USAFE

TACTICAL AIR CONTROL SYSTEM

RADAR OPERATIONS HANDBOOK

~~3/80~~
Revised NOV 91.

TABLE OF CONTENTS

1. Introduction

Welcome to the _____ and the 601st Tactical Control Group (TCG). You are now a member of the USAFE Tactical Air Control System (TACS), providing command and control support to the U.S. Forces in Europe and to NATO. This handbook contains basic operations information which should be helpful to you while you are learning about your operational responsibilities and as a quick reference when you have upgraded. The information given is a capsule extraction from numerous directives, published by a wide variety of higher headquarters. It is unclassified, so you may take it home. Remember, only the most basic facts and concepts needed to understand our purpose and system are included here. This handbook is not intended to replace any directives; it is intended only as an aid to you in organizing and orienting your studies. References to the basic publications used are listed for each section.

The training program which you are entering is divided into three Phases:

Phase I - Transition

Phase II - Upgrade

Phase III - Proficiency

You will have 30 days to complete Phase I, and 90 days (120 for 3-level airmen) to complete Phase II. Your upgrade to operational ready (OR) status will complete your initial Phase II training. Phase III consists of annual academic and positional training required to maintain proficiency. Your operations training officer/NCOIC will provide you a positional training guide for Phase II, issue handouts and quizzes, show you where references are kept, and otherwise assist you as required. Don't hesitate to ask for help if you need it.

2. Basic Tactical Doctrine

The fundamental objectives of U.S. military forces are to sustain deterrance, assure territorial integrity, conduct warfare and resolve conflicts in a manner favorable to the United States.

Aerospace power offers unique capabilities that commanders use to make efficient and effective use of our forces. It offers flexibility, readiness and responsiveness. It also offers presence, destructiveness, survivability and mobility.

Control of an air force is exercised through the elements of a tactical air control system. This system must provide an interface between air and surface forces to enable air space control in the theater of operations. For U.S. air forces in NATO, control is exercised through the USAFE Tactical Air Control System (TACS). The TACS assesses and assigns mission priorities and requirements, and then allocates resources. The TACS allows centralized control and decentralized execution of tactical air operations to insure unity of effort.

Reference: AFM 1-1

3. Command Structure

a. U.S. Forces

The Joint Chiefs of Staff (JCS) consists of the head of each branch of the U.S. Military Forces (Army, Navy, Air Force, Marine Corps) plus a chairman, (appointed by the President) who can be from any branch of the service. The functions of the JCS are to maintain worldwide control of all U.S. military forces, to advise the President on military matters, and to implement the use of those forces to meet any contingency.

The United States Commander-in-Chief Europe (USCINCEUR) is the highest U.S. Military Commander stationed in Europe. USCINCEUR is appointed by the President, and can be from any branch of the U.S. Military Forces. Normally this position is held by a U.S. Army four star general. The duty of USCINCEUR is to control all U.S. Forces in Europe.

The United States European Command (USEUCOM) has been developed to assist USCINCEUR. USEUCOM is an unified U.S. command operating under the JCS and is the top U.S. military headquarters in Europe. Located at Stuttgart, Germany, USEUCOM is composed of Army, Navy, Marines and Air Force elements.

The primary mission of USEUCOM is to support the U.S. commitment to NATO. In addition, USEUCOM is responsible for maintaining its own security and for protecting the United States, its possessions and bases against attack or hostile invasion.

The Commander, U.S. Navy, Europe (USNAVEUR) ; Commander, U.S. Air Forces, Europe (USAFE); and Commander, U.S. Army, Europe (USAREUR) are responsible to USCINCEUR for the control of their respective military forces assigned to Europe.

USANAVEUR, headquartered in London, England, has the responsibility for maintaining superority over the seas adjoining the European continent. The largest element of this command is the U.S. Sixth Fleet stationed in the Mediterranean Sea. In addition, it maintains a fleet of Polaris submarines at Rota, Spain and Holy Lock, Scotland.

USAREUR, headquartered in Heidelberg, Germany, is responsible for maintaining superority on the ground in Europe. The major component of USAREUR is the U.S. Seventh Army, the largest U.S. Army in the world.

USAFE, headquartered at Ramstein, Germany is responsible for the air superiority over the European continent, and for providing air support to ground forces. To accomplish this mission, USAFE has three numbered air forces under its control:

The 16th Air Force, smallest of USAFE's major sub-commands, has its headquarters at Torrejon, Spain. Its primary NATO mission is air refueling. It also provides support to the Tactical Fighter Training Wing at Zaragoza.

The 3rd Air Force, located at Mildenhall, England, is committed to provide both Air Defense and Offensive mission support over the European continent. The first F-111s in USAFE were assigned to this Air Force.

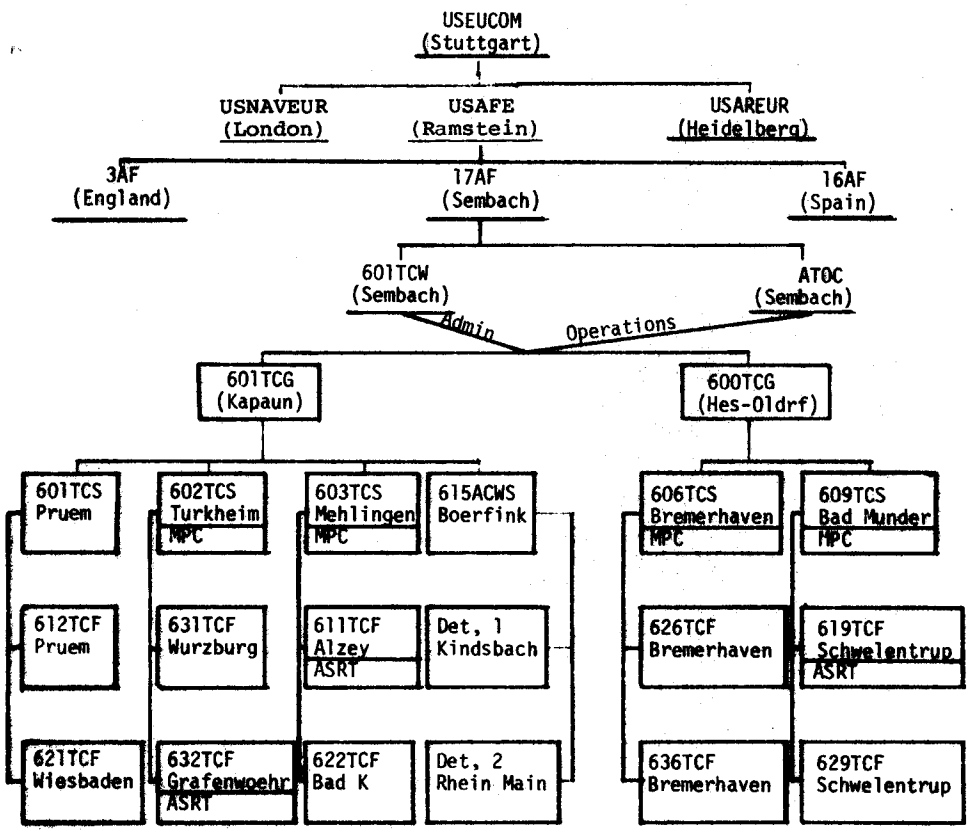
The 17th Air Force is located at Sembach Air Base, Germany. The 17th Air Force is responsible for air defense over the FRG and for offensive mission support for U.S. Army, Europe. In addition, USAFE has delegated to the 17th Air Force the responsibility for maintaining a Tactical Air Control System in Europe.

The 601st Tactical Control Wing, headquartered at Sembach AB, Germany, is responsible to the 17th Air Force for providing the control agencies and communications-electronics facilities of the Tactical Air Control System (TACS). This system provides the means for centralized control of the air effort, yet permits the decentralized execution of specific tasks and operations.

The 600th and 601st Tactical Control Groups provide administrative control for the five Tactical Control Squadrons, ten Tactical Control Flights and three ASRTs of the mobile radar system. The 601st TCG is also responsible for the U.S. fixed radar site at Boerfink, Germany.

Reference: AFR 23-20
USAFER 23 series regulations.

U.S. FORCES CHAIN OF COMMAND



ABBREVIATIONS:

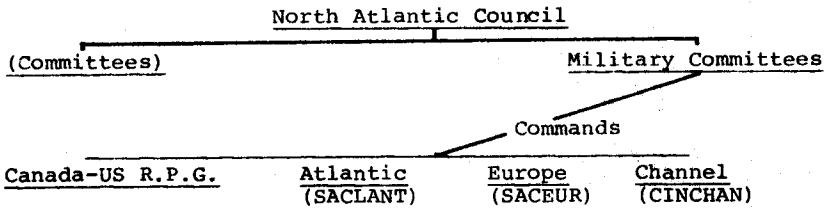
USEUCOM	-	United States European Command
USAFE	-	United States Air Forces Europe
USAREUR	-	United States Army Europe
ATOC	-	Allied Tactical Operations Center
TCS	-	Tactical Control Squadron
TCF	-	Tactical Control Flight
ASRT	-	Air Support Radar Team
MPC	-	Message Processing Center

Figure 1

b. NATO Forces.

