MOS

93C

AIR TRAFFIC CONTROL

SOLDIER'S MANUAL
SKILL LEVEL 1 AND
TRAINER'S GUIDE

HEADQUARTERS, DEPARTMENT OF THE ARMY

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SOLDIER'S MANUAL AND TRAINER'S GUIDE

MOS 93C

AIR TRAFFIC CONTROL
SKILL LEVEL 1

CONTENTS

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NOTE: Effective 30 September 2004, MOS 93C10 is scheduled for conversion/reclassification to MOS 15Q10.

Page

CHAPTER 3. MOS SKILL LEVEL TASKS

SUBJECT AREA 1: BASIC COMMUNICATIONS

SUBJECT AREA 2: INSTALLATION OF TACTICAL ATC EQUIPMENT

SUBJECT AREA 3: OPERATIONAL SUSTAINMENT OF ATC EQUIPMENT

SUBJECT AREA 4: PREPARATION OF ATC EQUIPMENT FOR MOVEMENT

Page

SUBJECT AREA 5: WEATHER/ADVISORIES

SUBJECT AREA 6: AIR TRAFFIC CONTROL FORMS

SUBJECT AREA 7: NONRADAR CONTROL PROCEDURES

SUBJECT AREA 8: RADAR PROCEDURES

SUBJECT AREA 9: FLIGHT-FOLLOWING PROCEDURES

SUBJECT AREA 10: GENERAL AIR TRAFFIC CONTROL PROCEDURES

Page

PREFACE

This publication supports the Army's revised enlisted and noncommissioned officer education system that focuses training on force standardization. It supports the training and enrichment soldiers need to pursue and enhance their military careers. Specifically, it covers operations-based individual tasks required of the specific Aviation MOS to perform proficiently. Appendix A provides an aviation school recommended professional reading list. Appendix B provides a sample DA Form 5164-R (Hands-on Evaluation). Appendix C provides a sample DA Form 5165-R (Field Expedient Squad Book). Appendix D provides a noncommissioned officer career progression for career management field 93, aviation operations. Soldiers will use the manual as a professional development and self-evaluation tool. Soldiers should gain high proficiency in performing the tasks in this publication. Therefore, their responses will become automatic when they perform these tasks, even under the most stressful circumstances.

All tasks in this guide are about specific CMF 93 duties and responsibilities. Reserve soldiers in the Army National Guard and Army Reserve will use this publication in the same self-development and evaluation method as their active duty counterparts.

The proponent of this publication is HQ TRADOC. Send comments and recommendations on DA Form 2028 (Recommended Changes to Publications and Blank Forms) to Commander, US Army Aviation Center, ATTN: ATZQ-TDS-T, Fort Rucker, Alabama 36362-5000.

This publication has been reviewed for operations security considerations.

Unless this publication states otherwise, masculine nouns and pronouns do not refer only to men.

CHAPTER 1

INTRODUCTION

GENERAL

This Soldier Training Publication identifies the individual MOS training requirement for soldiers in MOS 93C. Commanders, trainers, and soldiers should use it to plan, conduct, and evaluate individual training in units. This manual is the primary MOS reference to support the self-development and training of every soldier. It standardizes performance steps, measures, and evaluation guidance for all individual critical tasks for skill level 1.

Use this manual with the soldier's manuals of common tasks (STPs 21-1-SMCT and 21-24-SMCT), ARTEPs, and FM 7-10(FM 25-101) to establish effective training plans and programs that integrate soldier, leader, and collective tasks.

TASK SUMMARIES

Task summaries outline the wartime performance requirements of each critical task. They provide the soldier and the trainer with the information necessary to prepare, conduct, and evaluate critical task training. As a minimum, task summaries include information you must know and the skills that you must perform to standard for each task. The format for the task summaries included in this SM is as follows:

Task Title. The task title identifies the action to be performed.

Task Number. Each task is identified by a specific number sequence. This task number, along with the task title, will be included in any correspondence relating to the task.

Conditions. The task conditions identify all the equipment, tools, references, job aids, and supporting personnel that the soldier needs to perform the task in wartime. This section identifies any environmental conditions that can alter task performances such as visibility, temperature, and wind. This section also identifies any specific cues or events—a chemical attack or identification of a threat vehicle—that trigger task performance.

Standards. The task standards describe how well and to what level soldiers must perform a task under wartime conditions. Standards are typically described in terms of accuracy, completeness, and speed.

Training and Evaluation. This section may contain all or part of the training information outline, evaluation preparation subsection, and evaluation guide. The training information outline includes detailed training information. The evaluation preparation subsection indicates necessary modifications to task performance to train and evaluate a task that cannot be trained to the wartime standard under wartime conditions. It also may include special training and evaluation preparation instructions to accommodate these modifications and any instructions that should be given to the soldier before evaluation. The evaluation guide identifies the specific actions, known as performance measures, that the soldier must do to successfully complete the task. These actions are listed in a *Pass/Fail* format for easy evaluation. Each evaluation guide

contains a feedback statement that indicates the requirements—for example, number of performance measures *passed*—for receiving a *GO* on the evaluation.

References. This section identifies references that provide more detailed and thorough explanations of task performance requirements than that given in the task summary description.

Additionally, some task summaries include safety statements and notes. Safety statements (warning and caution) alert users to the possibility of immediate death, personal injury, or damage to equipment. Notes provide a small, extra supportive explanation or hint relative to the performance measures.

FORCE PROTECTION (SAFETY/RISK MANAGEMENT)

Safety is a component of force protection. Commanders, leaders, and soldiers use risk assessment and management to tie force protection into the mission. Risk management assigns responsibility, institutionalizes commander's review of operational safety, and leads to decision making at a level of command appropriate to the risk. The objective of safety is to help units protect combat power through accident prevention, which enables units to win fast and decisively with minimum losses. Safety is an integral part of all combat operations. Safety begins with readiness, which determines a unit's ability to perform its METL to standard. Risk management is a tool that addresses the root causes of accidents (readiness shortcomings). It helps commanders and leaders to identify *what* the next accident will be. It also helps identify *who* will have the next accident. Risk management is a way to put more realism into training without paying the price in deaths, injuries, or damaged equipment. Safety demands total chain of command involvement in planning, preparing, executing, and evaluating training. The chain of command responsibilities include the following:

Commanders.

- Seek optimum, not adequate, performance.
- Specify the risk they will accept to accomplish the mission.
- Select risk reductions provided by the staff.
- Accept or reject residual risk, based on the benefit to be derived.
- Train and motivate leaders at all levels to effectively use risk management concepts.

Staff.

- Assists the commander in assessing risks and develops risk reduction options for training.
- Integrates risk controls in plans, orders, METL standards, and performance measures.
- Eliminates unnecessary safety restrictions that diminish training effectiveness.
- Assesses safety performance during training.
- Evaluates safety performance during an AAR.

Subordinate Leaders.

- Apply effective risk management concepts and methods consistently to operations they lead.
- Report risk issues beyond their control or authority to their superiors.

Individual Soldiers.

- Report unsafe conditions, and act and correct the situation when possible.
- Establish a buddy system to keep a safety watch on one another.
- Take responsibility for personal safety.
- Work as team members.
- Modify their risk behavior.

Risk management is a five step cyclic process that is easily integrated into the decision-making process outlined in FM 5-0(FM 101-5). The five steps are identifying hazards, assessing hazards, developing controls and making risk decisions, implementing controls, and supervising and evaluating.

Identify Hazards. Identify hazards to the force. Consider all aspects of current and future situations, the environment, and known historical problems.

Assess Hazards. Assess hazards using the risk assessment matrix in Figure 1-1. Assess the impact of each hazard in terms of potential loss and cost based on probability and severity, and then find the block where the two intersect to determine the risk level. For example, if the hazard probability is *LIKELY* and the severity is *MARGINAL* then the risk level is *MODERATE*.

Develop Controls and Make Risk Decisions. Develop controls that eliminate the hazard or reduce its risk. As control measures are developed, risks are reevaluated until all risks are reduced to a level where benefits outweigh potential costs. Accept no unnecessary risks and make any residual risk decisions at the proper level of command.

Implement Controls. Put controls in place that eliminate the hazards or reduce their risk.

Supervise and Evaluate. Enforce standards and controls. Evaluate the effectiveness of controls and adjust/update as necessary.

Note: The risk management training support package for soldiers, developed by the U.S. Army Safety Center, should be used to train personnel on the five-step risk management process and the risk assessment matrix. To obtain this training support package, contact the U.S. Army Safety Center, ATTN: CSSC-RA, Fort Rucker, AL 36362-5363. (E-mail address: http://“CSSC“@safety.army.mil)

SOLDIER’S RESPONSIBILITIES

Each soldier is responsible for performing individual tasks that the first-line supervisor identifies based on the unit’s METL. The soldier must perform the task to the standards listed in the SM. If a soldier has a question about how to do a task or which tasks in this manual he must perform, he must ask the first-line supervisor for clarification. The first-line supervisor knows how to perform each task or can direct the soldier to the appropriate training materials.

			HAZARD PROBABILITY				
			FREQUENT	LIKELY	OCCASIONAL	SELDOM	UNLIKELY
			A	B	C	D	E
SEVERITY	CATASTROPHIC	I	EXTREMELY HIGH				
	CRITICAL	II		HIGH			
	MARGINAL	III		MODERATE			
	NEGLIGIBLE	IV					LOW

Severity

Catastrophic — Death or permanent total disability, system loss, major property damage.

Critical — Permanent partial disability, temporary total disability in excess of 3 months, major system damage, significant property damage.

Marginal — Minor injury, lost workday accident, compensable injury or illness, minor system damage, minor property damage.

Negligible — First aid or minor supportive medical treatment, minor system impairment.

Probability

Frequent	**Individual soldier/item**	**Occurs often in career/equipment service life.**
	All soldiers exposed or item inventory	**Continuously experienced.**
Likely	**Individual soldier/item**	**Occurs several times in career/ equipment service life.**
	All soldiers exposed or item inventory	**Occurs frequently.**
Occasional	**Individual soldier/item**	**Occurs sometime in career/equipment service life.**
	All soldiers exposed or item inventory	**Occurs sporadically, or several times inventory service life.**
Seldom	**Individual soldier/item**	**Possible to occur in career/equipment service life.**
	All soldiers exposed or item inventory	**Remote chance of occurrence.**
Unlikely	**Individual soldier/item**	**Can assume will not occur.**
	All soldiers exposed or item inventory	**Possible, but improbable; occurs rarely.**

Risk Levels

Extremely High — Loss of ability to accomplish mission.

