ready to push auxiliary throttle in and shut off emergency switch if any vehicle movement is noted or an unsafe condition or situation develops.

m. During refueling, monitor control panel and aircraft servicing supervisor signals; be prepared to shut down equipment in case of leak or other malfunction; remove equipment from servicing area immediately after refueling is complete or for repair if safe to do so.

n. Complete paperwork and obtain signature of servicing crew member on AF Form 1994 after aircraft departs; lock control panel, if applicable.

o. Perform walkaround inspection and depart area.

CHAPTER 6

E4-B NATIONAL AIRBORNE OPERATION CENTER (NAOC) AIRCRAFT HOT REFUELING

INTRODUCTION.

This chapter is a step-by-step guide in abbreviated form for use as a reference to ensure accomplishment of selected tasks by a predetermined sequence procedure. The intent of this chapter is to eliminate the possibility of omission of a step in the accomplishment of NAOC (E4-B) Hot Refueling. The procedures contained herein are presented for use by qualified personnel and are not intended to provide all technical instructions. Qualified E4-B hot refueling specialists will have a thorough working knowledge of these precautions, making it unnecessary to check off each completed step.

NOTE

- R5/R9/R-11 fuel servicing vehicles with deadman controls will be used for this operation.
- Waiver authority to fuel service without deadman controls may be issued on case-by-case basis by MAJCOM/DO/LG.
- A fuel equipment operator will be positioned at the fuel servicing vehicle and will be on intercom.
- All required headsets will be carried aboard the aircraft for hot refueling operations.

SAFETY PRECAUTIONS.

Aircraft servicing safety precautions regarding electrical storms, vehicle discrepancies, handling of lighter/matches, bonding, clothing and distance criteria apply. In addition observe the following:

a. No external maintenance will be accomplished during fuel servicing.

b. Fuel servicing team will consist of a minimum of seven personnel.

c. Telephone and radio landline may be connected to the aircraft but not connected/disconnected during fuel servicing.

d. Passengers and NAOC personnel may stay on board but are prohibited from exit/entry during fuel servicing (except for emergency evacuations).

e. Personnel must remain at least 10 feet from all lower UHF antennas.

WARNING

Severe electrical shock and burn may result when touching equipment/aircraft during HF transmission.

f. When notified by aircraft servicing supervisor of HF transmission, stop fuel flow, reduce RPMs to idle, and lay the deadman control down on ground. Do not touch the skin of the aircraft or other metal objects, including any portion of fuel servicing vehicle(s).

g. Hearing protection will be worn when aircraft engine is operating.

h. Headgear will not be worn in the immediate area of an operating engine.

LIMITATIONS.

a. Maintenance during fuel servicing is limited to physical replacement of avionics components inside the aircraft.

b. Number three engine will not be operated during hot refueling.

c. Fuel servicing will be accomplished using straight nozzle connected to the SPR on the wing opposite of the operating engine.

d. Major crash fire vehicle must be on scene during hot refueling operations; in addition, one 150 lb dry chemical extinguisher. If the

crash fire vehicle departs, fuel flow may continue until fuel servicing vehicle is emptied but fuel flow will not be restarted until the crash fire vehicle returns.

AIRCRAFT SERVICING.

a. Stop 25 ft from aircraft.

b. Approach upon direction of servicing crew member.

c. Prepositions wheel chocks prior to backing toward aircraft and keeps sight of spotter in mirror prior to and during backing operation.

d. Position vehicles for servicing operation.

e. When two fuel servicing vehicles are used, maintain 10 ft minimum vehicle separation.

f. Set parking brake, transmission, and PTO.

g. Secure hats, line badge, and other loose items.

h. Bond vehicle to aircraft.

i. Get verification of proper fuel grade, if applicable.

j. Obtain intercom headset from servicing crew member.

k. Prepare vehicle for servicing; unlock control panel and clear meters if applicable. The fuel equipment operator maintains the deadman control.

CAUTION

Refueling Operator shall ensure nozzles equipped ball strainer valves are in correct refuel/defuel position. The ball valve strainer must be inspected and cleaned as required every time the ball valve position is switched from the refuel to defuel or defuel to refuel position. This strainer is the last line of protection for preventing solid contaminants from entering AC or the refueling vehicle components. If the strainer is not inspected and cleaned if required, damage to AC fuel systems/refueling vehicle components and fuel spills may occur.

l. Prior to pressuring the hose, servicing crew member must test the strainer coupling quick disconnect locking device for positive engagement and test nozzle to be certain the single point servicing nozzle cannot be removed from aircraft when valve handle is in the open and locked position.

m. Start fuel transfer when notified by servicing crew member. Ensure deadman control is activated. The fuel equipment operator maintains the deadman control.

n. Monitor fuel servicing equipment for leaks or other malfunctions.

NOTE

Monitor the flow meter on truck for indication of reverse flow.

o. Shut down fuel flow upon direction of servicing crew member.

p. Stow fuel servicing equipment, prepare paperwork, obtain signatures, perform walkaround inspection and depart area.

CHAPTER 7

HOT REFUELING PROCEDURES UTILIZING THE R-11 6000 GALLON FUEL SERVICING VEHICLE

INTRODUCTION.

This chapter is a step-by-step guide for use as a reference by a 2F0X1 fuels specialist who is certified to hot refuel aircraft in accordance with TO 00-25-172 and MAJCOM directives. This checklist is intended to prevent the omission of a sequential task in the accomplishment of authorized hot refueling but does not provide detailed technical instructions. These procedures are to be used in conjunction with the general and emergency aircraft refueling procedures outlined in Chapters 1 and 2 of this checklist.

a. R-11 fuel servicing vehicle must be equipped with American Petroleum Institute (API) Bulletin 1529, Type C, Grade 2, hardwall aviation servicing hose assemblies with internally expanded forged brass or bar stock body couplings and brass or 300 Series stainless steel serrated ferrules, respectively and single point refueling nozzles listed under the hot refueling column of TO 00-25-172.

b. Perform a pressurized serviceability inspection of the refueling equipment once every 24 hours or when returned to service after maintenance.