The North Atlantic Treaty Organization (NATO) is composed of 15 sovereign nations. Twelve signed the Treaty of Washington on 4 April 1949 - Belgium, Canada, Denmark, France*, Iceland, Italy, Luxemburg, Netherlands, Norway, Portugal, United Kingdom, and the United States. In 1952 these members were joined by Greece and Turkey and in 1955 by the Federal Republic of Germany. NATO was organized to preserve peace and international security, and promote stability and well being in the North Atlantic Council, which is NATO's highest authority. Under the Council are numerous committees, including the Military Committee, which works with the major NATO Commanders to coordinate military plans. Each nation provides military personnel and equipment assigned to NATO. In peace these forces remain under national command, but plans to ensure their maximum effectiveness in the event of war are constantly developed by the major NATO Commanders.

The NATO forces are divided into three commands: Atlantic, Europe and Channel, with a Canada-U.S. Regional Planning Group.



The Supreme Allied Commander, Europe, (SACEUR), located at the Supreme Headquarters Allied Powers, Europe (SHAPE), is Commander-in-Chief of all forces allocated to NATO in Europe. This position is held by a four star general.

Allied Forces Northern Europe (AFNORTH) consists of allied Army, Navy and Air Force elements responsible for defense of the Scandinavian countries. This element is the northern-most command of NATO.

Allied Forces Southern Europe (AFSOUTH) consists of allied Army, Navy and Air Force elements responsible for defense of the area from Gibralter to Turkey. The U.S. Sixth Fleet is the largest component of AFSOUTH.

Allied Forces Central Europe (AFCENT) is the strongest, combines land and air force of the three major NATO commands. AFCENT is responsible for defending the area between the Baltic Sea and the Swiss and Austrian borders. The AFCENT area of responsibility is divided into two zones, each occupied by an Army Group.

Northern Army Group (NORTHAG) is composed of British, Belgian, Netherlands and German troops. NORTHAG is responsible for defending the northern portion of AFCENT's area of responsibility.

Central Army Group (CENTAG) is composed of American, German and Canadian troops. CENTAG is responsible for the southern portion of AFCENT's areas of responsibility. The Commander of USAREUR is also the Commander of CENTAG.

AFCENT's air elements consists of two Allied Tactical Air Forces (ATAFs) under the operational control of the Allied Air Force Central Europe (AAFCE). AAFCE is responsible for coordinating and controlling actions between the 2ATAF in north Germany, and the 4ATAF, in south Germany. The Commander, USAFE, is Commander, AAFCE.

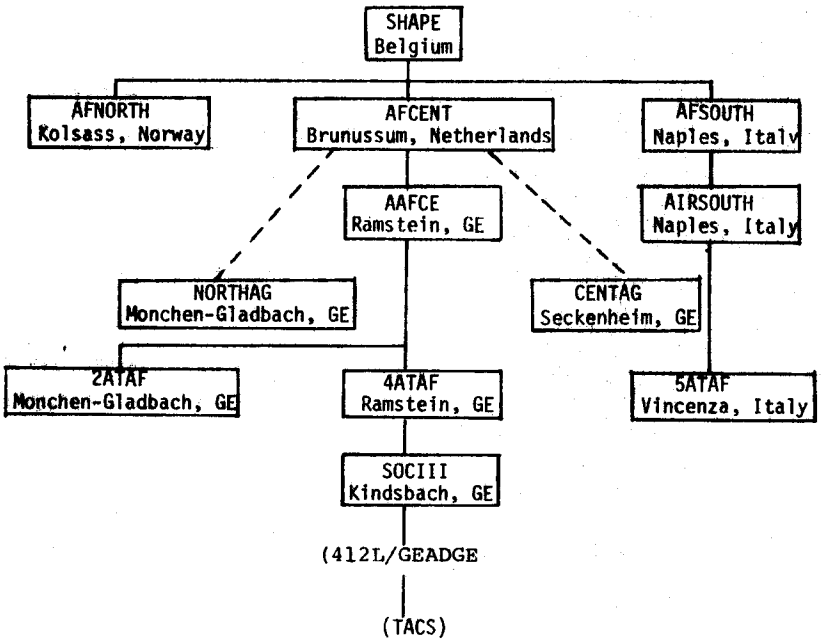
The Second Allied Tactical Air Force (2ATAF) is responsible for providing tactical air support to NORTHAG and for all air operations in the northern portion of AFCENT's area of responsibility.

The Fourth Allied Tactical Air Force (4ATAF) is located at Ramstein Air Base, and consists of American, German and Canadian Air Force elements. It is responsible for providing tactical air support to CENTAG and for all air operations in the southern portion of AFCENT's area of responsibility.

* - Political participation only; except for major exercises.

The Allied Sector Operations Center (SOC) is responsible to the appropriate ATAF Commander, and provides air defense command and control for its assigned area. SOCIII, located at Kindsbach, Germany, controls the 4ATAF area.

NATO CHAIN OF COMMAND



Key:

SHAPE - Supreme Headquarters Allied Powers, Europe
AFNORTH/SOUTH - Allied Forces North/South
AFCENT - Allied Forces Central Europe
NORTHAG/CENTAG - Northern/Central Army Group
AAFCE - Allied Air Forces, Central Europe
2/4/5 ATAF - Allied Tactical Air Force
SOCIII - Sector Operations Center III

References: NATO Handbook
USAFEM 55-2
4ATAF Supplan 34001D

Figure 2

4. Command and Control Systems

For our purposes, there are three command and control systems in Germany. Two fixed radar systems (NADGE and 412L/GEADGE) provide 24 hour air defense for the 2ATAF and 4ATAF areas respectively. The USAFE TACS has units throughout Germany, which work with one or both of the fixed systems. Details of each system are given below. Basically the difference between the fixed systems and the TACS is that the fixed system provides the day-to-day identification and air defense of central Europe. The TACS only becomes involved in "real world" operations during wartime, or when specifally tasked in peacetime.

a. TACS - The USAFE TACS is maintained in a constant state of readiness to cope with a large variety of possible contingencies, or hostile acts. The TACS provides the Commander, USAFE, with the organization and equipment necessary to plan, conduct and control Tactical Air Operations, and to coordinate air operations with other services and systems. The mobile TACS must be able to support the ATAF's Air Defense System with a unified system effort, while retaining the flexibility to operate as a national resource in conjunction with other USAFE Command and Control elements. The USAFE mobile TACS consists of an Allied Tactical Operations Center (ATOC) [NATO Operations Support Cell (NOSC) in 2ATAF], a direct air support subsystem, and a mobile radar subsystem. The fundamental principle of TACS operations is the concept of centralized direction of the total air effort by the ATOC, with the decentralized coordination of the air support for the Army through the direct air support subsystem and the decentralized execution of tactical air control through the mobile radars.

(1) ATOC - The ATOC is the senior air operations element of the TACS, and is responsible to the Commander, 17AF, for the centralized planning, coordination and control of those forces allocated to support the Army. As the focal element of the TACS, the ATOC is connected by communications to operations, logistics, and intelligence centers and appropriate staff elements of higher and lateral headquarters, other intelligence agencies, subordinate units, and subordinate elements. The ATOC is divided into two sections: current plans and current operations. Current Plans formulate specific day-to-day plans for the employment of air resources. Current Operations monitors and supervises day-to-day operations to make sure that missions are executed as tasked and all air operations are coordinated and integrated. The ATOC Sembach is responsible for USAFE TACS units in the 4ATAF area. The ATOC is located in an underground facility on Sembach AB, GE.

(2) Direct Air Support System - The direct air support system consists of Allied Support Operations Centers (ASOC), Tactical Air Control Parties (TACP), Air Liaison Officers (ALO), and Forward Air Controllers (FAC). The ASOC provides fast reaction to immediate requests of ground forces for close air support, tactical air reconnaissance, tactical airlift, and special operations. The ASOC is colocated with the Tactical Operations Center of the associated army corps headquarters. The ASOC equipment consists of a number of highly mobile vans and necessary communications equipment. There are two ASOCs in 4ATAF. The 601 ASOC is garrisoned at Bonames, Germany, near Frankfurt, and supports the V Army Corps. The 602 ASOC is garrisoned at Stuttgart, Germany and supports the VII Army Corps.