High — Significantly degrades mission capabilities in terms of required mission standards.

Moderate — Degrades mission capabilities in terms of required mission standards.

Low — Little or no impact on mission accomplishment.

Figure 1-1. Standard risk assessment matrix.

SELF-DEVELOPMENT

Self-development is one of the key components of the leader development program. It is a planned progressive and sequential program followed by leaders to enhance and sustain their military competencies. It consists of individual study, research, professional reading, practice, and self-assessment. Under the self-development concept, the soldier or NCO, has the responsibility to attain proficiency and remain current in all phases of the MOS. The SM is the primary source for the NCO to use in maintaining MOS proficiency.

Another important resource for self-development is the Army Correspondence Course Program, which can be accessed through the Internet at http://www.atsc.army.mil/accp/aipd.htm. Refer to DA Pamphlet 350-59 for information on enrolling in this program and for a list of courses, or write to: Army Institute for Professional Development, US Army Training Support Center, ATTN: ATIC-IPS, Newport News, VA 23628-0001.

TRAINING SUPPORT

This manual includes the following information, which provides additional training support information.

Glossary. The glossary is a single comprehensive list of acronyms, abbreviations, definitions, and letter symbols.

References. This section contains two lists of references, required and related, which support training of all tasks in this SM. Required references are listed in the conditions statement and are required for the soldier to do the task. Related references are materials, which provide more detailed information and a more thorough explanation of task performance.

DISTRIBUTION

Electronic versions of this manual can also be downloaded from the Internet at the web sites listed below.

Reimer Digital Library. The RDL web site (http://155.217.58.58.atdls.htm) contains the latest SM task summaries. Currently, this site does not contain graphics for all manuals, but it will in the near future. For more information, call 1-800-ASK-ATSC.

Army Doctrinal and Training Digital Library Data Repository. The ADTDL DR web site (http://155.217.58.100) serves to gather and disseminate training and doctrinal information. It acts as a bridge between proponent schools and units, with data flowing among the Army proponent schools, from proponent schools to units, and from units to proponent schools. The system contains hundreds of MTPs, STPs, drills, TSPs, OFSs, and collective and individual tasks developed within the proponent schools using the Automated Systems Approach to Training.

RECOMMENDED CHANGES

As a user of this soldier's manual, you are encouraged to recommend changes and make comments for improvement. In your comments, note the specific page, paragraph, and line where changes should be made. Give reasons for each comment so your recommended

change will be understood and completely evaluated. Fill out the questionnaire at the back of this manual and mail it. If you have detailed changes to recommend, prepare your comments on DA Form 2028 (Recommended Changes to Publications and Blank Forms) or write them on plain paper and forward to Commander, U.S. Army Aviation Center, ATTN: ATZQ-TDS-T, Training Division, Fort Rucker, Alabama 36362; or E-mail address: ASAT@rucker.army.mil. If you send it by e-mail, request the e-mail be forwarded to the Chief, Enlisted Training Branch, DOTDS Training Division.

Note: Your name, rank, and unit address must be printed clearly to receive a prompt reply.

CHAPTER 2

TRAINER'S GUIDE

GENERAL

The MOS training plan identifies the essential components of a unit-training plan for individual training. Units have different training needs and requirements based on differences in environment, location, equipment, dispersion, and similar factors. Therefore, the MOS training plan should be used as a guide for conducting unit training and not a rigid standard. The MOS training plan consists of two parts. Each part is designed to assist the commander in preparing a unit-training plan, which satisfies integration, cross training, training up, and sustainment training requirements for soldiers in this MOS.

Part One of the MOS training plan shows the relationship of an MOS skill level between duty position and critical tasks. These critical tasks are grouped by task commonality into subject areas.

Section I lists subject area numbers and titles used throughout the MOS training plan. These subject areas are used to define the training requirements for each duty position within an MOS.

Section II identifies the total training requirement for each duty position within an MOS and provides a recommendation for cross training and train-up/merger training.

Duty Position Column. This column lists the duty positions of the MOS, by skill level, which have different training requirements.

Subject Area Column. This column lists, by numerical key (see Section I), the subject areas a soldier must be proficient in to perform in that duty position.

Cross Train Column. This column lists the recommended duty position for which soldiers should be cross-trained.

Train-up/Merger Column. This column lists the corresponding duty position for the next higher skill level or MOSC the soldier will merge into on promotion.

Part Two lists, by general subject areas, the critical tasks to be trained in an MOS and the type of training required (resident, integration, or sustainment).

Subject Area Column. This column lists the subject area number and title in the same order as Section I, Part One of the MOS training plan.

Task Number Column. This column lists the task numbers for all tasks included in the subject area.

Title Column. This column lists the task title for each task in the subject area.

Training Location Column. This column identifies the training location where the task is first trained to soldier training publications standards. If the task is first trained to standard in the unit, the word *Unit* will be in this column. If the task is first trained to standard in the training base, it will identify, by brevity code (ANCOC, BNCOC), the resident course where the task was taught. Figure 2-1 contains a list of training locations and their corresponding brevity codes.

AIT	Advanced Individual Training
UNIT	Trained in the Unit

Figure 2-1. Training Locations

Sustainment Training Frequency Column. This column indicates the recommended frequency at which the tasks should be trained to ensure soldiers maintain task proficiency. Figure 2-2 identifies the frequency codes used in this column.

BA	- Biannually
AN	- Annually
SA	- Semiannually
QT	- Quarterly
MO	- Monthly
BW	- Biweekly
WK	- Weekly

Figure 2-2. Sustainment Training Frequency Codes

Sustainment Training Skill Level Column. This column lists the skill levels of the MOS for which soldiers must receive sustainment training to ensure they maintain proficiency to soldier's manual standards.

SUBJECT AREA CODES

Skill Level 1

1 BASIC COMMUNICATIONS
2 INSTALLATION OF TACTICAL ATC EQUIPMENT
3 OPERATIONAL SUSTAINMENT OF ATC EQUIPMENT
5 PREPARATION OF ATC EQUIPMENT FOR MOVEMENT
6 WEATHER/ADVISORIES
7 ATC FORMS
8 NONRADAR CONTROL PROCEDURES
9 RADAR PROCEDURES
10 FLIGHT-FOLLOWING PROCEDURES
11 GENERAL ATC PROCEDURES

DUTY POSITION TRAINING REQUIREMENTS

Table 2-1 shows the training requirements for MOS 93C1.

Table 2-1. Duty position training requirements.

SKILL LEVEL	DUTY POSITION	SUBJECT AREAS	CROSS-TRAIN	TRAIN-UP/MERGER
1	VEHICLE DRIVER	N/A	N/A	TACTICAL TEAM LEADER/SHIFT LEADER
	ATC TWR OPERATOR	1-11	N/A	TACTICAL TEAM LEADER/SHIFT LEADER
	ATC GCA OPERATOR	1-11	N/A	TACTICAL TEAM LEADER/SHIFT LEADER
*See Part II, Sustained Training Column, for tasks within subject areas that apply at this skill level.				

MOS TRAINING PLAN

Table 2-2 lists the critical tasks for the MOS 93C1 Training Plan.

Table 2-2. Critical tasks list.

Subject Area	Task Number	Task Title	Training Location	Sustained Training Frequency	Sustained Training Skill Level
Skill Level 1					
1. BASIC COMMUNICATIONS	011-141-1052	Operate SINCGARS Equipment	AIT	QT	1-4
	011-143-1021	Communicate Using Interphone Procedures	AIT	SA	1-4
	011-143-1022	Decode Military Aircraft Designation Symbols, Service, and Mission Prefixes	AIT	AN	1-4
	011-143-5057	Communicate Using Radio Communication Procedures	AIT	SA	1-4
	113-573-6001	Recognize Electronic Countermeasures (ECM) and Implement Electronic Counter-Countermeasures (ECCM)	UNIT	SA	1-4
	113-573-8008	Use Signal Operating Instructions (SOI) Extract	UNIT	SA	1-4

Table 2-2. Critical tasks list (continued)

Subject Area	Task Number	Task Title	Training Location	Sustained Training Frequency	Sustained Training Skill Level
2. INSTALLATION OF TACTICAL ATC EQUIPMENT	011-143-0016	Install the Flight Coordination Central, AN/TSQ-61B	UNIT	SA	1-4
	011-143-1003	Install the Air Traffic Control Facility, AN/TSQ-97	UNIT	AN	1-4
	011-143-1007	Install the Air Traffic Control Central, AN/TSQ-70A	UNIT	SA	1-4
	011-143-1009	Install the Landing Control Central, AN/TSQ-71B	UNIT	SA	1-4
	011-143-1061	Install the Air Traffic Control Central, AN/TSW-7A	UNIT	AN	1-4
	011-143-5050	Install Beacon Set, AN/TRN-30 (V)1 or AN/TRN-30 (V)2	UNIT	MO	1-4
	011-143-7001	Introduction to the AN/TSQ-198 (Tactical Terminal Control System)	AIT	AN	1-4
	011-143-7002	Prepare the AN/TSQ-198 (Tactical Terminal Control System) for Movement	AIT	SA	1-4
	011-143-7003	Install the AN/TSQ-198 (Tactical Terminal Control System)	AIT	SA	1-4
3. OPERATIONAL SUSTAINMENT OF ATC EQUIPMENT	011-143-5000	Operate the Air Traffic Control Facility, AN/TSQ-97	UNIT	SA	1-4
	011-143-5002	Operate the Air Traffic Control Central, AN/TSQ-70A	UNIT	SA	1-4
	011-143-5004	Operate the Air Traffic Control Central, AN/TSW-7A	UNIT	AN	1-4
	011-143-5006	Operate the Landing Control Central, AN/TSQ-71B	UNIT	SA	1-4
	011-143-5008	Operate the Flight Coordination Central, AN/TSC-61B	UNIT	SA	1-4
	011-143-5014	Operate Radar Set, AN/FPN-40	UNIT	SA	1-4
	011-143-5051	Operate Beacon Set, AN/TRN-30 (V) 1 or (V) 2	UNIT	SA	1-4
	011-143-7004	Operate the AN/TSQ-198 (Tactical Terminal Control System)	AIT	SA	1-4