REFUELING SITE SET UP.

a. Preposition vehicle for fuel servicing operation at designated hot refueling pad allowing for maximum separation between vehicle and aircraft. Wind direction should be a consideration for this portion. Setup truck downwind of the aircraft parking location, if possible.

b. Extend servicing hose and bonding wire and position along side of the fuel servicing vehicle.

c. Fire protection will be in accordance with TO 00-25-172.

d. An ARFF Vehicle will be on a standby position. The Base Fire Chief determines positioning for optimum response.

e. Secure line badges and other loose items inside pockets.

f. Complete preparation of vehicle for refueling. The pre-operation inspection will be done at the hot refueling site prior to arrival of the receiver aircraft.

g. The Deadman Valve will be hand-held by the team member designated/specified in MDS specific Technical Orders or local instruction.

h. Refueling Supervisor (2A3X3) will provide a safety briefing, including emergency procedures, prior to arrival of first aircraft.

i. Ensure all personnel have proper hearing protection.

AIRCRAFT SERVICING.

NOTE

Ensure the bonding wire is connected prior to single point nozzle hook-up.

a. Upon direction of Refueling Supervisor, first provide the bonding wire and then the servicing hose to the appropriate crew member and assist in hook-up.

CAUTION

Refueling Operator shall ensure nozzles equipped ball strainer valves are in the correct refuel/defuel position. The ball valve strainer must be inspected and cleaned as required every time the ball valve position is switched from the refuel to defuel or defuel to refuel position. This strainer is the last line of protection for preventing solid contaminates from entering AC or the refueling vehicle components. If the strainer is not inspected and cleaned if required, damage to AC fuel systems/refueling vehicle components and fuel spills may occur.

b. Test nozzle to be certain the single point servicing nozzle cannot be removed from aircraft when valve handle is in the open and locked position.

c. Extend hose and if equipped with a ball strainer, ensure valve is in the correct refuel/defuel position. Ensure the servicing crew member connects the SPR nozzle to the aircraft and if equipped with a strainer coupling quick disconnect, prior to pressuring the hose, servicing crew member must test the strainer coupling quick disconnect locking device for positive engagement.

d. Begin the pumping operation upon direction of the Refueling Supervisor. Increase the fuel servicing vehicle engine speed to the desired pressure level but not to exceed 55 psi at the single point nozzle.

CAUTION

Refueling Operator shall ensure nozzles equipped ball strainer valves are in the correct refuel/defuel position. The ball valve strainer must be inspected and cleaned as required every time the ball valve position is switched from the refuel to defuel or defuel to refuel position. This strainer is the last line of protection for preventing solid contaminates from entering AC or the refueling vehicle components. If the strainer is not inspected and cleaned if required, damage to AC fuel systems/refueling vehicle components and fuel spills may occur.

e. Monitor the control panel and aircraft servicing supervisor's signals; monitor the overall operation for fuel leaks or other hazards; be prepared to shutdown servicing equipment in the event of a fuel leak or other malfunction.

f. When signaled by the Refueling Supervisor that the aircraft is full, assist the crew member with the hose disconnection and obtain the single point nozzle and grounding wire and stow accordingly.

CAUTION

Be alert to jet blast as aircraft departs area.

g. Using a flash board, ensure the pilot of the departing aircraft is given the quantity of fuel received.

HOT REFUELING PROCEDURES.

a. Emergency Shutdown Procedures. During aircraft servicing, the refueling unit operator will monitor the refueler for leaks, ignition sources and other indications of a possible malfunction. In the event of an emergency, shutdown the unit as follows:

(1) Turn off emergency switch if vehicle should not be moved.

(2) Close Main Tank shut off valve.

(3) Notify aircraft servicing supervisor, operations expediter and Fuels Control Center (FCC), if possible.

(4) Evacuate area.

b. Emergency Aircraft Egress. Emergency Aircraft Egress as follows:

(1) Stop fuel flow.

(2) Aircraft servicing crew disconnects refueling hose and bond wires.

(3) Aircraft servicing crew clears aircraft for taxi.

(4) Depending upon urgency, fuel truck may/may not have time to move away from aircraft.

NOTE

In case of fuel spill do not evacuate fuel servicing vehicle until area is declared safe by fire department personnel.

c. Hand Signals. Hand Signals as follows:

(1) OK or Transfer Fuel: Hand raised thumbs up.

(2) A Negative Flow, Malfunction, or Not Clear: Hand raised thumbs down.

(3) Stop Fuel Flow/Servicing Complete: Movement of either hand across throat.

d. General Procedures. General Procedures as follows:

(1) Preposition refueler clear of the taxiway and await the arrival of the aircraft to be serviced.

(2) Position one 150-pound, Halon 1211 fire extinguisher in the immediate vicinity of the refueler, where it is visible to the deplaning aircrew member.

(3) Position servicing vehicle at rear of the aircraft, stopping 50 feet or more from the aircraft and ensure cab windows are closed; then approach only upon direction from the servicing crew member.

(4) Position vehicle for servicing. Ensure unit is not in direct path of prop blast or engine exhaust and has a clear exit.

(5) Set parking brake, transmission and PTO.

(6) Secure line badge, headgear and loose items inside pocket, don dust goggles, gloves and hearing protection prior to exiting the vehicle. Close cab door upon exiting vehicle.

(7) Deleted.