The Tactical Air Control Party is an extension of the ASOC functioning with land forces. The mission of the TACP is to advise Army Commanders on all aspects of Tactical Air Operations, to receive immediate air requests, and to coordinate and control tactical air support furnished to the land forces. TACPs are attached to Army field units and deploy with these units. The individual officers performing the TACP function are Air Liaison Officers (ALOs). The lowest echelon of the TACP is the Forward Air Controllers (FACs). FACs are qualified tactical fighter pilots who are responsible for controlling close air strikes from air or ground observation posts.

(3) Mobile Radar System - The mobile radar system provides for surveillance and defense of an assigned area of responsibility within the TACS. The basic control elements in USAFE are the Control and Reporting Post (CRP), the Forward Air Control Post (FACP), and the Air Support Radar Team (ASRT). Augmenting the control elements is the Message Processing Center (MPC), which provides an interface between the TACS units and other control systems.

The CRP may be subordinate to either the ATOC or to a designated unit within other radar subsystems. The CRPs provide primary aircraft and airspace control, plus surveillance capability for the TACS. (The peacetime identification functions is handled by the 412L/NADGE system). The CRP is a 14 scope, computerized facility which will normally be deployed between the primary airbases and the battle area. The CRPs control air-to-air missions and offensive control missions from

launch until handoff to a FACP or FAC. There are 3 CRPs in the 4ATAF area. Each CRP supervises the activities of assigned FACPs.

The FACP is a lightweight surveillance and control radar with point-to-point and ground-to-air voice communications. It is a non-computerized 4 console facility. Due to its rapid deployment capability its primary mission is to provide a radar extension and control element of a CRP. The FACP is normally deployed into forward areas to extend the radar coverage of the CRP, provide gap filler service and early warning and to function as a controlling agency for counter air and offensive air support missions. There are 6 FACPs in the 4ATAF area.

The ASRT is the most highly mobile forward element of the TACS. It is equipped with a precision tracking radar (the TPB-1C) capable of providing all-weather guidance for tactical fighter, bomber, reconnaissance, and airlift aircraft, to position them over predetermined coordinates. The ASRT may deploy with its parent FACP, an Army element, or on its own. There are currently two ASRTs assigned to the 4ATAF area.

The MPC is the primary facility of the mobile TACS responsible for assuring the accurate and non-conflicting automatic exchange of tactical data over digital data links. The automatic data link connects the CRPs to each other, to the control and reporting centers of the Air Defense Ground Environment system, the the E-3A/ AWACS, and to other U.S. Tactical Air Defense Systems (e.g., Army, Navy, Marines, etc). The MPC is not radar equipped and only displays the track symbology of all the crosstold tracks within the systems it links together. Using this display, MPC operators can selectively route track information to its users. The MPC can deploy with a CRP or other agency, or alone. There are two MPCs in the 4ATAF area.

References: AFM 2-7, USAFER 55-29

b. Fixed Ground Environment System (412L/GEADGE/NADGE)

The 412L fixed air defense system in the 4ATAF area consists of four Control and Reporting Centers (CRCs) and three Reporting Posts (RPs). The CRCs provide surveillance, identification and interceptor and SAM control for their respective areas. The RPs provide surveillance in the Buffer Zone and forward area. All sites share the same track data through the 412L automatic data link system.

Centralized control of the system is exercised through the Sector Operations Center (SOC III) at Kindsbach. The Sector Controller has overall responsibility for the operation of the air defense system in 4ATAF.

The 412L system will be replaced in the early 1980s by the newer German Air Defense Ground Environment System (GEADGE). The new system is an updated version of the NATO Ground Environment System (NADGE) that is used in northern Germany (2ATAF), Holland and Italy.

The TACS is able to interface with the fixed units through the MPC. This allows TACS units to function as a part of the fixed air defense system whenever required.

References: ASIII 55-4, 4ATAF SUPPLAN 34001D.

412L SITES

CALL SIGN	DESIGNATOR	UNIT	LOCATION
Cold Track	C/T		Freising
Sweet Apple	S/A		Messtetten
Hard Tire	H/T	615 ACWS	Boerfink
Straw Basket	S/B		Lauda
Cedar Mine	C/M		Wasserkuppe
Rust Crowd	R/C		Doebraberg
Token March	T/M		Burglengenfeld
Copper Ring	C/R	615 ACWS Det 1	Kindsbach

407L SITES

Morpha	S	601 TCS	Pruem
Jeremiah		612 TCF	Pruem
Believe		621 TCF	Wiesbaden
Biform	U	602 TCS	Turkheim
Chalet		631 TCF	Wurzburg
Console		632 TCF (632 ASRT)	Grafenwoehr
Maroon	Q	603 TCF	Site 1, Mehlingen
Mutate		611 TCF	Alzey
Hardware		611 ASRT	Alzey
Calorie		622 TCS	Rhein Grafenstein
Fanbelt	F	609 TCS	Bad Munder
Citric		619 TCF	Schwelentrup
Brahma	J	629 TCF	Schwelentrup
Galley		606 TCS	Bremerhaven
Compose		626 TCF	Bremerhaven
Educate		636 TCF	Bremerhaven

OTHER

Bearpit	A	ATOC	Sembach
Juryman		601 ASOC	Frankfurt
Angora		602 ASOC	Stuttgart

Figure 3

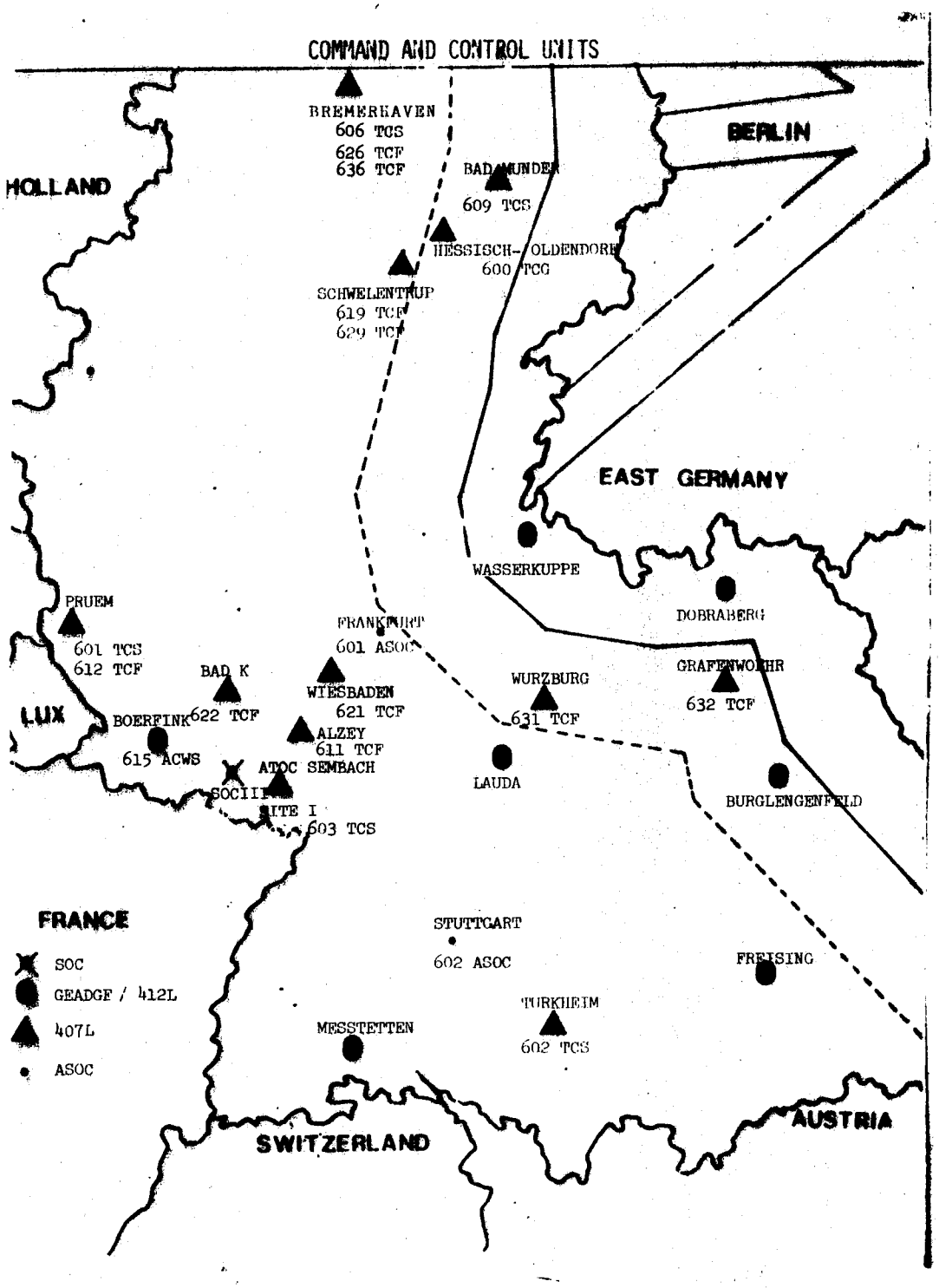

COMMAND AND CONTROL UNITS
BREMERHAVEN
606 TCS
626 TCF
636 TCF
BERLIN
HOLLAND
BAD MUNDER
609 TCS
HESSISCH-OLDENDORF
600 TCG
SCHWELENTRUP
619 TCF
629 TCF
EAST GERMANY
WASSERKUPPE
DOBRABERG
PRUEM
601 TCS
612 TCF
FRANKFURT
601 ASOC
BAD K
WIESBADEN
621 TCF
WURZBURG
631 TCF
GRAFENWOEHR
632 TCF
LUX
BOERFINK
622 TCF
ALZEY
611 TCF
615 ACWS
ATOC SEMBACH
LAUDA
BURGLENGENFELD
SOC III
SITE I
603 TCS
FRANCE
STUTTGART
602 ASOC
FREISING
SOC
GEADGE / 412L
407L
ASOC
TURKHEIM
602 TCS
MESSTETTEN
AUSTRIA
SWITZERLAND