Table 2-2. Critical tasks list (continued)

Subject Area	Task Number	Task Title	Training Location	Sustained Training Frequency	Sustained Training Skill Level
5. PREPARATION OF ATC EQUIPMENT FOR MOVEMENT	011-143-0002	Prepare the Landing Control Central, AN/TSQ-71B, for Movement	UNIT	SA	1-4
	011-143-0003	Prepare the Aircraft Control Central, AN/TSQ-70A, for Movement	UNIT	AN	1-4
	011-143-0004	Prepare the Air Traffic Control Facility, AN/TSQ-97, for Movement	UNIT	AN	1-4
	011-143-0006	Prepare the Air Traffic Control Central, AN/TSW-7A, for Movement	UNIT	AN	1-4
	011-143-0009	Prepare the Flight Coordination Central, AN/TSC-61B, for Movement	UNIT	SA	1-4
	011-143-5054	Prepare the Beacon Set, AN/TRN-30 (V) 1 or (V) 2, for Movement	UNIT	SA	1-4
6. WEATHER/ ADVISORIES	011-143-0012	Process Pilot Reports (PIREPS)	AIT	SA	1-4
	011-143-5063	Decode METAR Weather Reports	AIT	AN	1-4
7. ATC FORMS	011-143-0014	Process Flight Progress Strips	AIT	SA	1-4
	011-143-5055	Record ATC Facility Daily Activities	AIT	AN	1-4
8. NONRADAR CONTROL PROCEDURES	011-143-0026	Control the Flight of VFR/SVFR Aircraft	AIT	SA	1-4
	011-143-1043	Provide Nonradar IFR Service	AIT	SA	1-4

Table 2-2. Critical tasks list (continued)

	Task Number	Task Title	Training Location	Sustained Training Frequency	Sustained Training Skill Level
9. RADAR PROCEDURES	011-143-0025	Control the Flight of IFR/SVFR Arrival/Departure Aircraft	AIT	SA	1-4
	011-143-0100	Transfer Radar Identification	AIT	SA	1-4
	011-143-1038	Provide Radar Approach Information	AIT	SA	1-4
	011-143-1039	Provide Airport Surveillance Radar Approach	AIT	SA	1-4
	011-143-1040	Provide Precision Approach Radar Approach	AIT	SA	1-4
	011-143-1044	Identify Aircraft Using Radar Procedures	AIT	SA	1-4
	011-143-1045	Provide Radar Separation	AIT	SA	1-4
	011-143-1050	Align Radar, AN/TPN-18A	UNIT	SA	1-4
	011-143-2001	Perform the Initial Orientation of Radar Set, AN/TPN-18A	UNIT	SA	1-4
10. FLIGHT-FOL-LOWING PROCEDURES	011-141-0001	Locate a Geographic Coordinate on a Sectional, JOG-A or TPC	AIT	AN	1-4
	011-143-0020	Provide Flight Following Service	AIT	SA	1-4
11. GENERAL ATC PROCEDURES	011-143-0008	Conduct Landing Zone/Pick Up Zone (LZ/PZ) Operations	UNIT	AN	1-4
	011-143-0010	Interpret Crash Grid Map	AIT	SA	1-4
	011-143-0015	Control Aircraft, Vehicles, and Personnel by ATC Light Gun Signals	AIT	QT	1-4
	011-143-0018	Provide Traffic Information/Advisories	AIT	QT	1-4
	011-143-0019	Select Runway for Use	AIT	QT	1-4
	011-143-0022	Provide Emergency Assistance	AIT	SA	1-4
	011-143-0023	Issue Airport Condition Information	AIT	SA	1-4
	011-143-0024	Perform Assumption of Duty Requirements	AIT	SA	1-4

Table 2-2. Critical tasks list (concluded)

	Task Number	Task Title	Training Location	Sustained Training Frequency	Sustained Training Skill Level
	011-143-5060	Control Aircraft Taxi	AIT	QT	1-4
	011-143-7000	Implement Basic Airspace Command and Control Procedures	AIT	SA	1-4
	071-334-4002	Establish a Helicopter Landing Point	UNIT	SA	1-4

CHAPTER 3

MOS/SKILL LEVEL TASKS

SKILL LEVEL 1

SUBJECT AREA 1: BASIC COMMUNICATIONS

Decode Military Aircraft Designation Symbols, Service, and Mission Prefixes 011-143-1022

Conditions: While performing duties as an air traffic control operator in an ATC facility or as an aviation operations specialist in a TOC, you are given AR 70-50, FAA Order 7110.65, DOD FLIP General Planning, and a requirement to visually identify and decode the designation of the aircraft.

Standards: Perform the task according to AR 70-50, FAA Order 7110.65, and DOD FLIP General Planning.

Performance Steps

1. Decode Aircraft Designation Symbols.
   a. The status prefix symbol indicates that an aircraft is being used for experimentation or a special or service test. This letter is placed to the immediate left of the modified mission symbol or, if no modified mission symbol applies, the mission or type symbol.
   b. The modified mission symbol indicates that the aircraft is so modified that its original intended capability no longer applies or that the aircraft has an added or restricted capability. This symbol consists of a prefix letter placed to the immediate left of the basic mission or type symbol. Only one modified mission symbol is used in any one designation.
   c. The basic mission symbol indicates the basic intended function or capability of the aircraft; for example, observation or utility.
   d. The type symbol is an additional letter that designates a helicopter and V/STOL aircraft. An aircraft identified by a type symbol, such as "H" for helicopter, will be further identified by only one mission symbol whether it is a basic mission or a modified mission symbol.
   e. The design number is the sequence number of each new design of the same basic mission or type of aircraft. A number is assigned consecutively for each basic mission or type. A new design number is assigned when an existing aircraft is redesigned to the extent that it no longer reflects the original configuration or capability.
   f. The series letter denotes differences affecting the relationship of the vehicle to its ground environment and major modifications to the aircraft, which result in significant changes to its logistics support. A series letter is assigned to each series change of a specific basic design. As new aircraft are designed, they are assigned a series letter in consecutive order, starting with the letter "A." To avoid confusion, the letters "I" and "O" will not be used as series symbols. The series letter completes the aircraft designation symbol.
2. Decode Military Aircraft Branch of Service Prefix.

3. Decode Military Aircraft Mission Prefix.

Evaluation Preparation: Setup: In an actual setting, require the soldier to interpret and decode military aircraft designation symbols, service, and mission prefixes. However, the requirement may be simulated by providing the soldier with a sample symbols and prefixes and asking him to decode them.

Brief Soldier: Tell the soldier he will be evaluated on his ability to decode military aircraft designation symbols, service, and mission prefixes.

Performance Measures	**GO**	**NO GO**
1. Decoded aircraft designation symbols.	____	____
2. Decoded military aircraft service prefix.	____	____
3. Decoded military aircraft mission prefix.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the Step correctly, and reevaluate the task.

References

Required	**Related**
AR 70-50	None
FAA Order 7110.65	
DOD FLIP General Planning	

Operate SINCGARS Equipment
011-141-1052

Conditions: As an aviation operations specialist, you are given a SINCGARS radio equipment and TM 11-5820-890-10-1, TM 11-5820-890-10-6 or TM 11-5820-890-10-8, EP Fill Device or ANCD containing signal operation instructions data (AN/CYZ-10), an SOI, and FM 6-02.19(FM 24-19).

Standards: According to TM 11-5820-890-10-1, TM 11-5820-890-10-6 or TM 11-5820-890-10-8, SOI, and FM 6-02.19(FM 24-19).

Performance Steps

1. Operate SINCGARS Single-channel.
2. Prepare SINCGARS for Operation.
3. Operate SINCGARS in Frequency Hopping Mode (Net Members).
4. Perform Operator Troubleshooting on SINCGARS.
5. Communicate using SINCGARS.

Evaluation Preparation: Setup: In a suitable training environment. Provide the soldier with a frequency, message to be sent, a simulated malfunction, encryption fills to use and all items listed in the conditions statement.

Brief Soldier: Tell the soldier that by using the SINCGARS radio and encryption device he is to ensure the system is properly setup, send a message using single channel mode, send a message using frequency hopping mode, and perform operator troubleshooting on the radio from a simulated malfunction you provided.

Performance Measures	GO	NO GO
1. Operated SINCGARS SC.	___	___
2. Prepared SINCGARS for operation.	___	___
3. Operated SINCGARS in FH mode (net members).	___	___
4. Performed operator troubleshooting on SINCGARS.	___	___
5. Communicated using SINCGARS.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
FM 6-02.19(FM 24-19)	None
TM 11-5820-890-10-1	
TM 11-5820-890-10-6	

Communicate Using Interphone Procedures

011-143-1021

Conditions: As an ATC operator in a field environment, given an air traffic control facility and [supporting equipment], you are assigned to a position in an ATC facility given interphone information that has to be prioritized and transmitted.

Standards: Determine priority of messages, interrupt lower priority messages, transmit messages using correct format/phraseology, and terminate interphone messages with operating initials according to FAA Order 7110.65.

Performance Steps

1. Determine the Interphone Transmission Priorities. Give priority to interphone transmissions as follows:
   a. First priority—emergency messages including essential information on aircraft accidents or suspected accidents. After an actual emergency has passed, give a lower priority to messages relating to that accident.
   b. Second priority—clearance and control instructions.
   c. Third priority—movement and control messages using the following order or preference when possible: progress reports, departure or arrival reports, and flight plans.
   d. Fourth priority—movement messages on VFR aircraft.
2. Interrupt Lower Priority Messages. Use the words "emergency" or "control" to interrupt lower priority messages when you have an emergency or a control message to transmit.
3. Transmit an Interphone Message using ICAO Phonetics. Use the ICAO pronunciation of numbers and, as necessary, the letters for clarification.
4. Terminate the Interphone Message. Stating the operating initials of the parties involved terminates interphone messages.

Evaluation Preparation: Setup: Require the soldier to use interphone procedures when messages are to be transmitted or received. Providing the soldier with canned interphone messages may simulate the requirement. The supervisor will act as the transmitting or receiving station.

Brief Soldier: Tell the soldier he will be evaluated on the correct use of interphone procedures according to AR 95-11 and FAA Orders 7110.10 and 7110.65. The soldier will not be informed of his progress during the performance of the task.