(8) When the aircrew member arrives, obtain the appropriate fuel billing card/information, verify the fuel grade to be issued with aircrew member and conduct a safety briefing.

(9) Ensure the 150-pound Halon fire extinguisher is positioned between the fuel servicing vehicle and the refueling crew members' position.

(10) Give servicing hose and bonding wire to aircrew member for deployment.

(11) Ensure the servicing crew member bonds vehicle aircraft.

(12) Prepare vehicle for refueling.

CAUTION

- At NO time will the vehicle operator (2F0X1) enter the area directly behind operating aircraft engines.
- Refueling Operator shall ensure nozzles equipped ball strainer valves are in the correct refuel/defuel position. The ball valve strainer must be inspected and cleaned as required every time the ball valve position is switched from the refuel to defuel or defuel to refuel position. This strainer is the last line of protection for preventing solid contaminates from entering AC or the refueling vehicle components. If the strainer is not inspected and cleaned if required, damage to AC fuel systems/refueling vehicle components and fuel spills may occur.

(13) Prior to pressuring the hose, servicing crew member must test the strainer coupling quick disconnect locking device for positive engagement and test nozzle to be certain the single point servicing nozzle cannot be removed from aircraft when valve handle is in the open and locked position.

(14) Upon notification and activation of the deadman control from the servicing crew member, begin pumping operation.

(15) During refueling, monitor control panel and pay close attention to the aircraft servicing crew member at all times for signals; be prepared to shut down equipment in case of leak or other malfunction.

(16) Upon completion of the operation, close all valves, stow hose and bonding cable.

(17) Complete accounting documentation as required.

(18) Perform walk-around inspection and depart the area.

CHAPTER 8

CONCURRENT SERVICING OF CARGO AND TRANSPORT AIRCRAFT (WITH OR WITHOUT PASSENGERS ON BOARD)

INTRODUCTION.

This chapter provides in abbreviated form, procedures for concurrent fuel servicing operations of commercial, contract, and military cargo and passenger aircraft. This chapter is a step-by-step guide to ensure accomplishment of selected tasks. The intent of this chapter is to eliminate the probability of a step omission in the accomplishment of an intended task. The procedures contained herein are presented in the shortest, practical form for use by qualified personnel and are not intended to provide full technical instructions. Those tasks preceded by an asterisk are additional steps to be taken when concurrent servicing aircraft with passengers on board.

NOTE

On C/KC-135 (all models), MAF and Commercial aircraft, concurrent servicing SSEA is not required unless loading/downloading munitions or explosives, OR servicing LOX while performing maintenance. If none of the above apply, simultaneous servicing of fuel while loading passengers and cargo, performing maintenance, aircrew members performing inspections, or operating aircraft systems is considered to be a normal CONCURRENT servicing operation. Restrictions listed in Paragraph 5.6 and Paragraph 5.7 still apply.

EMERGENCY PROCEDURES.

In the event of an emergency, shutdown the refueling unit as follows:

a. Release deadman control.

b. Push engine auxiliary throttle control all the way in.

c. Turn off Emergency switch.

d. Close hose reel shutoff valve.

e. Close main tank emergency shutoff valve.

f. Notify aircraft fuel servicing supervisor and Fuels Control Center.

g. Evacuate area, if instructed by fuel servicing supervisor or fire department personnel.

PREPARATION FOR CONCURRENT SERVICING.

a. Refuelers when equipped with deadman controls are authorized for use in concurrent servicing operations.

b. Perform a pressurized serviceability check of the refueling equipment when returned to service after maintenance, as required.

c. Make sure the Chief Servicing Supervisor (CSS) notifies the Fire Department at least 15 minutes prior to performing concurrent servicing operations.

d. *If personnel are remaining on board the aircraft, make sure the CSS informs the Fire Department of the number of people involved.

AIRCRAFT SERVICING.

WARNING

Simultaneous fuel and oxygen servicing on an aircraft is not authorized.

CAUTION

C-130 and C-17 aircraft troop doors and emergency hatches on the right or SPR side of the aircraft must be closed during concurrent servicing operations to isolate the cargo department from the fuel servicing safety zone.

a. Stop 25 or more feet from aircraft.

b. Approach upon direction of servicing crew member.

c. Preposition wheel chock and use a spotter when backing toward aircraft.

d. If personnel are remaining on board, make sure that the fire department is informed of the number of people involved.

e. Set parking brake, place transmission and PTO in appropriate mode.

f. Deleted.

g. Bond fuel servicing vehicle to aircraft.

h. Unlock control panel and clear meters.

i. Get verification of proper fuel grade, if applicable and receive safety briefings from concurrent servicing supervisor.

j. Extend hose and, if equipped with a ball strainer, ensure valve is in the correct refuel/defuel position. Ensure the servicing crew member connects the SPR nozzle to the aircraft and if equipped with a strainer coupling quick disconnect, prior to pressuring the hose, servicing crew member must test the strainer coupling quick disconnect locking device for positive engagement.

k. Test nozzle to be certain the single point servicing nozzle cannot be removed from aircraft when valve handle is in the open and locked position.

CAUTION

Refueling Operator shall ensure nozzles equipped ball strainer valves are in the correct refuel/defuel position. The ball valve strainer must be inspected and cleaned as required every time the ball valve position is switched from the refuel to defuel or defuel to refuel position. This strainer is the last line of protection for preventing solid contaminates from entering AC or the refueling vehicle components. If the strainer is not inspected and cleaned if required, damage to AC fuel systems/refueling vehicle components and fuel spills may occur.

l. *Establish and maintain voice intercom contact if passengers are on board the aircraft.

m. (When applicable) The Concurrent Servicing Supervisor (CSS) will wear a reflective vest with the letters CSS on the front and back. The CSS is responsible for controlling and monitoring all concurrent servicing operations.

n. During refueling, monitor fuel control panel, aircraft fuel vent outlets, and CSS signals; be prepared to shut down in case of fuel leak or other malfunction.

o. After fuel servicing, complete paperwork, stow hoses and bonding cable.

p. Perform walk-around inspection of refueling vehicle and depart area.