Figure 4

5. Tactics and Techniques

a. Aircraft. Although we may be tasked to control almost any kind of military aircraft in the NATO inventory, we primarily deal with the F-4, F-15 and A-10.

(1) The F-4 is a two-place, supersonic, long range, all weather, radar equipped fighter bomber built by McDonnell-Douglas. It is powered by two General Electric J-79-GE-17 engines. Both engines are lightweight, high thrust, axial flow turbojets equipped with afterburner for thrust augmentation. The F-4 possesses an internal 20mm gun as well as conventional armament. The wings fold for ease of storage and ground handling and a hydraulically retracted arresting hook can be used to stop the aircraft under a wide range of conditions.

(2) The F-15 is a single seat, twin turbofan, air superiority fighter. Its two Pratt and Whitney F100-PW-100 turbofan engines gives approximately 25,000 pounds of thrust each. Avionics include a virtually unjammable pulse Doppler air-to-air and air-to-ground radar; a Visual Situation Display (VSD); a Heads Up Display (HUD); INS, TACAN and ILS. The VSD scope gives the pilot all the information he needs to complete any intercept. Most of this information is also displayed on the HUD, allowing the pilot to visually monitor the intercept. Armament includes the AIM-7 Sparrow, Air-9 Sidewinder and 20mm cannon.

(3) The A-10 is a single seat, twin turbofan, heavily armed and armored close air support aircraft. The A-10 offers a unique combination of large payload, long loiter, and wide combat radius to ensure operational flexibility. It can carry up to 16,000 lbs of mixed ordnance and has a 30mm GAU 8/A internal gun. Other equipment includes a headup display, laser seeker, target penetration aids and associated equipment for Maverick missiles.

b. Missions:

Tactical Air Missions fall into one of two categories: Preplanned and Immediate. Preplanned missions are those for which a requirement can be forseen and are therefore scheduled at least a day in advance. Immediate missions are those for which specific target make up and location cannot be determined in advance, thus often requiring the utilization of aircraft which have been on alert status.

The TACS will normally control 5 of the Air Force's basic operational missions: Airlift, Close Air Support, Air Interdiction, Counter Air Operations and Surveillance/Reconnaissance. (Ref: AFM 1-1, para 2-8). We also provide air defense forces to NATO to assist in maintaining Germany's national sovereignty.

(1) Airlift provides for deployment of personnel and materiel where needed and aeromedical evacuation. Airlift can be used to support joint and combined operations; as well as military assistance and civilian relief programs.

(2) Close Air Support involves air attacks against hostile targets that are in close proximity to friendly surface forces. The purpose is to destroy enemy troops, emplacements and weapons in response to the needs of the frontline forces. All preplanned and immediate close air support missions require detailed integration with the fire and maneuver plans of friendly surface forces.

(3) Interdiction is designed to deny the enemy the use of communications and supply routes by disrupting the flow of enemy supplies, men and equipment, through destruction, delay or harassment before it can be brought to bear effectively against friendly forces. Detailed integration of each air mission with the fire and movement of friendly forces is not required because such strikes are conducted beyond the fire support coordination line (FSCL). Normally, a completely successful interdiction plan cannot be put into effect until an acceptable degree of control of the air has been attained. After the enemy's air capability has been reduced to the extent that it is no longer a threat or deterrent to friendly air and surface operations, the striking power of air forces can be concentrated upon the critical elements of the enemy's logistic structure.

(4) Counter Air operations are conducted with the ultimate goal of gaining and maintaining air supremacy. This is carried out by destroying or neutralizing the enemy's offensive and defensive air capabilities. Targets include enemy airfields and immediate supporting facilities, aircraft, radar and other electronic guidance and control facilities, missile stockpiles and missile launch sites. Counterair operations also include air-to-air combat with enemy air forces after

they have become airborne. This includes fighter sweeps, airborne fighter combat air patrol (CAP), air defense and interceptor operations.

(5) Tactical Air Reconnaissance missions penetrate enemy territory where they obtain accurate and timely information on disposition activities of enemy forces, post strike damage, weather, etc., by visual, imagerial and electronic means.

(6) Air Defense during peacetime is the responsibility of the fixed NADGE/GEADGE system. We may augment these forces during peacetime and will be full integrated during wartime.

References: AFM 1-1, AFR 3-16, Jane's All the World's Aircraft

6. Aircraft and Airspace

a. Bases/USAFE Flying Units: The following flying units are tasked to support 4ATAF in air/ground tactical operations:

GAF/TAC
Canadian Air Force (CAF)
3rd Air Force - based in the United Kingdom
17th Air Force
French Air Force (when participating in NATO training)

Each major command is normally divided into Tactical Fighter Wings (TFWs), of 2 - 3 squadrons, each with 12 - 25 aircraft; and Tactical Reconnaissance Wings (TRW) of 2 - 3 squadrons, each with 15 - 18 aircraft.

The major 4ATAF airbases and USAFE flying units are:

ICAO Designator	BASE	UNIT	TYPE A/C
EDAB	Bitburg	36 TFW	F-15
		22 TFS	F-15
		53 TFS	F-15
		525 TFS	F-15
EDAD	Spangdahlem	52 TFW	F-4
		23 TFS	F-4
		81 TFS	F-4
EDAF	Rhein Main		
EDAH	Hahn	50 TFW	F-15
		10 TFS	F-15
		496 TFS	F-15
EDAL	Sollingen		
EDAM	Zweibrucken	26 TRW	F-4
		17 TRS	F-4
		38 TRS	F-4
EDAN	Lahr		
EDAR	Ramstein	86 TFW	F-4
		526 TFS	F-4
EDAS	Sembach	704 TASS	OV-10
		20 TASS	OV-10
		601 TASS	CH-53
EDAW	Wiesbaden		

b. Major 4ATAF NAVAIDS

BASE	ICAO DESIGNATOR	TACAN	USER
Bitburg	EDAB	56	USAF
Erding	EDSE	83	GAF/TAC
Fürstenfeldbruck	EDSF	17	GAF/TAC
Hahn	EDAH	24	USAF
Ingolstadt	EDSI	51	GAF/TAC
Lahr	EDAN	39	CAF
Lechfeld	EDSL	25	GAF/TAC

BASE	ICAO DESIGNATOR	TACAN	USER
Leipheim	EDSD	53	GAFSC
Neuberg	EDSU	51	GAFSC
Memmingen	EDSM	119	GAFSC
Ramstein	EDAR	81	USAF
Sollingen	EDAL	105	CAF
Spangdahlem	EDAD	32	USAF
Stuttgart	EDAT	72	USAF/CIV
Zweibrucken	EDAM	48	USAF

References: DOD, Enroute Supplement, Unit WC Handbook

c. Airspace.

The airspace in central Germany is one of the most congested in the world. In addition to the large number of civilian aircraft on the complicated route structure, there are many military flights performing a number of different missions. Flying operations are further complicated by the large number of military and civilian control agencies involved. These factors, combined with the limited area of the FRG, mean that special use airspace for conducting military operations is very limited.

Because of these difficulties, it is imperative that all personnel assigned to agencies involved in planning and conducting air defense missions be familiar with all aspects of airspace management within the FRG, and be aware of the constraints placed on air defense operations. Although surveillance personnel may not be directly involved with aircraft/airspace control, they must be aware of the locations of the various special use areas, and separation criteria, in order to provide surveillance information on the most important tracks. Detailed airspace information is provided in Section 8 for weapons personnel.