Performance Measures	GO	NO GO
1. Determines the interphone transmission priority.	____	____
2. Interrupts low priority messages.	____	____
3. Transmits an interphone message.	____	____
4. Terminates the interphone message.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
FAA Order 7110.65	AR 95-11
	AV2408
	FAA Order 7110.10

Communicate Using Radio Communication Procedures
011-143-5057

Conditions: You are a member of an ATC team required to transmit and receive control information using radio communication equipment.

Standards: Monitor radios, make authorized transmissions, and transmit messages not directly associated with ATC according to FAA Order 7110.65 and FM 3-04.303(FM 1-303).

Performance Steps

1. Monitor Radios. Monitor interphone and assigned radio frequencies continuously.
2. Make Authorized Transmissions. Transmit only those messages necessary for air traffic control or ones, which contribute, to air safety.
   a. Relay official FAA messages as required.
   b. Relay operational information to military aircraft.
   c. Use correct message format. Communicate with an aircraft via radio for both initiation and reply.
      (1) For sector/position initial radio contact, use the following format:
         (a) Identify the aircraft.
         (b) Identify the ATC unit.
         (c) Relay the message, if any.
         (d) Use the word "over," if required.
      (2) Subsequent radio transmissions from the same sector/position shall follow the same format as in (1) above, except the identification of the ATC unit may be omitted.
      (3) During the final portion of a radar approach (terminal), the aircraft identification may be omitted after the initial contact.
   d. Use authorized words and phrases. Use the words or phrases in radio telephone and interphone communications contained in the pilot/controller glossary (FAA Order 7110.65).
3. Transmit Messages not Directly Associated with ATC. Although control instructions shall not be issued, on occasion third-party messages must be transmitted that pertain to the safety of aircraft operations or the preservation of life and/or property. Such messages may be authorized on FAA radio communication channels. ATC specialists may handle them or by the individuals making the request. The individuals making the request may be given access to facilities to issue these messages personally. Third-party transmissions may be interrupted, when required, to continue ATC services.

Evaluation Preparation: Setup: Require the soldier to communicate messages using radio communication procedures. The supervisor may act as the transmitting or receiving station.

Brief Soldier: Tell the soldier he will be evaluated on the correct use of radio communication procedures according to FAA Order 7110.65 and FM 3-04.303(FM 1-303). The soldier will not be informed of his progress during the performance of the task.

Performance Measures	GO	NO GO
1. Monitors radios. (All assigned radio frequencies must be monitored continuously.)	____	____
2. Makes authorized transmissions. (Only those messages necessary for ATC or which otherwise contribute to air traffic safety are transmitted.)	____	____
3. Relays authorized messages and operational information. (Official FAA messages and their sources and operational information are relayed, as necessary.)	____	____
4. Transmit messages not directly associated with ATC.	____	____
5. Uses authorized words and phrases. (Authorized military and FAA phrases are used.)	____	____
6. Transmits messages not directly associated with ATC. (Authorized non-ATC messages may be transmitted but must be interrupted when ATC services are required.)	____	____
7. Uses correct message format. (Correct message format is used on the initial call-up or when a reply is made to a call-up.)	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
FAA Order 7110.65	None
FM 3-04.303(FM 1-303)	

RECOGNIZE ELECTRONIC COUNTERMEASURES (ECM) AND IMPLEMENT ELECTRONIC COUNTER-COUNTERMEASURES (ECCM)

113-573-6001

Conditions: You are given a radio set, electronic interference, technical manuals, and unit SOI extract. Supervision and assistance will be available.

Standards: Determine the type of electronic warfare that is directed at your station and employ ECCM for continued operation.

Performance Steps

1. Introduction. There is a close relationship between ECM and communications security. Both defensive arts are based on the same principle: an enemy who does not have access to our essential elements of friendly information is a much less effective foe. The major goal of COMSEC is to make sure friendly use of the electromagnetic spectrum for communications is unexploitable by the enemy. The major goal of practicing sound ECCM techniques is to ensure the continued use of the electromagnetic spectrum. ECCM techniques are designed to ensure commanders some degree of confidence in the continued use of these techniques. Our objective must be to ensure that all communications equipment can be employed effectively by tactical commanders in spite of the enemy's concerted efforts to degrade our communications and gain the tactical advantage. The modification and the development of equipment to make our communications less susceptible to enemy exploitation are expensive processes. Equipment is being developed and fielded which will provide an answer to some of the ECCM problems. Commanders, staff, planners, and operators remain responsible for security and continued operation of all communications equipment.
   a. Communications equipment operators must be taught what jamming and deception can do to communications. They must be made aware that incorrect operating procedures can jeopardize the unit's mission and ultimately increase unit casualties. Preventive and remedial ECCM techniques must be employed instinctively. Maintenance personnel must be made aware that unauthorized or improperly applied modifications may cause equipment to develop peculiar characteristics that can be readily identified by the enemy.
   b. ECCM should be preventive in nature. ECCM should be planned and applied to force the enemy to commit more jamming, interception, and deception resources to a target than it is worth or more resources than are available. ECCM techniques must also be applied to force the enemy to doubt the effectiveness of the enemy's jamming and deception efforts.
   c. Before we can begin to prevent ECM, we must first be certain of what we are trying to prevent.
      (1) Jamming is deliberate radiation, reradiation, or reflection of electromagnetic energy with the object of impairing the use of electronic devices, equipment, or systems. The enemy conducts jamming operations against us to prevent us from effectively employing our radios, radars, navigational aids, satellites, and electro-optics. Obvious jamming is normally very simple to detect. The more commonly used jamming signals of this type are described below. Do not try to memorize them; just be aware that these and others exist. When experiencing a jamming incident, it is much more important to recognize it and take action to overcome it than to identify it formally.

(a) Random noise. Random noise is random in amplitude and frequency. It is similar to normal background noise and can be used to degrade all types of signals.
(b) Stepped tones. These tones are transmitted in increasing and decreasing pitch. They resemble the sound of bagpipes.
(c) Spark. The spark is easily produced and is one of the most effective forms of jamming. Bursts are of short duration and high intensity. Sparks are repeated at a rapid rate and are effective in disrupting all types of communications.
(d) Gulls. The gull signal is generated by a quick rise and a slow fall of a variable radio frequency and is similar to the cry of a sea gull.
(e) Random pulse. In this type of interference, pulses of varying amplitude, duration, and rate are generated and transmitted. Random pulses are used to disrupt teletypewriter, radar, and all types of data transmission systems.
(f) Wobbler. The wobbler is a signal frequency that is modulated by a low and slowly varying tone. The result is a howling sound, which causes a nuisance on voice radio communications.
(g) Recorded sounds. Any audible sound, especially of a variable nature, can be used to distract radio operators and disrupt communications. Examples of sounds include: music, screams, applause, whistles, machinery noise, and laughter.
(h) Preamble jamming. This type of jamming occurs when the synchronization tone of speech security equipment is broadcast over the operating frequency of secure radio sets. Preamble jamming results in radios being locked in the receive mode. It is especially effective when employed against radio nets using speech security devices.
(i) Subtle jamming. This type of jamming is not obvious at all. With subtle jamming, no sound is heard from our receivers. Incoming friendly signals cannot be received, but everything appears normal to the radio operator.

(2) Meaconing. This is a system of receiving radio beacon signals from NAVAIDs and rebroadcasting them on the same frequency to confuse navigation. The enemy conducts meaconing operations against us to prevent our ships from arriving at their intended targets or destinations.
(3) Intrusion. Intrusion is the intentional insertion of electromagnetic energy into transmission paths with the objective of deceiving equipment operators or causing confusion. The enemy conducts intrusion operations against us by inserting false information into our receiver paths. This false information may consist of voice instructions, ghost targets, coordinates for fire missions, or even rebroadcasting prerecorded data transmissions.
(4) Interference. Interference is any electrical disturbance that causes undesirable responses in electronic equipment. As a meaconing, intrusion, jamming, and interference term, interference refers to the unintentional disruption of the use of radios, radars, NAVAIDs, satellites, and electro-optics. This interference may be of friendly, enemy, or atmospheric origin. For example, a civilian radio broadcast interrupting military communications is interference.

2. Communications Protective Measures.
a. Properly applied ECCM techniques will deny valuable intelligence sources to the enemy and eliminate much of the threat he poses to our combat operations. The following discussion describes practical ways to protect communications systems.
b. The siting of the transmitting antenna is critical in the ECCM process. Before making a decision about a proposed site for either a single-channel or multichannel antenna, there are two basic questions to answer:

(1) Are communications possible from the proposed site?
(2) Are there enough natural obstacles between the site and the enemy to mask transmission?

c. The final decision on site selection will often be a trade-off between the answers to these two questions. The communications mission must have first priority in determining the actual antenna sites. Additional actions must be taken to limit the enemy's chances of interception and location successes. Transmitters and antennas should be located away from the headquarters. The two locations should be separated by more than 1 kilometer (0.62 mile). Erroneous radio frequency data used in conjunction with observation data may favor the targeting of a decoy site instead of the actual transmitter site. This ploy depends upon good camouflage at the actual site. Transmitters grouped in one area indicate the relative value of the headquarters. Directional antennas reduce radiation exposure to enemy receivers and enhance the intended signal. (For instruction on directional antennas refer to TC 24-21).
d. Use the lowest possible transmitter power output. Lower power means less radiated power reaches the enemy and thus increases his difficulty in applying ECM.
e. Use only approved code systems. Never use unauthorized (homemade) codes. Use of other than National Security Agency generated codes can provide a false COMSEC sense of security that can be exploited by enemy radio intercept operators. Traffic be should passed in the clear, only when necessary.
f. Rather than assuming equipment is defective, assume that it is operational. Operators must not contact other stations for equipment checks simply because no message has been transmitted in the set time frame.

Evaluation Preparation: Setup: Provide the soldier with a radio set operating in a radio net with interference applied to the system.

Brief Soldier: Tell the soldier to ensure he is applying proper tactics to the jamming system.

Performance Measures	**GO**	**NO GO**
1. Determine if ECM is being employed. a. Check for accidental unintentional interference. b. Check for intentional interference.	____	____
2. Initiate operator procedures. a. Check the equipment ground to ensure the interference is not caused by buildup of static electricity. b. Disconnect the antenna. c. Identify the type of sound. d. Move the receiver or reorient the antenna, if possible, and listen or look for variations in the strength of the disturbance. e. Tune the receiver above or below the normal frequency.	____	____
NOTE: If such detuning causes the intensity of the interfering signal to drop sharply, it can be assumed that the interference is the result of spot jamming.		
3. Identify jamming signals.	____	____
4. Employ antijamming measures.	____	____

NOTE: Antijamming measure have been designed to allow radio operators to work effectively through intentional interference. Regardless of the nature of the interfering signal, radio operators will not reveal in the clear the possibility or success of enemy jamming.