CHAPTER 9

REFUELING IN HARDENED AIRCRAFT SHELTERS (HAS), PROTECTIVE AIRCRAFT SHELTERS (PAS), ALERT SHELTERS AND FLOW-THROUGH REVETMENTS

INTRODUCTION.

This chapter provides precautions and restrictions when refueling aircraft inside a shelter or FTR using an R-9 or R-11 fuel truck. Positioning a truck near or inside a shelter can create significant space and clearance limitations. In most cases, the truck is outside the shelter or FTR, but in some critical wartime or training scenarios, it is necessary to place the truck inside the shelter or FTR, and, in the case of a HAS/PAS, with the shelter doors closed. The general and emergency aircraft refueling procedures in Chapters 1 and 2 will apply to shelter/FTR operations. However, some clearance requirements will be changed as described below.

EMERGENCY PROCEDURES.

In addition to those procedures in Chapters 1 and 2, if a fuel spill or fire occurs in a HAS/PAS, open the shelter doors.

TRUCK/SHELTER CLEARANCES.

Trucks will always be parked outside FTRs with the hose extended its full length. Fuel servicing vehicles can be positioned inside or outside of shelters. When positioned inside the shelters, trucks will be backed into the shelter on the right or left side of the aircraft. Except during nose-in or double-stuff conditions, the nearest part of the fuel-servicing vehicle must not be closer then three feet from the shelter wall or door. (R-11 fuel servicing vehicles are exempt from the minimum three feet clearance requirements for nose-in, nose-out, and double-stuff conditions.) Whether one or more aircraft are parked within a HAS/PAS, the FSSZ must be strictly enforced during servicing operations.

RESTRICTIONS.

When servicing inside a HAS/PAS/FTR, the following applies:

a. Aircraft may utilize CSO procedures for simultaneous operations. MDS specific technical order procedures for aircraft reconfiguration, servicing, inspections, and munitions loading/unloading will be followed. Only those activities specifically authorized in aircraft technical orders will be performed in conjunction with aircraft servicing. Servicing operations inside shelters/FTR present a greater degree of risk than the same operations conducted outside on open ramp.

NOTE

The adjacent aircraft parking criteria does not apply to FTR since the revetment wall minimizes the probability of spreading fire or explosion.

b. The fuel servicing safety zone criteria shall be complied with. Refueling will not start until all nonessential personnel and equipment have been removed from the area. During servicing operations, restrictions will be placed on the entry of nonessential personnel or equipment into the servicing area. During CSOs powered support equipment, i.e., munitions loaders/jammers, may pass underneath aircraft fuel vent outlets but must not stop or be parked under fuel vent outlets during fuel servicing portions of CSOs.

c. A communications system or portable radio must be available and operational.

d. Fire protection equipment requirements shall be available as specified in TO 00-25-172. Operations will cease during any fuel spill and will not resume until the spill has been removed or neutralized and the area has been deteremined safe.

e. All powered vehicles or equipment not involved in the servicing operation shall be shut down and parked in an area that will not obstruct the operation. When powered support equipment is required for the fuel servicing operations, the equipment shall be positioned outside the shelter when possible. If the equipment cannot be positioned outside, it may be positioned inside; however, all aircraft entry doors must remain open.

f. The fueling supervisor shall be prepared for immediate removal of the refueling equipment where rapid evacuation and/or alert reaction may be required.

CAUTION

Refueler vehicle engine should not be operated more than 20 minutes when aircraft entry doors are closed. When aircraft entry doors are closed, the shelter aircraft can be refueled inside a completely closed shelter. Crew members conducting in-shelter refueling with shelter doors completely closed should be limited to four refuelings per duty day and should have at least a sixty-minute period of low or no fuel vapor exposure between refueling aircraft in a closed shelter.

g. Shelter doors will remain open during fuel servicing. However, HAS/PAS doors can be closed only when all of the following apply:

(1) Exercise/contingency/wartime situation

(2) Aircraft engines not running (cold fuel operation)

(3) Fuel servicing equipment is inside the shelter

h. Fuel servicing vehicles will not be backed into shelters until a chock is placed to stop the vehicle in case of brake failure and a spotter is in position to direct movement.

CHAPTER 10

HOT REFUELING PROCEDURES UTILIZING FUELS OPERATIONAL READINESS CAPABILITY EQUIPMENT (FORCE)

INTRODUCTION.

This checklist is a step by step guide for use as a reference by 2F0X1 fuels specialist who is certified to hot refuel aircraft in accordance with TO 00-25-172 and MAJCOM directives. This checklist is intended to prevent the omission of a sequential task in the accomplishment of authorized hot refueling but does not provide detailed technical instructions.

a. The R-20 servicing platform issue hoses must be equipped with API/EI 1529, Grade 2, Type C aviation fueling hose and tested IAW 37A-1-101, Table 4-1.

b. Couplings shall be permanent non-reusable type. They shall be made of materials of sufficiently high strength corrosion-resistant material free from porosity and other defects, meeting the design and performance specification of API/EI 1529.

c. A single point refueling nozzle listed under the hot refueling column of TO 00-25-172 shall be used.

EMERGENCY SHUTDOWN PROCEDURES.