Airspace over the Federal Republic of Germany (FRG) is normally controlled by the Bundesanstalt Fur Flugsicherung (BFS), which is similar to the FAA in the United States. Sections of airspace are allocated to the military control agencies on a request basis; sterile airspace, however, is not available on a normal day-to-day basis. (i.e., The BFS will not reroute civilian aircraft around allocated airspace; therefore, all traffic must be avoided in accordance with published directives).

The major types of special use airspace that we use include: Temporary Reserved Airspace (TRA's), Restricted Airspace (EDRs), Traffic Management Areas (TMAs), Terminal Control Areas (TCAs), the Air Defense Identification Zone (ADIZ), and the Central European Buffer Zone (CEBZ).

(1) TRAs are described in great detail in both the DOD Flight Information Publications (FLIPS), and the Special Use Airspace segment of the Flight Planning Document (AP-2). Generally, TRAs are strictly defined both vertically and laterally and are reserved for specified periods of time by both flying and radar squadrons. TRAs provide an area to conduct Practice Intercepts, Aerial Combat Tactics/ Maneuvers, etc.

(2) EDRs consist of restricted airspace of defined vertical and lateral boundaries, and are addressed in detail in both documents mentioned above. These pieces of airspace are termed "hot" when they are activated; since activation may mean artillery fire, it is wise to take heed of these EDRs. Daily NOTAMs (Notice to Airmen) denote activation/deactivation times.

(3) TMAs are generally large pieces of airspace of defined dimensions that provide precise traffic management for heavily used areas. The Frankfurt TMA, for example, encompasses both the military and civilian airports in Frankfurt. Since many ascent/descent corridors intersect here, it is imperative that precise traffic management be provided.

(4) TCAs are simply the control areas, of defined dimensions listed in the FLIPS, that surround every airport.

(5) An ADIZ is an area of defined dimensions within which ready identification of all aircraft is required. In Germany, the ADIZ is that area immediately adjacent to the East German and Czechoslovakian borders.

(6) The CBEZ is an airspace of defined dimension adjacent to the ADIZ, and was established to prevent accidental intrusion into Communist block airspace. Both CEBZ and ADIZ procedures are covered in detail in USAFER 60-17.

(7) Political boundaries must also be avoided. The "Delta Line" is the southern boundary for FRG military airspace, and provides separation from Swiss and Austrian airspace. The French and Benelux borders are on the western boundary of FRG airspace, and the 2ATAF area of responsibility provides a "boundary" of sorts to the north.

Finally, the diagram below highlights the generalized airspace breakdown, by altitude, as shown in the FLIP.

60,000' — 29,000 - 60,000' IFR*. Radar control/monitor required, flight plan required. Separation 2,000 Ft/5 n.m.

29,000' — 10,000 - 29,000' IFR. Radar control/monitor required, flight plan required. Separation 1,000 Ft/5 n.m.

10,000'

0 ——— Surface to 10,000' VFR*. No flight plan required.

*IFR = Instrument Flight Rules/VFR = Visual Flight Rules

References: USAFER 60-17, DOD FLIPS, AP-2 WC Handbook

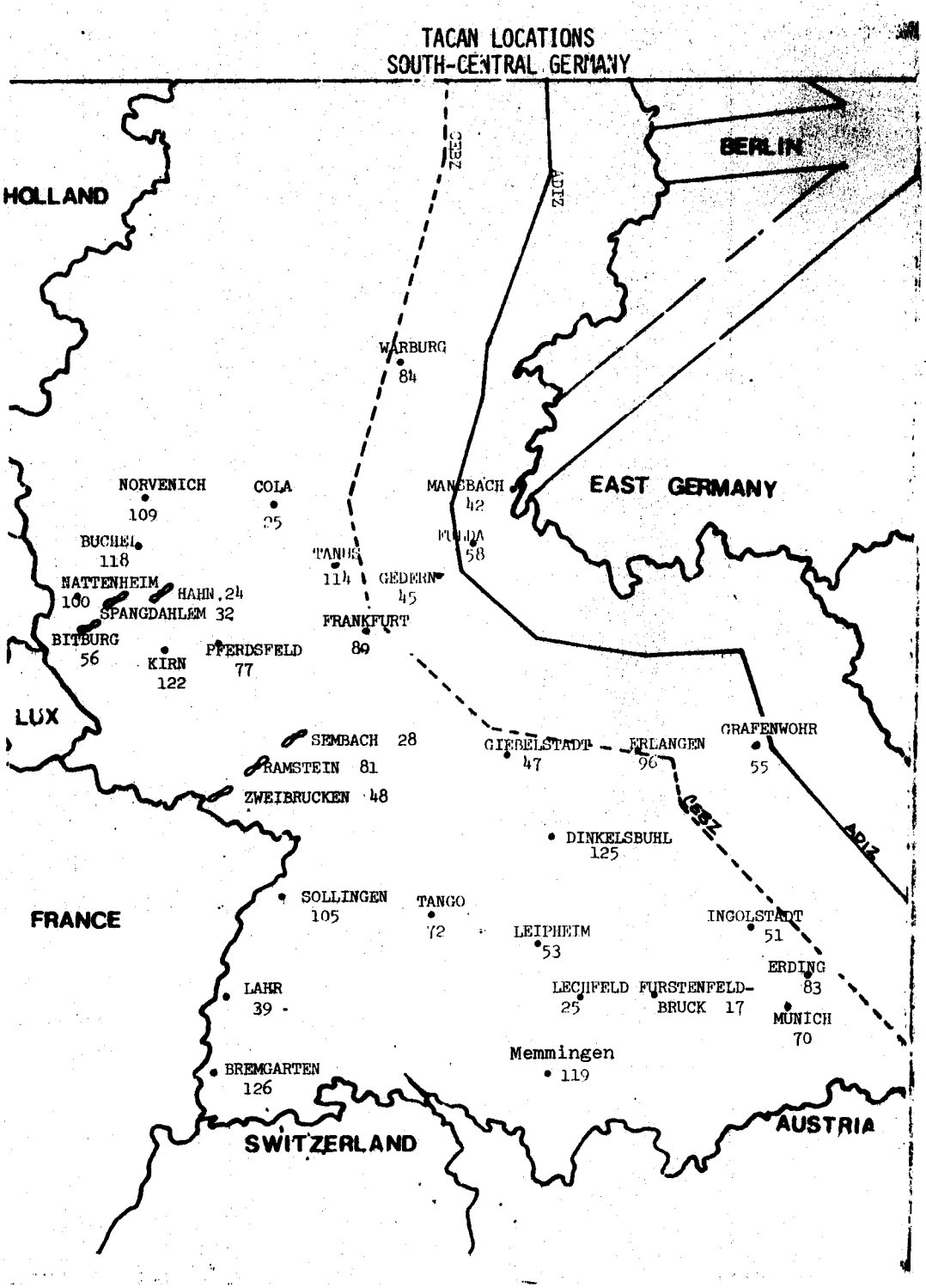

TACAN LOCATIONS
SOUTH-CENTRAL GERMANY
HOLLAND
BERLIN
EAST GERMANY
FRANCE
LUX
SWITZERLAND
AUSTRIA
CZSZ
ADIZ
WARBURG
84
NORVENICH
109
COLA
25
MANSBACH
42
BUCHEL
118
FULDA
58
TAUNUS
114
GEDERN
45
NATTENHEIM
100
HAHN, 24
SPANGDAHLEM 32
FRANKFURT
89
BITBURG
56
KIRN
122
PFERDSFELD
77
SEMBACH 28
RAMSTEIN 81
ZWEIBRUCKEN 48
GIEBELSTADT
47
ERLANGEN
96
GRAFENWOHR
55
DINKELSBUHL
125
SOLLINGEN
105
TANGO
72
LEIPHEIM
53
INGOLSTADT
51
ERDING
83
LAHR
39
LECHFELD
25
FURSTENFELD-
BRUCK 17
MUNICH
70
Memmingen
119
BREMGARTEN
126