Evaluation Guidance: Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier scores NO-GO, show him what was done wrong and how to do it correctly.

References

Required	Related
TC 24-21	FM 6-02(FM 24-1)
TM 11-5820-890-10-1	FM 6-24.18(FM 24-18)
	FM 6-24.33(FM 24-33)
	TM 11-5840-281-12
	TM 11-5840-281-12-1

SUBJECT AREA 2: INSTALLATION OF TACTICAL ATC EQUIPMENT

Install the Air Traffic Control Central, AN/TSQ-70A
011-143-1007

Conditions: You are assigned as a member of an ATC tower team at a predetermined site and have a requirement to install the aircraft control central. You are provided a vehicle mounted AN/TSQ-70A, TM 11-5895-579-12, a power source and appropriate TM for the power source, pioneer tools, and a standard tool kit.

Standards: Position and assemble the AN/TSQ-70A into an operational unit capable of facilitating visual sighting and communication with aircraft according to TM 11-5895-579-12. Install power source according to appropriate TM.

Performance Steps

1. Position the Equipment. Certain components of the aircraft control central must be assembled before operational use. All components are installed within the shelter with the exception of meteorological equipment, antennas, remote consoles, interconnecting cables, and power equipment.

WARNING
Injury or death could result from failure to comply with safe practices. Therefore, the safety requirements in TB 43-0129 must be strictly complied with during the installation of this equipment.

2. Assemble the Tower.
   a. Loosen the link-lock fasteners (three on each side) that hold the tower cover in place over the opening at the top of the shelter.
   b. Lift the tower cover from the opening and set it aside.
   c. Remove the tower Plexiglas side panels from the tower storage case.
   d. Assemble the tower by placing the side of a panel containing thumbscrews against the edge of a panel containing mating nuts and tighten the thumbscrews to secure the panels. Repeat this procedure on the two other sides.
   e. Place the assembled tower over the tower opening at the top of the shelter.
   f. Place the tower cove, which was removed as shown in b above, on top of the assembled tower with the flare gun port as close as possible to the front of the shelter. Secure the tower cover in place with the link-lock fasteners.
   g. Insert one end of the S-hook, which is provided in the hole in the tower cover support frame, and hang the signal light gun on the other end of the S-hook.
   h. Connect the cable from the signal light gun transformer (mounted on the front side of the radio rack) to the CONVENIENCE outlet.
   i. Connect the blower cable assembly between the blower connector on the tower cover and the BLOWER 1 outlet.

3. Install the Vestibule.

NOTE: When performing the following procedures, use the short bottom legs when the shelter is on the ground; the medium bottom legs when the shelter is on casters; and the long bottom legs when the shelter is on a truck.

a. Remove the components of the vestibule from the wooden storage crate.
b. With the sloped edge of the assembly up, place the rear gable assembly in position along the upper rear wall of the shelter. Secure the assembly with the four captive retaining bolts.
c. Assemble the front gable assembly, top legs, bottom legs, adjustable legs, side support ribs, and top support ribs as described below.
   (1) Place the front gable assembly on its back near the location on the shelter where it is to be installed.
   (2) Slide a top leg on the flange at each end of the front gable assembly that is parallel to the ground. Ensure that the flange on the opposite end of the top leg is facing the same direction as the three flanges on the front gable assembly.
   (3) Slide the appropriate bottom legs onto the top legs with the holes in the bottom legs away from the top legs and facing each other.
   (4) Slide the adjustable legs into the bottom legs so that the holes in each adjustable leg face in the same direction as the holes in the bottom legs. Secure the adjustable leg (fully telescoped) to the bottom leg using the pip pins.
   (5) Slide a side support rib on the flange on each top leg that was installed as shown in (2) above.
   (6) Slide a top support on each flange of the front gable assembly.
d. Lift the components assembled in c above and join them to the mating flanges on the shelter.
e. Position the adjustable legs so that the top support ribs are parallel to the shelter roofline. Secure the legs using the pip pins.
f. Drive the anchors on the adjustable legs into the ground to secure the frame.
g. Mount the tarpaulin on the frame as described below.
   (1) Unfold the tarpaulin and position it with the grommet fastener holes facing the rear of the shelter.
   (2) Slide the tarpaulin over the assembled vestibule frame. Carefully slide the left side of the tarpaulin between the frame and the air conditioner.
   (3) Secure the tarpaulin to the shelter with the fasteners provided on the shelter.

4. Install the Antennas.
   a. FM antenna installation (A1, E1, E2, E3).
      (1) Assemble the FM antenna components listed below before the three FM antennas are installed.
         (a) Three FM antenna support brackets with attaching hardware.
         (b) Three antennas (AS-1729/VRC). Three antenna matching units (MX-6707/VRC). Three antenna elements (AS-1730/VRC) and three antenna elements (AT-1095/VRC).
         (c) Three FM antenna cable assemblies.
         (d) Three FM antenna control cable assemblies.
      (2) Assemble and mount each FM antenna as described below. (Two antennas are mounted on the curbside of the shelter and one antenna is mounted on the roadside.)
         (a) Fasten the FM antenna support bracket to the shelter using the mounting hardware provided.

(b) Mount the antenna-matching unit (MX-6707/VRC) on the mounting bracket using the bolts provided.
(c) Screw the antenna elements (AS-1730/VRC and AT-1095/VRC) together tightly.
(d) Screw the assembled antenna elements tightly into the antenna-matching unit (MX-6707/VRC).
(e) Thread a five-inch length of safety wire through the two small holes in the hexagonal portion of the AS-1730/VRC and then through a pair of safety wire holes in the spring mount on the MX-6707/VRC.

NOTE: Three pairs of safety wire holes are in the spring mount. Select the pair of holes that will hold the safety wire tight when the AS-1730/VRC begins to loosen.

(f) Connect an FM antenna cable assembly from the coaxial connector on the antenna-matching unit (MX-6707/VRC) to the appropriate FM connector on the antenna entrance panel.

NOTE: Three cable assemblies are provided. The 2-foot cable is used for the FM-1 antenna, the 3 1/2-foot cable for the FM-2 antenna, and the 11-foot cable for the FM-3 antenna.

(g) Connect an FM antenna control cable assembly from the remaining connector on the antenna-matching unit (MX-6707/VRC) to the ANT CONTROL connector on the antenna entrance panel adjacent to the FM connector that was selected in (f) above.

b. VHF Antenna Installation (A1A17).
(1) Assemble the VHF antenna components listed below before the antenna is installed.
(a) VHF antenna mast.
(b) Adapter bracket.
(c) Three VHF support arms.
(d) Antenna (AS-112/TRC-7).
- Three bases (AB-7/TRC-7).
- Eighteen elements (AB-78/TRC-7).

(e) Three VHF antenna cable assemblies.
(2) Fasten the VHF antenna support bracket to the shelter using the mounting hardware provided. Install the VHF antenna array as described below.
(a) Slide the three bases (AB-77/TRC-7) over the three support rods of the VHF support arms and tighten the thumbscrews to secure them.
(b) Screw six elements (AB-78/TRC-7) into each of the three bases (AB-77/TRC-7). Three elements extend downward and three upward on each base.
(c) Remove all pip pins from the holes in the adapter bracket and slide the square end of each VHF support arm into its mating hole in the adapter bracket. Secure the VHF support arms using the pip pins.
(d) Slide the VHF antenna mast into its mating hole in the adapter bracket and secure it using the pip pin, which was removed in (c) above.
(e) Wrap the VHF antenna cable assembly twice around its associated VHF support arm and connect it to the coaxial connector on each base (AB-77/TRC-7). Repeat these steps for the other two cable assemblies.
(f) Tape or tie the three VHF antenna cable assemblies to the VHF antenna mast just under the adapter bracket. Be sure to relieve any strain on the coaxial connectors at the AB-77/TRC-7.
(g) Slide the opposite end of the VHF antenna mast into the VHF antenna support bracket. Rotate the antenna assembly until one of the VHF support arms forms a 45-degree angle with the sides of the shelter (as viewed from above) and the hole in the VHF antenna mast lines up with the hole in the VHF antenna support bracket. Secure the VHF antenna mast using the pip pin.

(h) Connect the free end of each of the VHF antenna cable assemblies to the VHF-1, VHF-2, or VHF-3 connector on the antenna entrance panel.

c. UHF Antenna Installation (A1A16).
   (1) Assemble the UHF antenna components listed below before installing the antenna.
      (a) UHF antenna support mast.
      (b) Adapter bracket.
      (c) Three UHF support arms.
      (d) Three antennas (AT-197/GR).
      (e) Three UHF antenna cable assemblies.
   (2) Fasten the UHF antenna support bracket to the shelter using the mounting hardware provided. Install the UHF antenna array.
      (a) Bolt the UHF antenna to the mounting plate on each of the three UHF support arms. Check to ensure that the antenna elements are secure.
      (b) Wrap the UHF antenna cable assembly twice around its associated UHF support arm and connect it to the RF connector on its UHF antenna. Repeat these steps for the other two cable assemblies.
      (c) Remove all pip pins from the holes in the adapter bracket and slide the square end of each UHF support arm into its mating hole in the adapter bracket. Secure the support arms using the pip pins.
      (d) Slide the UHF antenna mast into the adapter bracket. Secure the mast using the pip pin, which was removed in (c) above.
      (e) Tape or tie the three UHF antenna cable assemblies to the UHF antenna mast just under the adapter bracket. Be sure to relieve any strain on the RF connector at the antenna.
      (f) Slide the opposite end of the UHF antenna mast into the UHF antenna support bracket on the shelter. Rotate the antenna assembly until one of the UHF support arms form a 45-degree angle with the sides of the shelter (as viewed from above) and the hole in the UHF antenna mast lines up with the hole in the UHF antenna support bracket. Secure the UHF antenna mast with the mast base pip pin.
      (g) Connect the free ends of the UHF antenna cable assemblies to the UHF-1, UHF-2, and UHF-3 connectors on the antenna entrance panel.

d. HF and LF Antenna Installation.
   (1) HF antenna (A1E4). Install the HF antenna as described below.
      (a) Screw the HF antenna sections together.
      (b) Screw the assembled sections to the HF antenna base.
      (c) Connect a short length of coaxial cable (with the outer cover and shield removed) between the terminal on the HF antenna base and the top terminal of the HF antenna feedthrough.
   (2) LF antenna. Installation instructions are not given because an LF antenna is not furnished with this facility. However, a 50-foot length of field cable and a UG-30/U connector are furnished to connect any antenna used for LF communications to the LF ANT connector on the antenna entrance panel.

e. Wind Transmitter Installation on the Shelter.
   (1) Connect one end of the 35-foot wind transmitter cable assembly to the connector (A1A18) on the bottom of the wind transmitter.
   (2) Feed the cable through the mast assembly using the six captive screws.
   (3) Secure the mast assembly to the shelter using the bolts provided.
   (4) Secure the free end of the wind transmitter cable assembly to the AN/GMQ-11 connector on the signal entrance panel.