During aircraft servicing, the R-18 Pumping Unit operator and R-20 Servicing Platform operator will monitor the pumping unit and system area for fuel leaks, ignition sources and other indications of possible malfunction. In the event of an emergency, shutdown the unit as follows:

a. Release deadman and activate emergency shutdown switch on hand-held remote, R-18 pumping unit, or R-20 servicing platform.

b. Close R-18 inlet valve and the R-20 inlet valve (NOT the diverter valve (V27)).

c. Notify aircraft servicing supervisor, operations expediter, and Fuels Service Center (FSC), if possible.

d. Evacuate area if instructed by servicing supervisor or fire department personnel.

EMERGENCY AIRCRAFT EGRESS.

a. Stop fuel flow.

b. Crew Chief will disconnect refueling hose and bond wire.

c. Crew Chief will clear aircraft for taxi.

REFUELING SITE SET UP.

a. Position a 150-pound wheeled fire extinguisher between fuel servicing vehicle and the refueling supervisor's position. Ensure an ARFF vehicle is on standby posture before starting hot refueling operations, if an operational fixed or skid-mounted AFFF fire suppression system is not available.

b. Secure line badges and other loose items inside pockets.

c. Complete preparation of FORCE for hot refueling.

(1) R-18 Pumping Unit Set-up:

(a) Establish two-way communication with R-20 servicing platform operator.

(b) Ensure all system valves are properly positioned per local requirements. Refer to local checklist for proper valve configuration.

(c) Ensure pumping unit controls are properly set on all R-18's and R-20's in the system.

(d) Ensure all R-18's are grounded.

(e) Set throttling control, if applicable:

1 Set MANUAL/REMOTE CONTROL switch to MANUAL POSITION.

2 Set RUN/IDLE switch to IDLE position.

3 Turn ignition switch to ON and observe indicator light. When light goes out, turn ignition switch to START. Release switch when engine starts.

4 Set RUN/IDLE switch to RUN position.

5 Rotate THROTTLE CONTROL to an RPM that provides 150 PSI fuel discharge pressure.

6 Set RUN/IDLE switch to IDLE position.

7 The R-18 can now be shut down if the hot refueling operations are not immediate.

8 Set MANUAL/REMOTE CONTROL switch to REMOTE position.

9 Set OFFLOAD/SERVICING switch to SERVICING position.

(2) R-20 Servicing Platform Set-up:

(a) Establish two-way communication with R-18 pumping unit operator, if applicable.

(b) Ensure all system valves are properly positioned per local requirements. Refer to local checklist for proper valve configuration.

(c) Ensure the R-20 is grounded/bonded.

(d) Clear meters, if applicable.

(e) Get verification of proper fuel grade, if applicable.

(f) Verify the R-20 sump tank is not over 75% full (manually drain tank below 75% prior to starting operation).

(g) Prepare R-20 for appropriate servicing operation (low flow or high flow).

(h) Place applicable control valve selector switches to REMOTE.

AIRCRAFT SERVICING.

a. If applicable, start R-18 manually or using the R-18 hand-held remote.

b. Starting engine using the hand-held remote:

(1) Turn ignition switch to ON position, if applicable.

(2) On the hand-held, set the PUMP switch to START.

(3) Press and release the action/deadman switch.

(4) Repeat for each pumping unit required.

(5) Throttling of the engine from idle to run and back to idle will be done automatically based on fuel demand providing communication systems and PLC's are operational.

CAUTION

Ensure the bonding wire is connected prior to single point nozzle hook-up.

NOTE

- Refueling Supervisor (2A3X3) will provide a safety briefing, including emergency procedures, prior to arrival of first aircraft.
- Aircraft Refueling Supervisor will operate the deadman switch during fuel transfer.
- Deadman switch must be cycled every two minutes with a quick release of the switch. The release cannot exceed one second, as Control Valve(s) will close.

c. Upon direction of Refueling Supervisor, first provide the bonding wire and then the servicing hose to the appropriate crew member and assist in hook-up.

d. Extend hose, and if equipped with ball strainer, ensure valve is in the correct refuel/defuel position. Ensure that the strainer is cleaned after every time the ball valve is switched from the refuel to defuel or from the defuel to refuel position. Ensure the servicing crew member connects the SPR nozzle aircraft, and, if equipped with a strainer coupling disconnect, prior to pressurizing the hose, service crew member must test the strainer coupling disconnect locking device for positive engagement.

e. Prior to pressurizing the hose, be sure the nozzle is securely locked to the aircraft by attempting to remove the nozzle with the nozzle crank handle in the open position.

f. On R-20 hand-held remote, set appropriate toggle switches (left and/or right) to the OPEN position and provide the remote to the Aircraft Refueling Supervisor.

g. Begin the pumping operation upon direction of the Refueling Supervisor ensuring the nozzle pressure does not exceed 55 PSI.

h. Monitor the control panel and aircraft servicing supervisor's signals; monitor the overall operation for fuel leaks and other hazards; be prepared to shutdown servicing equipment in the event of a fuel leak or other malfunction.

i. Monitor/Record R-20 Micronic Filter differential pressure as required.

j. Upon completion of fuel servicing operation, the pumping units will automatically return to idle speed.

CAUTION

Be alert of jet blast as aircraft departs area.

k. Complete accounting forms or APOSD transaction, ensure identaplate is returned to servicing crew member, and obtain signature.

NOTE

Allow R-18 engine to idle minimum of 3-5 minutes before shutting it down.

l. On the R-18 hand-held, set the PUMP switch to STOP.

m. Press and release the action/deadman switch.

n. Repeat for each pumping unit required.

o. Turn ignition switch to OFF position, if applicable.

p. Relieve pressure from the pressure relief skid upon completion of aircraft servicing.

CHAPTER 11

AIRCRAFT SERVICING WITH FUELS OPERATIONAL READINESS CAPABILITY EQUIPMENT (FORCE)

INTRODUCTION.