Figure 5

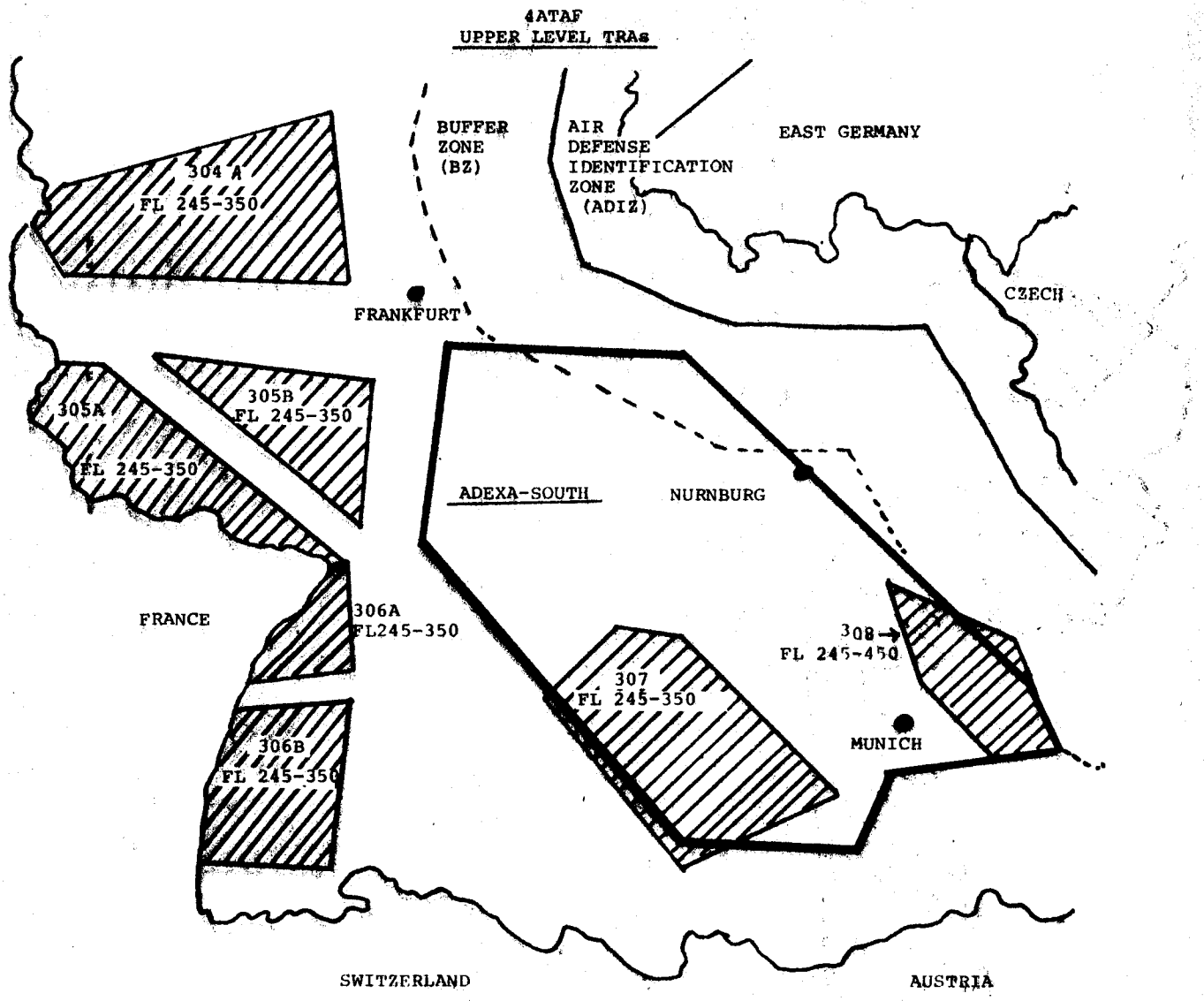

4ATAF
UPPER LEVEL TRAs
BUFFER ZONE (BZ)
AIR DEFENSE IDENTIFICATION ZONE (ADIZ)
EAST GERMANY
304 A
FL 245-350
FRANKFURT
CZECH
305A
FL 245-350
305B
FL 245-350
ADEXA-SOUTH
NURNBURG
FRANCE
306A
FL245-350
306B
FL 245-350
307
FL 245-350
308
FL 245-450
MUNICH
SWITZERLAND
AUSTRIA

Figure 6

4ATAF

LOWER LEVEL TRAS

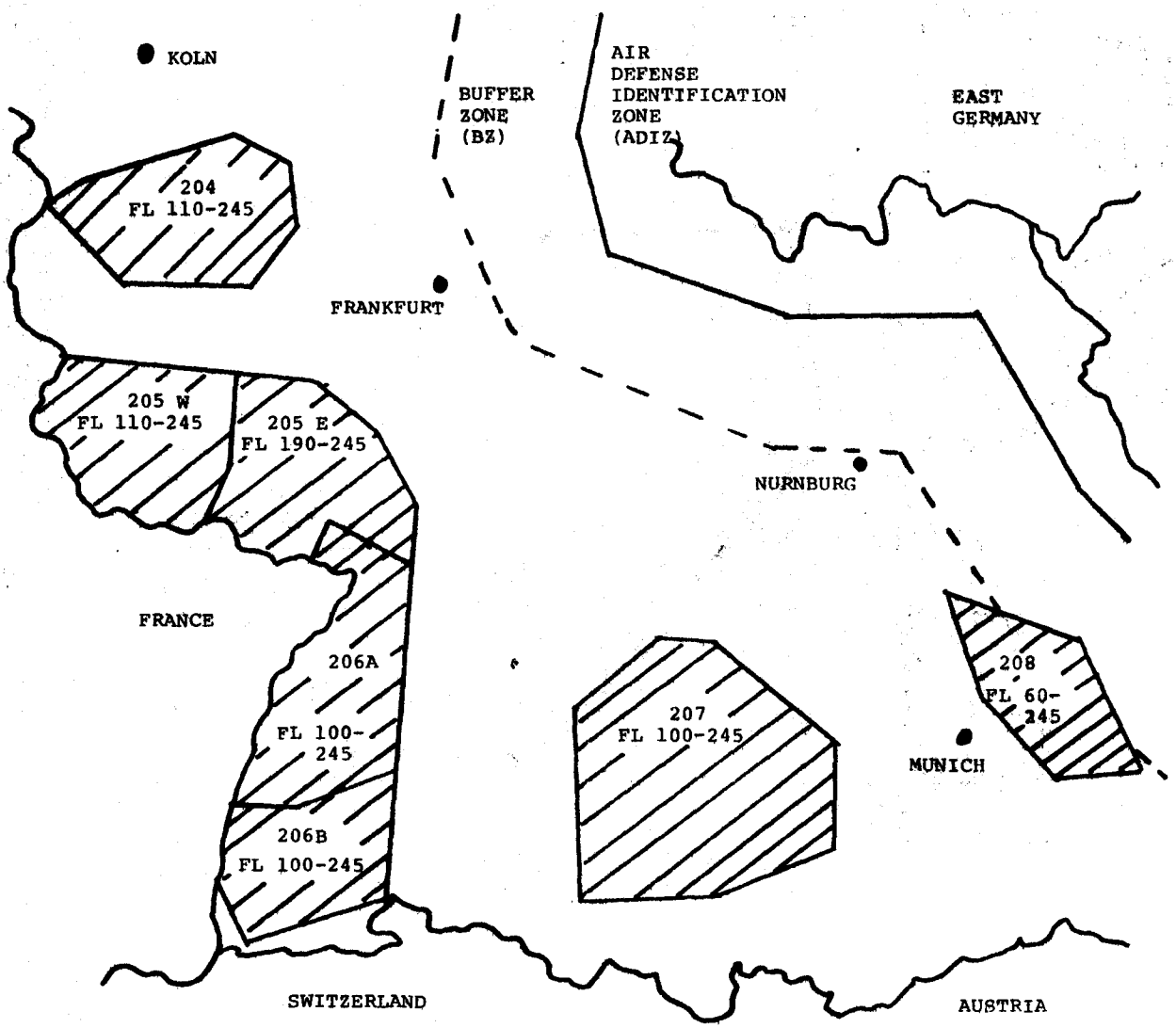


Figure 7

7. Equipment

a. Communications Equipment

(1) The AN/TRC-97 is a Super High Frequency (SHF) radio set which is the primary means of communicating between sites. The TRC-97 provides 2-way voice communications (up to 24 channels) and teletype (up to 16 channels over a single voice channel). Transmission is line-of-sight, troposcatter or defraction. The TRC-97 has a range of 80 - 100 miles over normal terrain using direct terminal-to-terminal communications, or can be used a a relay station station to cover distances of 200 - 300 miles.

(2) The AN/TRC-87 consists of five radio sets providing ground-to-air ultra-high frequency (UHF) voice communications simultaneously. It is the primary means of communication between the controller and the aircraft. The TRC-87 can be remotely operated from an operations shelter less than 5 miles away. (CRP)

(3) The AN/TSC-60 communications central is a radio that can be used for ground-to-ground, ground-to-air and teletype communications. It operates in the high frequency (HF) band and is used for very long range transmission over rough terrain. The TSC-60 is primarily a backup to the TRC-97.

(4) The AN/TSC-15 is a transportable HF radio capable of being a backup for the TSC-60 if two TSC-15s are used. This communications central is capable of ground-to-ground, ground-to-air, TTY and phone patching service. It is very long range radio with limited capabilities because of its size.