5. Perform a Remote Console Installation. For remote control operation of the radio sets in the shelter, the master remote console, the support remote console, the remote secure box, and the wind transmitter may be installed in a tower or in a temporary location that is within a 100-foot radius of the shelter. For a remote installation, perform the applicable procedures described below.
   a. Master remote console and support remote console (A2, A3).
      (1) Remove the master and the support remote consoles from their metal storage boxes.
      (2) Remove the cover from the support remote console and then remove the eight legs and the eight extension legs from inside.
      (3) Place each console on its back, slide a leg in each corner of the console, and secure the legs using a pip pin.
      (4) Slide an extension leg into each leg and secure the extensions at the desired length using a pip pin.
      (5) Stand each console on its legs.
      (6) Remove the cover from the master remote console.
      (7) Loosen the screws that hold the hinged portions of the top on the master and the support remote consoles. Secure them in their raised position.
      (8) Remove the telephone key panel and the radio key panel from the radio operator's console in the shelter.
      (9) Install the panels in the support remote console and make the cable connections at the rear of the panels.
      (10) Connect the foot switch, microphone, headset-microphone, and handset to their respective connectors on both the master and support remote consoles.
   b. Remote secure box (A5). If the remote secure box is to be used, remove the secure control from the radio operator's console in the shelter. Make the cable connections at the rear of the secure control and install the secure control in the remote secure box. Connect a headset-microphone to the HEADSET jack on the remote secure box.
   c. Wind transmitter. The wind transmitter normally is mounted on the shelter. If desired, the mast assembly and wind transmitter may be removed from the shelter and installed at a remote location near the remote consoles.
   d. Remote cable installation.
      (1) Connect the 5-foot remote signal cable assembly between the master remote console REMOTE OUT jack and the support remote console REMOTE IN jack.
      (2) Connect the 100-foot cable assembly, AC power (W30) between the AC IN jack on the master remote console and the 115 VAC outlet on the power entrance panel.
      (3) Connect the 100-foot remote signal cable assembly between the REMOTE IN jack on the master remote console and the REMOTE CONSOLE jack on the signal entrance panel.
      (4) If the wind transmitter is installed on the shelter, connect the 100-foot wind transmitter cable assembly between the AN/GMQ-11 IN jack on the master remote console and the REMOTE WIND SPEED INDICATOR jack on the signal entrance panel.
      (5) If the wind transmitter is installed at the remote location, connect the 35-foot wind transmitter cable assembly between the jack on the bottom of the wind transmitter and the AN/GMQ-11 IN jack on the master remote console. Also connect the 100-foot wind transmitter cable assembly between the AN/GMQ-11 OUT jack on the master remote console and the AN/GMQ-11 jack on the signal entrance panel.
      (6) Connect the 100-foot secure cable assembly from the CRYPTO jack on the secure entrance panel to the secure cable connector on the remote secure box.

6. Connect the Power.

WARNING

Be sure to ground the power trailer and the shelter before starting the generators.

CAUTION

Ensure that the three-phase AC power is connected in the correct phase between the shelter and the power trailer as indicated below. Failure to do so can result in equipment damage.

a. Select damp spots within the 10-foot length of the grounding straps and drive the grounding rods (one near the shelter and one near the power trailer) into the ground.
b. Connect a grounding strap between the GROUND TERMINAL on the power entrance panel and the grounding rod and a grounding strap between the grounding terminal on the power trailer (as described in TM 5-6115-365-15) and its grounding rod.
c. Connect the 100-foot AC power cable assembly between the power trailer and the power entrance panel AC POWER IN 120/208 VAC 30 60 CY jack.
d. Ensure that the MAIN circuit breaker on the AC power distribution panel is set to OFF.
e. Set the transfer switch on the power trailer to OFF.
f. Start the power trailer generators as described in TM 5-6115-365-15.
g. When the generator is up to its rated output frequency and voltage, set the transfer switch to GEN 1 or GEN 2, as desired.
h. Check to ensure that the PHASE SEQUENCE INDICATOR on the AC power distribution panel illuminates.
i. Repeat the procedures in d through g above until the PHASE SEQUENCE INDICATOR illuminates when AC power is supplied.
j. Position the transfer switch to OFF.
k. Connect the air conditioner cable assembly between the AIR COND connector on the power entrance panel and the AC power connector on the air conditioner.

7. Connect the Telephone Lines, if used. A maximum of four telephone lines can be connected to the shelter. Connect the telephone lines (field wire pairs) to the signal entrance panel as described below.
   a. Skin approximately one-half inch of cover from each wire.
   b. Connect each field wire pair to the matching binding posts.
   c. Route the opposite end of the field wire pair to its desired location to allow for installation of subscriber telephones.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment. Have the soldier perform the task in an actual setting or provide a training site.

Brief Soldier: Tell the soldier that he will be evaluated on installing the AN/TSQ-70A according to the appropriate TMs and unit SOP. Tell the soldier that he will not be informed of his progress during performance of the task except to prevent personnel injury or damage to the equipment.

Performance Measures	**GO**	**NO GO**
NOTE: Use TM 11-5895-579-12 and the power source technical manual.		
1. Positions the equipment.	____	____
2. Unpacks the equipment.	____	____
3. Installs the tower.	____	____
4. Installs the vestibule.	____	____
5. Installs the antennas.	____	____
6. Installs the remote consoles.	____	____
7. Connects the power.	____	____
8. Connects the telephone lines.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
TM 11-5895-579-12	TM 5-6115-365-15

Install the Flight Coordination Central, AN/TSQ-61B
011-143-0016

Conditions: You are a member of a team required to provide flight-following to aircraft. You are given an AN/TSC-61B, power source, electronic equipment tool kit, pioneer tools, TM 11-5895-469-12, TM 11-5820-538-12, and TM for power source.

Standards: Select site, install power unit, assemble antennas and antenna mast, and connect external connections and power source, according to TM 11- 5895-469-12, TM 11-5820-583-12, and power source TM.

Performance Steps

1. Select the Site. The location of the FCC shelter depends on the tactical situation and the use of the shelter in its assigned area. When installed on the ground, the shelter should be located on a site that is reasonably dry and level. Depressions (gullies and ravines), valleys, and other low places are poor locations for radio reception and transmission. A cleared site, which is large enough for the FCC, the telescoping mast, and the power units is required. The telescoping mast requires a reasonably flat area approximately 60 feet in diameter. The cleared site should not be underneath or close to a steel bridge, an underpass, power lines, or any RF-radiating equipment such as diathermy or X-ray machines. Whenever possible, use concrete blocks or wooden beams for the foundation. Position the shelter to facilitate connections to the power entrance and antenna entry panels. If the shelter is to remain truck-mounted, remove the ladder from the shelter and secure it to the truck tailgate. To reduce generator noise interference, position the shelter about 75 to 100 feet away from the power source.

2. Install the Power Source.

NOTE: After the power unit has been towed to the operating site and positioned as outlined above, set up the unit as described below.

   a. Unhook the safety chains from the towing vehicle and secure the chains to the tie-down loops on the trailer frame.
   b. Close the shutoff valves on the air hoses at the rear of the towing vehicles.
   c. Uncouple the air hoses and fit the dummy plugs into the air hoses on the towing vehicle.
   d. Secure the trailer hoses to the dummy couplings on the trailer.
   e. Disconnect the intervehicle cable from the towing vehicle receptacle.
   f. Remove the clevis pin and drop the landing gear brace.
   g. Remove the clevis pin and drop the landing gear into position.
   h. Secure the landing gear brace to the landing gear with a clevis pin.

3. Assemble the Antennas (Antenna Installation Number 1). The shelter-mounted array is assembled from three mounting plates, one UVU antenna, one VUV antenna, and one FM antenna. The remote antennas consist of the HF antenna mounted on the HF coupler case and two FM antennas mounted on tripods. All components and the necessary hardware are provided with the FCC. When assembling the array, be sure to use the proper flat washer and lock washer combination.
   a. Assemble the three FM antennas by screwing an AT-1095/VRC element into each AS-1730/VRC element. Screw the antenna elements into the antenna bases. Installation of the FCC antenna system can be made using the 50-foot telescoping mast or without the

mast. The configuration to be installed affect site layout, installation time, personnel, and forecast of FCC operational availability.
b. Attach the SC-D-889536 FM antenna mount to the shelter using the six bolts supplied.
c. Mount one FM antenna on the mount with the four bolts supplied.
d. Assemble two FM antenna tripods.
e. Mount the remaining two FM antennas on the tripods.
f. Attach the SC-D-889535 antenna mount (one on the curbside rear top corner and one on the roadside front top corner) using the three bolts supplied.
g. Mount the VUV antenna on the front antenna-mounting bracket by slipping the split ring portion of the clamp around the antenna and mount; tighten the attaching bolt.
h. Mount the UVU antenna on the front mounting bracket as described in g above.