This checklist is a step by step guide in abbreviated form for use as a reference to ensure accomplishment of selected tasks by a predetermined sequence procedure. The intent of this checklist is to eliminate the probability of omission of a step in accomplishment of the intended task. The procedures contained herein are presented for use by qualified personnel and are not intended to provide full technical instructions. This checklist provides sequenced procedures for servicing aircraft using USAF Fuels Operational Readiness Capability Equipment (FORCE). It includes steps for both normal refueling operations and concurrent servicing operations. Those steps specific to concurrent servicing operations are in **bold text** for emphasis. These instructions will be used by FORCE operators as an aid to safe and efficient aircraft refueling. Two refueling operators (2F0X1) shall be used for this operation. One to man the R-18 Pumping Unit and one to operate the R-20 Servicing Platform. However, FORCE was designed to allow full operation with just one operator when mission requirements limit resources. If one operator is used to operate the R-18 and R-20, the operator shall follow this checklist completely. If two operators are used, the R-18 operator shall follow the INTRODUCTION, EMERGENCY SHUTDOWN PROCEDURES AND R-18 PUMPING UNIT OPERATOR PROCEDURES sections in this chapter; the R-20 operator shall follow the INTRODUCTION, EMERGENCY SHUTDOWN PROCEDURES AND R-20 SERVICING PLATFORM OPERATOR PROCEDURES sections in this chapter.

EMERGENCY SHUTDOWN PROCEDURES.

During aircraft servicing, the R-18 Pumping Unit operator and R-20 Servicing Platform operator will monitor the pumping unit and system area for fuel leaks, ignition sources and other indications of possible malfunction. In the event of an emergency, shutdown the unit as follows:

a. Release deadman switch and activate emergency shutdown switch on the hand-held remote, R-18 pumping unit, or R-20 servicing platform.

b. Close R-18 inlet valve and the R-20 inlet valve (NOT the diverter valve (V27)).

c. Notify aircraft servicing supervisor, operations expediter, and Fuels Service Center (FSC), if possible.

d. Evacuate area if instructed by servicing supervisor or fire department personnel.

R-18 PUMPING UNIT OPERATOR PROCEDURES.

a. Establish two-way communication with R-20 servicing platform operator.

b. Ensure all system valves are properly positioned per local CL requirements per TO guidance. Refer to local checklist for proper valve configuration.

c. Ensure pumping unit controls are properly set on all R-18's and R-20's in the system.

d. Ensure all R-18s are grounded.

e. Set throttling control, if applicable.

(1) Set MANUAL/REMOTE CONTROL switch to MANUAL position.

(2) Set RUN/IDLE switch to IDLE position.

(3) Turn ignition switch to ON and observe indicator light. When light goes out, turn ignition switch to START. Release switch when engine starts.

(4) Set RUN/IDLE switch to RUN position.

(5) Rotate THROTTLE CONTROL to a desired RPM that provides 150 PSI discharge pressure.

NOTE

Ensure net positive suction head required is sufficient to not cause pump cavitation. See TO 37A9-3-5-61 SWP 004 02 Paragraph 2.2.

(6) Set RUN/IDLE switch to IDLE position, then shut down by turning ignition switch to OFF.

(7) Set MANUAL/REMOTE CONTROL switch to REMOTE position (if hand-held is to be used).

(8) Set OFFLOAD/SERVICING switch to SERVICING position.

NOTE

The R-18 pumping unit may be started manually with the ignition switch.

f. Start engine using the hand-held.

(1) Turn ignition switch to ON position, if applicable.

(2) On the hand-held, set the PUMP switch to START.

(3) Press and release the action/deadman switch.

(4) Repeat for each pumping unit required.

(5) Throttling of the R-18 engine (run or idle) will be done automatically based on fuel demand.

g. Throughout operation, closely monitor all pumping unit control panels and the system area.

h. Observe and record R-19 Filter Separator differential pressure if required.

i. Upon completion of fuel servicing operation, the pumping units will automatically return to idle speed.

NOTE

- Allow R-18 engine to idle a minimum of 3-5 minutes before shutting it down.
- The R-18 pumping unit may be shut down manually with the ignition switch or via the handheld.

(1) On the hand-held, set the PUMP switch to STOP.

(2) Press and release the action/deadman switch.

(3) Repeat for each pumping unit required.

(4) Turn ignition switch to OFF position, if applicable.

(5) Relieve pressure from the pressure relief skid, upon completion of aircraft servicing.

R-20 SERVICING PLATFORM OPERATOR PROCEDURES.

a. Establish two-way communication with R-18 pumping unit operator.

b. Ensure all system valves are properly positioned per local requirements. Refer to local checklist for proper valve configuration.

c. **Make sure the Chief Servicing Supervisor (CSS) notifies the Fire Department at least 15 minutes prior to performing concurrent servicing operations.**

d. **If personnel are remaining on board the aircraft, make sure the CSS informs the Fire Department of the number of people involved.**

WARNING

Simultaneous fuel and oxygen servicing on an aircraft is not authorized.

CAUTION

C-130 and C-17 aircraft troop doors and emergency hatches on the rights side or SPR side of the aircraft must be closed during concurrent servicing operations to isolate the cargo department from the fuel servicing safety zone.

e. Ensure the R-20 is grounded and bonded to the aircraft.

f. Clear meters, if applicable.

g. Get verification of proper fuel grade, if applicable.

h. Verify the R-20 sump tank is not over 75% full (manually drain tank below 75% prior to starting operation).

i. Prepare R-20 for appropriate servicing operation (low flow or high flow).

j. Place applicable control valve selector switches to REMOTE if using the hand-held control or MANUAL if using the control valve switch(es).