(5) The AN/TTC-30 is an automatic telephone central which provides direct dialing and automatic routing of telephone traffic for both intra and inter site voice communications. It is compatible with commercial telephone systems, autovon and army switchboards and provides a preempting service and priority routing for key positions. (CRP)

(6) The AN/TGC-28 is a teletype communications center equipped to perform message preparation, transmission and reception at the CRP. It is capable of five full duplex, encrypted (secure) circuits, of off-line preparation of teletype tapes, and of monitoring, patching, and testing equipment and circuits. (CRP)

(7) The AN/TSC-53 communications central provides HF voice, teletype and VHF/UHF air-to-ground communications. It also serves as an intrasite communications net between the TPS-43E van, the 61 van and other on-site subscribers. (FACP)

(8) The AN/TSC-62 technical control center provides a central point for most operating sites for equipment interface and quality control of the communications circuits. It also provides for maintenance and service restoration between operating sites.

(9) The AN/MRC-107A consists of four separate jeep mounted radio sets. They provide the capability for ground-to-ground, ground-to-air radio voice communications. The MRC-107A provides primary communications for the ASRT, or other highly mobile field units.

b. Operations Shelters. All TACS equipment is built around a modular, air/ground mobile concept. Some or all of a unit's equipment may be used depending upon the deployment configuration and the operational requirement.

(1) The AN/TSQ-91 ("Bubble," "Duck") is built from the following modules: (CRP ONLY)

The Console Module (CM) contains four multi-purpose display consoles and associated technician stations with sufficient electronics to integrate with the radar, communications and data processing equipment. When the CM is deployed in a tactical operating mode, the module will provide man-machine interfaces for the communication, display, and control of tactical air situations.

The Group Display Module (GDM) contains plotting boards and communications patch bay. The function of the patch bay is to provide intercommunication and control for the telephone subsystem, the radio subsystem and the automatic data link subsystem. The GDM on a CM connect to form the interior of the TSQ-91.

The Ancillary Equipment Module (AEM) houses the common display controller, two multi-purpose display consoles, and automatic data link equipment. When

the Ancillary Equipment Module is deployed in a tactical operating mode, it provides multi-purpose display and communications capabilities, including communication terminal equipment for the automatic data link capabilities.

The Data Processing Module (DPM) processes data from the SIF processor, the operator station buffer, display consoles, ADL buffer and magnetic tape units. It is the "computer room" of the CRP. It contains the HM4118 computer, the magnetic tape units, the Kleinschmidt Printer Punch (KPP) keyboard and the video mapper. The HM4118 computer is a high speed, general purpose digital computer which performs weapons and surveillance calculations and allows digital data link between the CRP and other computerized units.

Air Conditioning Module (ACM) contains heating and air conditioning facilities which provide environment control for the Operations Center personnel.

Each console module contains sufficient electronics to integrate with the radar, communications and data display equipment; therefore, a manual operations center can be established with only one console module and one group display module. However, the maximum/normal configuration for the CRP Operations Center will use three console modules, three group display modules, one data processing module, one ancillary equipment module and two air conditioning modules.

(2) The FACP operations shelters are the AN/TSQ-61 and/or AN/TPS-43E vans. Both vans contain 2 AN/UPA-62C PPI (Plan Position Indicator) scopes, and associated SIF equipment. Both normally channel communications through the TSC-53, although the 43E van does have an internal ARC 64 UHF radio. (The 43E van also contains all the electronics control for the radar).

(3) The ASRT operating controls can be housed in a mobile shelter, or in a tent, depending on the degree of mobility required.

c. Radars

(1) The AN/TPS-43E is used by the CRPs and FACPs. It is a highly mobile ground radar set designed for simultaneous long range search and height finding in severe weather or jamming. The radar uses a stacked beam antenna to provide range, height and azimuth information. (3-D. - No height finder is required). When in transit condition, the complete radar set is housed in 2 packages, shelter and antenna pallet.The radar may be remoted up to 8 miles by use of the GSQ-120 Radar Remoting Set.

(2) The AN/TPB-1C is used by the ASRT. It is a highly mobile ground directed bombing system designed to provide night/all weather guidance to tactical strike, reconnaissance and airlift aircraft. The system consists of a computer-controlled "pencil beam" radar set which operates in conjunction with a beacon-equipped aircraft. The radar interrogates the beacon, automatically tracks the aircraft, provides range/azimuth/evaluation data to the self-contained digital computer that computes the ballistics problem, and displays aircraft position data to the operator. All components of the system can be packed inside the shelter.

d. Power Production

(1) Primary equipment power is provided by A/E 24U-8 generator pallets. The 24U-8 is a transportable 60/120 KW, 400 Hz power plant consisting of two EMU-30/5 gas turbine generators and associated distribution equipment on each pallet. The power plant is capable of operating with either one or both generators. One generator will automatically start if the other fails. Normally 8 pallets will be deployed with a CRP, and 3 for a FACP.

(2) The MB-18 generator provides 60 cycle power to the deployed contonement area. The MB-18 contains all its components within a single unit and is designed for extreme environmental conditions.

(3) In-garrison power may also be provided by a frequency converter which converts 50 Hz German commercial power to 400 Hz/120 KW.

e. Vehicles. The following are the basic unit vehicles:

(1) M-35 (2 1/2 ton truck): General purpose cargo and/or passenger carrier with 2 1/2 ton capacity. It has cruising range of 300 miles with fuel capacity for 50 gallons (diesel). Over road speed 53 mph. Used mostly for pulling mobilizer loads.

(2) M-151 (1/4 ton jeep): General purpose 1/4 ton jeep for either cargo or passengers. Is usually used as transportation vehicle for command and reconnaissance personnel. Good rough terrain vehicle, however upsets easily.

(3) M-720 Mobilizer: Three ton equipment transporter. The mobilizer separates so that the front and back portions can be placed under the module being towed. Recommended towing vehicle is the M-35.

(4) M-107 (Water Trailer): 1 1/2 ton (empty) vehicle designed to transport 400 gallons of water. Recommend towing vehicle is M-35 vehicle.

(5) A-1B Fuel Trailer. Is designed to service ground equipment with automatic type fuel, or jet and oil. It has a 600 gallon capacity.

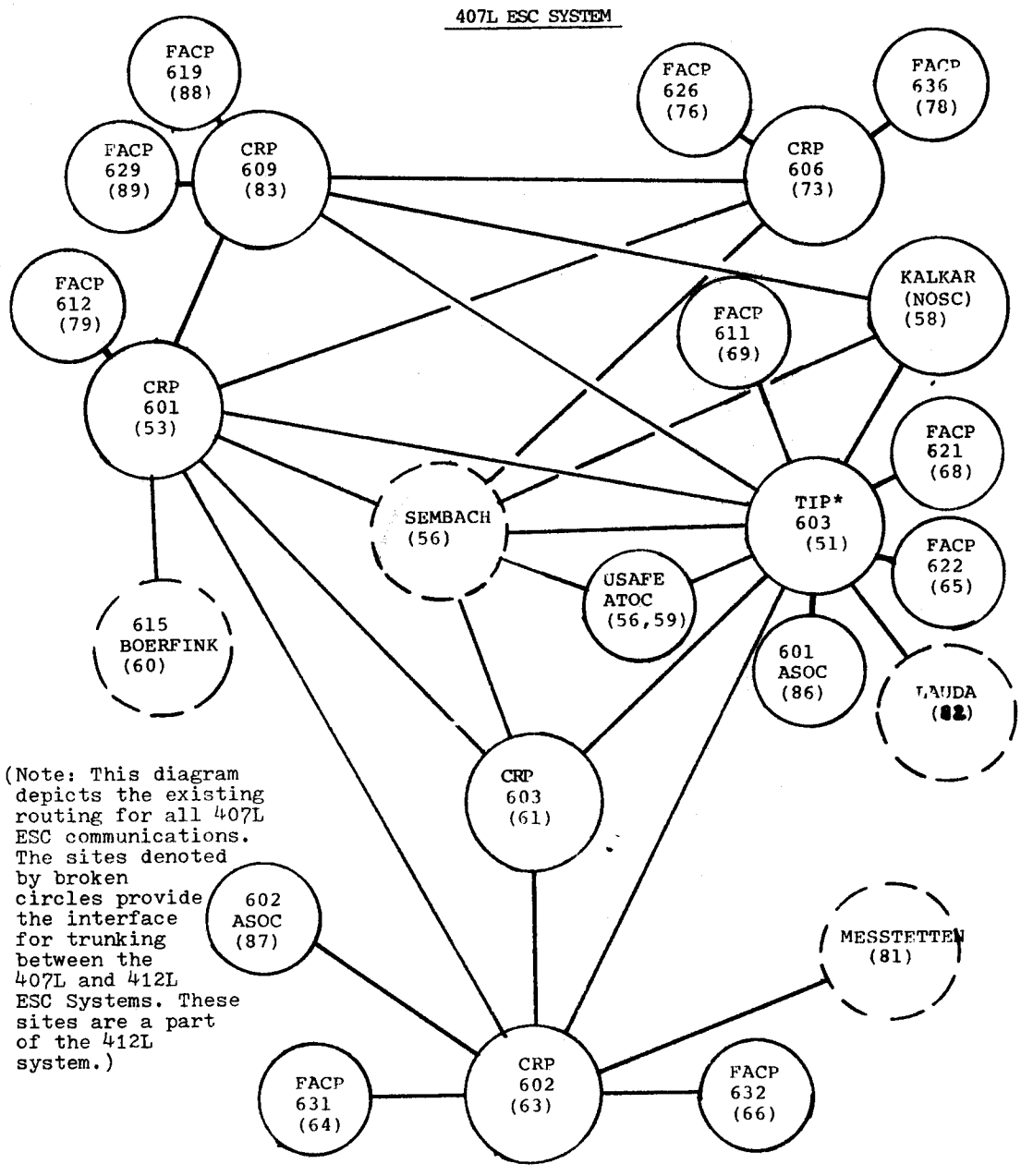


Figure 8

(*Tactical Interface Point)