4. Assemble the Antenna (Antenna Installation Number 2). The shelter-mounted array consists on one FM antenna and one VUV antenna. The remote antennas consist of an FM tripod-mounted antenna, an HF antenna, and the 50-foot mast array. The telescoping mast antenna array is a T-bar design supplied with bolts, nuts, washers, one UVU antenna, and one FM antenna. All of the components and the necessary hardware are provided with the FCC. When assembling the array, be sure to use the proper flat washer and lock washer combination. Figure 0016-1 shows the side view of an erected AB-577/GRC with an AB-720/G antenna support and an antenna array.
   a. Attach the AB-720/G with the mating adapter to the 50-foot antenna mast; tighten the bolt.
   b. Install the SC-D-881835 adapter to one arm of the antenna support assembly; tighten the bolt.
   c. Mount the UVU antenna by slipping the split ring portion of the clamp around the SC-D-881835 adapter; tighten the bolt.
   d. Attach the SC-D-881815 adapter assembly in the remaining arm of the antenna support assembly; tighten the bolt.
   e. Assemble the three FM antennas by screwing an AT-1095/VRC element into each AT-1096/VRC. Screw the assembled elements into the antenna bases.
   f. Mount one FM antenna in the SC-D-881815 adapter, which is part of the array, mounted on the 50-foot mast.
   g. Attach the SC-D-889536 FM antenna mount to the shelter using the six bolts supplied.
   h. Mount one FM antenna on the mount with the four bolts supplied.
   i. Assemble one FM antenna tripod and mount one FM antenna on the tripod.
   j. Attach the SC-D-889535 antenna mount to the roadside front top corner of the shelter with the three bolts supplied.
   k. Mount the VUV antenna on the mounting bracket.
   l. Mount the remaining HF antenna by screwing it to the base provided on the HF antenna coupler case.
   m. Tighten all bolts and screws.

5. Install the Guy Line Anchors.

CAUTION

Injury or death could result from failure to comply with safety procedures. Therefore, all safety requirements in TB 43-0129 must be complied with during the installation of this equipment. In addition to the individuals erecting the mast, three or more individuals should be available to hold the ends of the guy lines while the mast is being erected. This is particularly important when the ground is wet, frozen, or slippery and the wind is blowing more than 15 miles per hour (13 knots or 24 kilometers per hour).

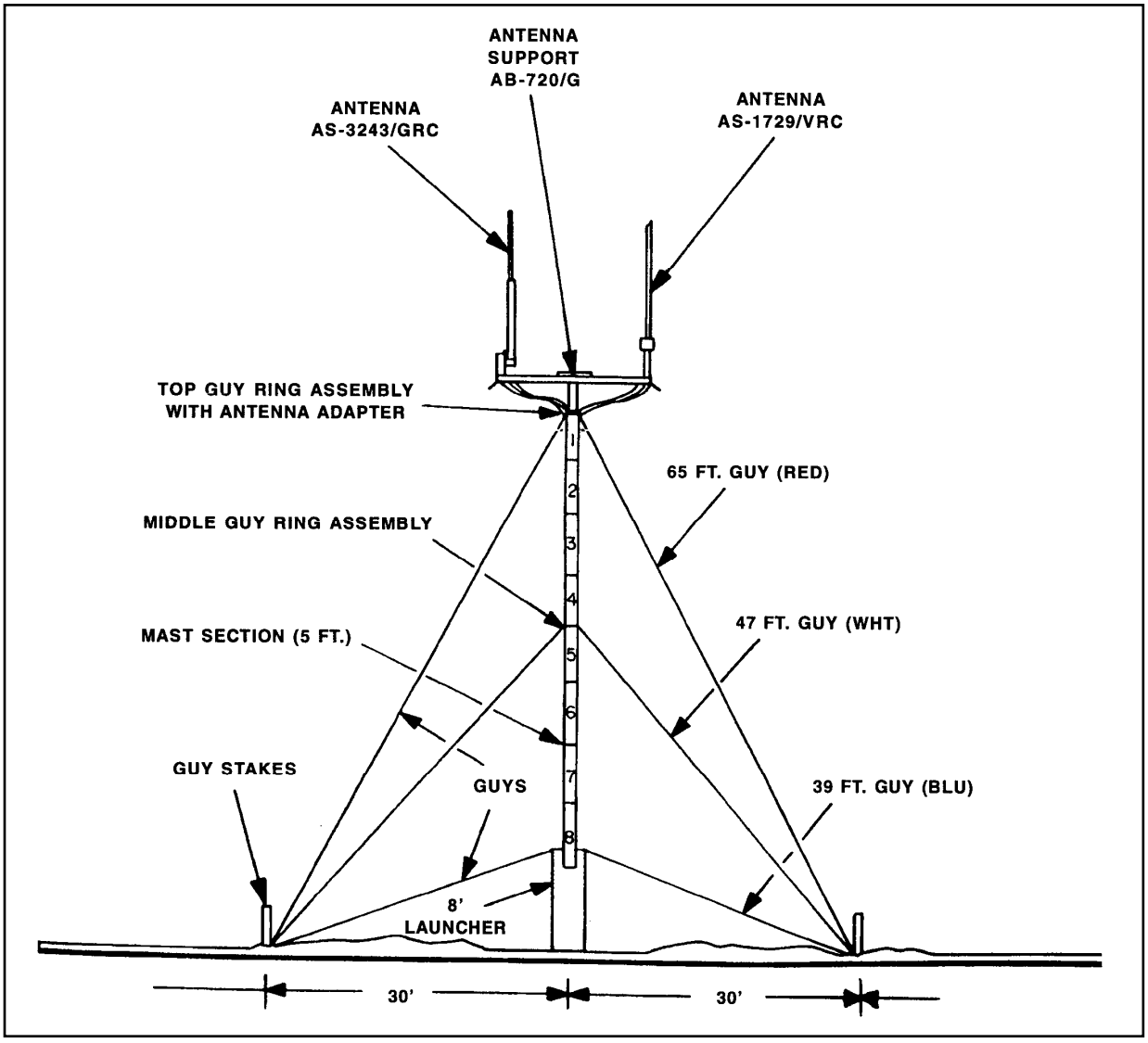


Figure 0016-1. Erected AB-577/GRC mast with AB-720/G antenna support and antenna array (side view)

a. Selecting the required items. Select the radius rope, the digging bar, and the hammer. Depending on the condition of the soil, select either the GP-112/U stakes or the screw-type anchors. For normal soil conditions, use the screw-type anchors. If the ground is composed of shale, sandstone, soft rock, or ice, use the GP-112/U stakes. In some cases, small trees, large rocks, or stumps may be used as guy line anchors.
b. Locating the guy line anchors. The AB-577 guy line anchors may be placed up to five feet away from the mast if obstructions prevent their being located as described. The guy line assemblies are long enough to reach the added distance. Drive the GP-2 stakes about three inches into the ground to mark the positions of the guy line anchors and the mast.

NOTE: The radius rope has a loop at each end and a loop where the 30-foot and 52-foot sections join.

(1) Mark the proposed mast position with a GP-2 stake.
(2) Put the loop at the end of the 30-foot section of the radius rope over the mast location stake and mark the position of the first guy line anchor (30 feet away).
(3) Leave the end of the 30-foot section of the radius rope on the mast location stake, and put the loop at the end of the 52-foot section over the marker stake for the first guy line anchor. Take the remaining loop in the radius rope. Stretch both sections of the rope and mark the second guy line anchor position.
(4) Leave the ends of the radius rope looped over the same two stakes. Stretch the rope in the other direction and mark the third guy anchor position.

c. Installing the guy line anchors.
(1) When using screw-type anchors, proceed as described below.
(a) Loosen the dirt with the digging bar to help start the guy line anchor.
(b) Insert the digging bar through the anchor eye. Using the bar for leverage, screw the anchor into the ground.
(c) Start screwing the anchor vertically into the earth, then slant the top of the rod approximately 45 degrees toward the mast base location.
(d) Screw the anchor into the ground until the eyelet is at ground level.
(2) When using GP-112/U stakes for rocky soil, proceed as described below.
(a) Drive a hole for the stake no wider or deeper than necessary using the digging bar and hammer. The slope of the hole should be approximately 60 degrees (slanted away from the mast base location).
(b) Drive the stake into the hole until the eyelet is at ground level. If the stake fits loosely in the hole, pack the hole with dirt.

6. Mount the First Mast Section and Antenna. After the guy line anchors have been installed, set up the first mast section in the launcher and mount the antenna on it.
a. Preparing the launcher.
(1) Open the catches that hold the mast section carrier in the launcher frame and lift the mast section carrier out of the launcher frame.
(2) Remove the mast location stake. Lay the launcher on the ground with the center of its base at the stake location and the top of the launcher facing midway between the second and third guy line anchors.
(3) Remove one mast section from the mast section carrier and set it aside.
(4) Lift the top end of the launcher and set the mast section carrier under it.
b. Mounting the first mast section.
(1) Remove the winch-locking pin from the rear of the elevator platform and secure the pin to the platform to prevent tangling during assembly.
(2) Remove the locking pin from the hand brake handle and open the hand brake.

(3) Insert the mast section, which was previously set aside, bottom first through the top of the launcher.

NOTE: the word UP and an arrow identify the top of the mast section. The bottom of the mast section has an arrow pointing to the key in the bottom.

(4) Remove the locking pin from the locking bar of the winch cable reel and lock the bar in the open position.

(5) Lower the elevator platform on the launcher slightly. Push the mast section in until it meets the elevator base bearing. Lock the hand brake.

c. Mounting the two AT-903/Gs. The antenna adapter and the top guy line ring assembly are required. An AB-720G antenna support is also required.
   (1) Check the polarization and depression/elevation settings of the AT-903/Gs and adjust as necessary.
   (2) Set an open mast section coupler over the top of the mast section.
   (3) Set the antenna adapter on the end of the mast section.
   (4) Rotate the antenna adapter until the key engages in the top of the mast section and prevents further rotation. Some antenna adapters have an arrow pointing to the key.
   (5) Tighten the mast section coupler. The mast section is securely clamped if the mast section coupler cannot be manually turned around the mast joint. If the mast section coupler can be turned, replace the coupler and test it to ensure that the joint is securely clamped. If changing the coupler fails to produce a secure joint, the lower mast section may be defective and should be replaced.
   (6) Slip the top guy line ring assembly over the antenna adapter.
d. Mounting the AB-720/G.
   (1) Set the AB-720/G over the antenna adapter and rotate it until it is seated.
   (2) Loosen the antenna clamps on both arms of the AB-720/G.
   (3) Set an AT-903/G on one arm of the AN-720/G. Rotate the AT-903/G until the key engages in the slot in the antenna clamp. Tighten the antenna clamp. If fully inserting the AT-903/G is difficult, remove the paint on the mating surfaces and apply a light coat of grease.
   (4) Set the second AT-903/G on the other arm of the AB-720/G. Rotate the AT-903/G until the key engages in the slot in the antenna clamp. Tighten the antenna clamp.
e. Attaching guy lines to the launcher. Attach the three launcher guy lines (coded blue) to the launcher. Adjust the length of the two guy line assemblies for the second and third guy line anchor close to the actual length (36 feet) required after the launcher is erected. Connect the snubber end of these guy line assemblies to the second and third guy anchors.
f. Attaching guy lines to the top of the mast. Use the AB-577/GRC top guy line assemblies (coded red). When the AB-720/G is used, attach the three top guy line assemblies to the top guy line ring assembly. Also attach the guy line assemblies to the ends of the AB-720/G.