NOTE

Perform a pressurized serviceability check of the R-20 when returned to service after maintenance, as required.

k. Extend hose, and if equipped with a ball strainer, ensure valve is in the correct refuel/defuel position. Ensure that the strainer is cleaned after every time the ball valve is switched from the refuel to defuel or from the defuel to refuel position. Ensure the servicing crew member connects the SPR nozzle aircraft, and if equipped with a strainer coupling disconnect, prior to pressurizing the hose, servicing crew member must test the strainer coupling disconnect locking device for positive engagement.

l. Prior to pressurizing the hose, be sure the nozzle is securely locked to the aircraft by attempting to remove the nozzle with the nozzle crank handle in the open position.

m. **Establish and maintain voice intercom contact if passengers are on board.**

n. **The CSS will wear a reflective vest with the letters CSS on the front and back. The CSS is responsible for controlling and monitoring all concurrent servicing operations.**

o. On hand-held remote, set appropriate toggle switches (left and/or right) to the OPEN position.

NOTE

- If pumping in MANUAL mode, the applicable CONTROL VALVE switch on the control panel will have to be depressed throughout the entire operation.
- Deadman switch must be cycled every two minutes with a quick release of the switch. The release cannot exceed one second, as Control Valve(s) will close.

p. Begin pumping operation upon direction of the servicing crew member by activating the deadman control switch.

CAUTION

Sump tank evacuation during aircraft servicing operations shall be completed after the aircraft has performed all internal valve checks.

q. If required (fuel level more than 1/8 full), begin sump tank evacuation.

(1) Stop fuel flow.

(2) Close evacuation diverter valve (V27).

(3) Open sump tank isolation valve (V29).

(4) Restart fuel flow.

(5) Observe sump tank sight gauge and operate until tank is empty.

(6) Stop fuel flow.

(7) Close sump tank isolation valve (V29).

(8) Open evacuation diverter valve (V27).

(9) Restart fuel flow.

r. Closely monitor control panel, system area, and sump tank level during operation.

s. Record differential pressure if required.

t. Upon completion of fuel servicing operation, set the remote toggle switch(es) to the CLOSED position and release the deadman switch.

u. If the 3" x 120' servicing hose(s) were used, partially evacuate the hose(s) enough to ensure space for thermal expansion.

(1) Verify sump tank ullage.

(2) Ensure hose reel isolation valve(s) (V16) are closed.

(3) Ensure hose stub isolation valve(s) (V23) are open.

(4) Open hose evacuation valve(s) (V20).

(5) Open and hold spring loaded hose evacuation valve (V32).

(6) Raise lever on evacuation pump and hold until hose pressure is relieved.

(7) Lower lever to turn off pump.

(8) Release hose evacuation valve (V32), and close hose evacuation valve(s) (V20).

v. Stow fuel servicing hose(s) and bonding wires.

w. Complete accounting forms or APOSD transaction, ensure identaplate is returned to servicing crew member, and obtain signature.

CHAPTER 12

HOT INTEGRATED COMBAT TURNAROUNDS (ICT)

12.1 INTRODUCTION.

This chapter is a step-by-step guide for use as a reference by a 2F0X1 fuels specialist who is certified to perform hot Integrated Combat Turnarounds (ICT) in accordance with TO 00-25-172 and MAJCOM directives. This checklist is intended to prevent the omission of a sequential task in the accomplishment of authorized operation but does not provide detailed technical instructions. These procedures are to be used in conjunction with the general and emergency aircraft refueling procedures outlined in Chapters 1 and 2 of this checklist.

a. Fuel servicing equipment must be equipped with American Petroleum Institute (API) Bulletin 1529, Type C, Grade 2, hardwall aviation servicing hose with the annual hydrostatic test date stenciled on the hose. Additionally, include internally expanded forged brass or bar stock body couplings, brass or 300 Series stainless steel serrated ferrules, and single point refueling nozzles listed under the hot refueling column of TO 00-25-172.

b. Perform a pressurized serviceability inspection of the refueling equipment once every 24 hours or when returned to service after maintenance.

12.2 REFUELING SITE SET UP.

a. Thirty (30) minutes prior to first operation preposition servicing equipment for fuel servicing operation at designated hot refueling pad allowing for maximum separation between equipment and aircraft. Wind direction should be a consideration for this portion. Setup downwind of the aircraft parking location, if possible.

b. Extend servicing hose and bonding wire and position alongside of the fuel servicing equipment.

c. Fire protection will be in accordance with TO 00-25-172.

d. Secure line badges and other loose items inside pockets.

e. Complete preparation of vehicle for refueling. The pre-operation inspection will be done at the hot refueling site prior to arrival of the receiver aircraft.

f. Fuel servicing equipment operator will operate the deadman control valve during fuel transfer.

g. Aircraft Turnaround Supervisor (2AXXX) will provide a safety briefing, including emergency procedures, prior to arrival of first aircraft.

h. Get verification of proper fuel grade, if applicable.

NOTE

Deadman controls will be installed on all approved refueling equipment used in conjunction with ICTs. Ensure the fuel servicing equipment operator operates the deadman control in all ICT concurrent servicing operations.

12.3 INTEGRATED COMBAT TURNAROUNDS (ICTS) FOR A-10, F-15, F-16, F-22, AND F-35 AIRCRAFT.

WARNING

- Simultaneous fuel and oxygen servicing on an aircraft is NOT authorized. Failure to comply could result in injury to, or death of, personnel or long-term health hazards.
- Electrical “power-on” portions of -6 or Joint technical Data (JTD) inspections are NOT authorized during concurrent munitions loading/unloading, aircraft reconfiguration, and fuel servicing operations.

a. Upon direction of ATS, first provide the bonding wire and then the servicing hose to the appropriate crewmember and assist in hook-up.