8. Miscellaneous

AIRSPACE

The basic principles for conducting air defense missions are laid out in the Memorandum of Understanding (MOU) between the German Ministries of Defense and Transport, 21 Dec 1970. This MOU is the basis for all Letters of Agreement (LOAs) governing military control of air defense flights in Germany. It also establishes the separation criteria that will be observed by aircrews and controllers. Failure to observe these criteria can result in violations being filed through military and civilian air traffic control channels. The criteria are: 5 NM horizontal separation or 1,000' vertical separation up to and including FL 290; and 5 NM/ 2,000' above FL 290.

TEMPORARY RESERVE AIRSPACE (TRA)

TRAs are the primary airspace for conducting daytime intercepts within the FRG. While this airspace is the most frequently used for conducting intercepts, it is in no way similar to intercept areas in the U.S., and there are a number of problems assiciated with its use:

TRAs ARE NOT STERILE AIRSPACE! Reservation of a TRA means only that civil aircraft will not normally be issued ATC clearance to penetrate that airspace, and that other GCI controlled flights should not be using the same area. The reservation does not guarantee anything. Other traffic does transit the TRAs and it is the responsibility of the radar unit to maintain separation from this traffic/keep the pilot fully aware of "strangers" in the vicinity.

TRAs are scheduled a month in advance, in half hour time blocks, by ATOCs Messtetten, Kalkar, and Sembach, based upon inputs from the various flying units. The USAFE inputs are forwarded to the 1st German Air Division, ATOC Messtetten, (TRA director for 4ATAF), and to the 3rd German Air Division, ATOC Kalkar, (TRA director for 2ATAF). Each TRA director publishes a monthly TRA useage schedule. ATOC Sembach uses this schedule to publish the weekly flying schedule which allocates the scheduled sorties and airspace to the various USAFE control units.

Each TRA is monitored by one or more German ATC/military radars. The TRA monitoring agencies are responsible for watching all controlled and uncontrolled activities within the TRAs. They should always be notified when aircraft scheduled to use a TRA will not be able to do so, so the airspace can be made available to other aircraft. The TRA monitor should also be notified whenever aircraft enter or leave a TRA.

The TRA monitors are also responsible for providing military radars with advisories of aircraft transiting the TRAs, but only within workload and equipment constraints. With or without advisories from the monitor, we must maintain the required separation.

TRAs are activated on Monday from 30 minutes before sunrise, but not earlier than 0700Z until 30 minutes after sunset; Tuesday through Thursday from 30 minutes before sunrise, but not earlier than 0600Z, until 30 minutes after sunset; and Friday, from 30 minutes before sunrise, but not earlier than 0600Z until 30 minutes after sunset, but not later than 1700Z. The TRAs are not activated on German holidays.

In order to ensure flight safety and the smooth conduct of air defense missions, the following limitations must be taken into account when scheduling intercepts/ACT in the TRAs:

305A: The shape of this airspace dictates that intercepts be limited to one-on-ones with an HCA of 150° or greater.

305B: Much of the central portion of this TRA is in the cone of silence of the 603 TCS. The 601 TCS, 612 TCF, and 615 ACWS have good coverage in this area. However, if multiple missions are run, the A/C must use a minimum of 45° angle of bank, and HCAs should be greater than 140°.

304A: The westernmost 20 miles of this TRA are in the 601 TCSs cone of silence.

206A/B, 207, 306A & 307: The 602 TCS has radar coverage in these TRAs but currently lacks the necessary Letters of Agreement and/or communications to use them. 306A to too small for safe use.

GEOREF AIRSPACE

If TRAs are not available, the unit WAO can request GEOREF airspace from the CRC WA. When the TRAs are active, this GEOREF airspace must be outside or above the TRAs, and consists of GEOREF defined areas. Because of the congested air route structure in Germany, GEOREF airspace is often effectively limited to above FL 350, the upper limit of the TRAs. GEOREF is not restricted or reserved airspace, but an advisory to other GCI units that air-to-air training will be conducted in a particular area. The CRC WA will insure that two units are not using the same area at the same time. The controlling agency is responsible for maintaining separation IAW the MOU.

REFUELING

Refueling in the 4ATAF area is accomplished on designated refueling tracks, currently Erika Anchor in TRA 304A/B and Sandy Anchor in TRA 305A/B. Refueling missions are scheduled by ATOC Sembach through Rhein Monitor. The appropriate TRAs are reserved by the ATOC Sembach. Exact procedures for conducting refueling are spelled out in letters of agreement for each anchor. The anchors, however, are currently not large enough to efficiently conduct refueling without violating airspace boundaries. Because of this, virtually all refueling is now being conducted by Rhein MUAC.

ADEXA - SOUTH

The only airspace in 4ATAF dedicated to air defense activity is Air Defense Exercise Area - SOUTH (ADEXA-SOUTH). This airspace is the largest area available and also the most sterile, due to the time activated. However, several problems limit its use for USAFE aircraft.

ADEXA-South is activated only during evening hours until 2300Z. Since most USAFE flying is done during the day, ADEXA-South cannot normally be used. Another problem is the area's location: it is out of the radar coverage of most USAFE GCI units. The 602 TCS is the only unit that can use the entire area. The 603 TCS and 615 ACWS can use only the Northwest portion of it.

ADEXA-South is scheduled weekly from flying unit requirements, by ATOC Sembach. Daily scheduling and mission coordination is handled by the ADEXA-South scheduling agency, CRC Messtetten, back-up Lauda and Freising. The major advantage of ADEXA-South is that Rhein and Munich Control must receive clearance from the ADEXA scheduling agency prior to having IFR traffic transit the area. After the scheduling agency grants approval it notifies air defense units conducting missions in the area of the traffic. The air defense unit is then responsible for maintaining standard separation from this traffic. The communications required for using ADEXA-South are: an operational TAC loop and ESC communications with the scheduling authority.

LOW LEVEL FLYING

Low level intercepts can be conducted beneath the TRA structure, however, they must be done under VFR/VMC with ultimamate separation responsibility resting with the aircrew. Outside of ranges, the low level structure and the day low flying areas, military jet aircraft are generally restricted to a minimum altitude of 5000' AGL.

AIRSPACE SUMMARY

TRA	LIMITS	MONITORING AGENCY	AIR DEFENSE CONTROL AGENCIES
204	FL 110-245	Rhein	601 TCS, 603 TCS, 615 ACWS,612 TCF
205W	FL 110-245	Rhein	601 TCS, 603 TCS, 615 ACWS,612 TCF
205E	FL 090-245	Rhein	601 TCS, 603 TCS, 615 ACWS,612 TCF
206A	FL 100-245	Lahr	602 TCS, 615 ACWS
206B	FL 100-245	Bremgarten	602 TCS, 615 ACWS
207	FL 100-245	Sweetapple, CT, SB	602 TCS
208	FL 060-245	Munchen	
304A	FL 245-350	Rhein	601 TCS, 603 TCS, 615 ACWS,612 TCF
304B	FL 245-350	Lippe	615 ACWS, 609 TCS
305A	FL 245-350	Rhein	601 TCS,603 TCS, 615 ACWS,612 TCF
305B	FL245-350	Rhein	601 TCS,603 TCS, 615 ACWS,612 TCF
306A	FL 245-350	Lahr	602 TCS, 615 ACWS
306B	FL 245-350	Bremgarten	602 TCS, 615 ACWS
307	FL 245-350	Sweetapple, CT, SB	602 TCS
308	FL 245-350	Munchen	
ADEXA SOUTH			
Area A	FL 320-350	Sweetapple, CT, SB	602 TCS, 603 TCS, 615 ACWS
Area B	FL 270-350	Sweetapple, CT, SB	602 TCS
Area C	FL 270-350	Sweetapple, CT, SB	602 TCS