CAUTION

If equipped with a ball strainer, ensure valve is in the correct refuel/defuel position. Ensure the servicing crew member connects the SPR nozzle to the aircraft and if equipped with a strainer coupling quick disconnect, prior to pressuring the hose, servicing crew member must test the strainer coupling quick disconnect locking device for positive engagement.

NOTE

A CSS is not used during ICTs, only an Aircraft Turnaround Supervisor (ATS). The ATS must be present during the entire ICT until complete.

b. Begin the pumping operation upon direction of the ATS. Increase the fuel servicing engine speed to the desired pressure level but not to exceed 55 psi at the single point nozzle.

c. Monitor the control panel and ATS's signals; monitor the overall operation for fuel leaks or other hazards; be prepared to shutdown servicing equipment in the event of a fuel leak or other malfunction. Hand Signals as follows:

(1) OK or Transfer Fuel: Hand raised thumbs up.

(2) A Negative Flow, Malfunction, or Not Clear: Hand raised thumbs down.

(3) Stop Fuel Flow/Servicing Complete: Movement of either hand across throat.

d. When signaled by the ATS that the aircraft is full, assist the crewmember with the hose disconnection and obtain the single point nozzle and grounding wire and stow accordingly.

CAUTION

Be alert to jet blast as aircraft departs area. Failure to comply could result in injury, damage to or destruction of equipment, or loss of mission effectiveness.

e. Emergency Aircraft Egress as follows:

(1) Stop fuel flow.

(2) Aircraft servicing crew disconnects refueling hose and bond wires.

(3) Aircraft servicing crew clears aircraft for taxi.

(4) Depending upon urgency, fuel truck may/may not have time to move away from aircraft.

NOTE

In case of fuel spill, do not evacuate fuel servicing vehicle until area is declared safe by fire department personnel.

CHAPTER 13
WET WING DEFUEL OPERATIONS (WWD)

13.1 INTRODUCTION.

This chapter is a step-by-step guide for use as a reference by a 2F0X1 fuels specialist who is certified to perform Wet Wing Defuel Operations in accordance with TO 00-25-172 and MAJCOM directives. As defined in AFI 11-235, wet wing defueling moves fuel from a tanker aircraft with engine(s) running into approved fuel support equipment, not an aircraft. Wet wing defueling may also be known as rapid defueling since the provider/source/tanker aircraft has at least one engine running. Wet wing defueling can be done with all support equipment that has been approved for hot refueling. Any aircraft that is approved as a Forward Area Refueling Point (FARP) tanker aircraft is also approved for hot defueling operations.

13.1.1 WWD Activity. This checklist is intended to prevent the omission of a sequential task in the accomplishment of authorized operation but does not provide detailed technical instructions. These procedures are to be used in conjunction with the general and emergency aircraft refueling procedures outlined in Chapter 1 and Chapter 2 of this checklist.

NOTE

Prior to Operation, recirculate fuel through the bottom loader to perform high-level shutoff valve within the first minute of fuel flow to assure that it is operating properly.

WARNING

- Double hearing protection and eye protection required. Failure to comply could result in severe injury or long term health hazards to personnel.

- Do not stop fuel flow for any reason using poppet valve on fuel nozzle at SPR receptacle. Pressure surges could unseat fuel nozzle causing injury to personnel and damage equipment. Ensure transfer/boost pump(s) or 2 ½" Hose Valve switch are used to stop fuel flow. Failure to comply could result in injury to or death of personnel, or damage to equipment.

a. Once the aircraft arrives, it should stop outside of defuel area to let the loadmaster deplane. The loadmaster will marshal the aircraft into the fueling area.

CAUTION

Aircraft engines on the R-11 side should have FLAPS UP (C-130 aircraft) or OFF (non-prop). Ensure the R-11 is not in the direct path of engine exhaust and has a clear emergency exit.

b. Approach the aircraft and position the R-11 upon direction of the servicing crewmember. (The servicing crew WILL NOT spot the R-11 backward at any point in the operation.)

c. Set parking brake, transmission and engage PTO as required.

WARNING

Only intrinsically safe radios will remain on for duration of operation. Failure to comply could result in injury to, or death of, personnel.

d. Place fire bottle near aircraft SPR.

e. Prior to starting operations, receive a safety briefing and discuss offload amounts.

NOTE

Visually check AFTO Form 781-H to determine previous product grade of aircraft refuels (if not JP-8 or F-24 ensure FSC or receiver crew chief is notified).

f. Bond fuel-servicing vehicle to aircraft.

g. Unlock control panel and clear meters, if applicable.

h. Prepare vehicle for appropriate servicing operation.

CAUTION

Ensure the ball valve strainer is in the defuel position.

i. Connect hose to aircraft SPR and perform poppet valve check (loadmaster) observed by fuels personnel.

j. R-11 operator will notify loadmaster at aircraft SPR they are ready for positive pressure over intercom or with hand signals if intercoms are not available.

k. Closely monitor control panel during operation.

NOTE

Monitor for leaks and notify servicing crew member of condition.

l. When the operation is complete, notify loadmaster with hand signals or intercom when R-11 is full and to stop pumping.

WARNING

Do not fill R-11 over 5,000 gallons. Failure to comply could result in injury to, or death of, personnel or long term health hazards.

m. Close SPR on aircraft, then disconnect and stow servicing hose.

n. Disconnect and stow bonding cables.

o. Remove fire bottle from area.

p. Perform walk around inspection and depart area at the direction of a servicing crew member.

q. Prior to a refueling operation, visually inspect the ball valve strainer for any debris (clean if necessary) and ensure the strainer direction is configured for the next fueling operation.

r. Draw a visual sample from the truck sump and ensure fuel is clear, bright, and free of particulate matter and water.