7. Attach the Antenna Cables.
   a. Attach the snap fasteners of the cable grips to the ring in the top guy line ring assembly.
   b. To prevent the cables from whipping in the wind, attach them to the mast with electrical tape.
   c. After each cable connection is made, check to ensure that the joint is locked completely and wrap electrical tape over the joint to keep water out.
   d. Set up the cable reel so that the antenna cable unwinds freely as the mast is put together. Tie the antenna cable to the mast every three or four mast sections to prevent the cable from whipping in the wind.

8. Erect the launcher.
   a. To raise the launcher to a vertical position, push a GP-2 into each side of the launcher to act as a hinge. Remove the GP-2, which was used to indicate the center position of the launcher base.
   b. Drive a GP-2 into the ground on each side of the launcher to prevent the launcher from slipping out of position while it is being erected.
   c. Raise the launcher to a vertical position. The launcher will stand unsupported in a vertical position if the ground is level.
   d. Attach the snubber end of the third guy line assembly to the guy line anchor.
   e. Adjust the launcher guys lines as described below.
      (1) Check the target level to determine if the launcher is level.
      (2) Unscrew the snubber adjustment to its fully extended position (open).
      (3) Unlock the snubber clamp and take up the slack in the guy line. Lock the snubber clamp.
      (4) Take up on each snubber adjustment until the launcher is level.
   f. Drive two GP-2 stakes partly into the ground through the front of the launcher base to prevent the launcher from shifting position.
   g. Remove the two GP-2 stakes that were used as a hinge.
   h. Install the winch assembly on the launcher frame. Slide the winch shaft lock (located on the rear of the winch reel-supporting frame) over the winch shaft to lock the winch assembly in position. Make sure that the elevator cable is threaded over the pulley wheels.
   i. Operate the winch to raise the elevator up to the bottom of the mast section.
   j. Drive a third GP-2 into the ground through the rear of the launcher base.
   k. Drive each GP-2 fully into the ground. Check the target level to make sure that the launcher is still level. If necessary, adjust the snubber assemblies to control the tension of the guys.
   l. Install the spanner wrench as a foot lever in the launcher base.

9. Raise the Mast. After the launcher has been erected, install the mast sections, middle guy line assemblies, and guy lines as described below. Determine the locations for the middle guy line ring assemblies and number of mast sections required.

WARNING

If during windy conditions no one is available to hold the ends of the guy line assemblies while the mast is being erected, attach the top guy line assemblies to their respective guy line anchors and take up the slack in the guy lines. Before raising each mast section, loosen the guy lines enough to raise each section. Take up the slack in the guy lines when the mast section is elevated. Repeat the process for the installation of each mast section.

   a. First mast sections.
      (1) Release the hand brake and use the winch to raise the first mast section to the upper limit. The elevator stop will determine the upper limit. Lock the hand brake.

CAUTION

Always lock the hand brake securely before lowering the elevator.

(2) Operate the winch to lower the elevator to the lowest position.
(3) Slip an opened mast section coupler over the bottom joint of the first mast section. Do not tighten the mast section coupler.
(4) Set another mast section in place on the elevator with the UP arrow on top. Make sure that the bottom of the mast section is seated on the elevator platform.
(5) Step on the spanner wrench, which is being used as foot lever, and raise the elevator platform until the mast section meets the bottom of the mast section above it. Rotate the mast section until the slot seats in the key in the bottom of the upper mast section. Lock the mast section coupler. The mast section is securely clamped if the mast section coupler cannot be manually turned about the mast joint. If the mast section coupler can be turned, replace it with another coupler and test it again to ensure that the joint is securely clamped. If changing the coupler fails to produce a secure joint, the lower mast section may be defective.
(6) Raise the elevator platform about two inches with the winch until the new mast section rests on the elevator.
(7) Release the hand brake and use the winch to raise the mast section to the upper limit. Lock the hand brake.
(8) Repeat the above procedures to install two more mast sections before installing the middle guy line assemblies.

b. Middle guy line assemblies. Determine how many mast sections are required and where the middle guy line ring assembly is placed. To install the middle guy lines, follow the procedures described below.
(1) Raise the last mast section about halfway and lock the hand brake.
(2) Climb up the rear of the launcher and place the middle guy line ring around the bottom of the mast section coupler. Align the guy line holes of the middle guy line ring with the guy line stakes; put the pin through the middle guy line ring. The ring should rotate freely.
(3) Connect the top ends of the proper middle guy line assemblies to the middle guy line ring. Connect the other ends to the guy line assemblies. Place tension on the guy line assemblies.
(4) Release the hand brake and use the winch to raise the mast to the upper limit.

c. Last mast sections. After installing the middle guy line ring, install the remaining mast sections. Figure 0016-2 shows the AB-577/GRC mast with the AB-720/G antenna support and antenna array.
(1) When the last mast section has been placed on the elevator platform, align the arrow in the mast platform base bearing with the arrow on the bottom mast section. Rotate the base bearing until the slot engages with the key in the base of the mast section.
(2) Release the hand brake and operate the winch to raise the mast to the highest position.

d. Mast section carrier.
(1) Remove the spanner wrench from the base of the launcher.

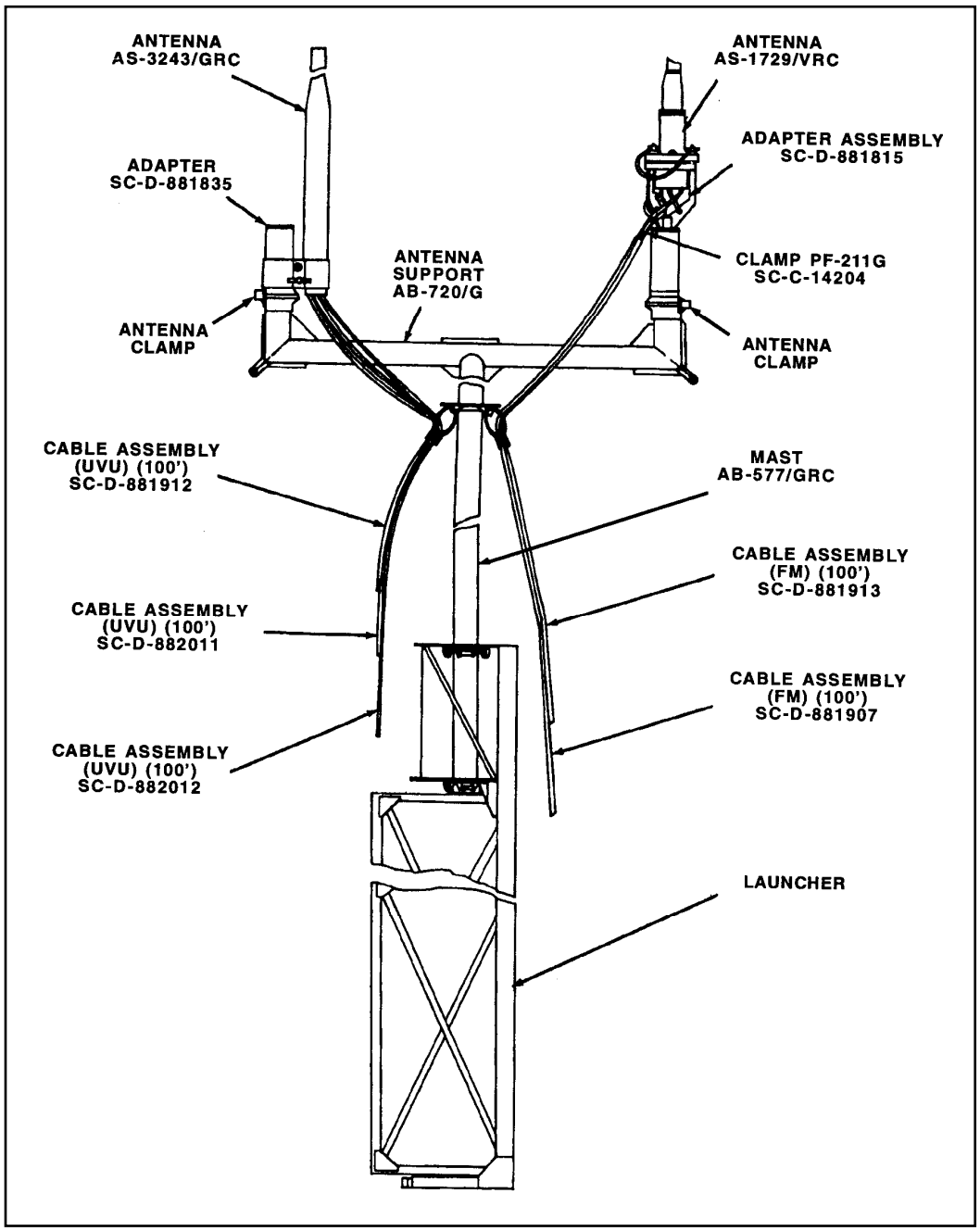


Figure 0016-2. AB-577/GRC mast with AB-720/G antenna support and array.

(2) Install the mast section carrier of the AB-577/GRC into the launcher to act as a base for the launcher. Lock the mast section carrier in position by closing the latches.

(3) Release the hand brake and use the winch to lower the mast until its full weight rests on the mast section carrier. There should be no tension on the elevator cable. Lock the hand brake.

e. Guy line assemblies.
   (1) Make sure that the top and middle guy lines have slack.
   (2) Check the launcher with the target level.
   (3) Unscrew the snubber adjustment on each top and middle guy line to the fully extended position.
   (4) Using the snubber clamps, adjust the tension of the three middle guy lines until the lower half of the mast is straight. To aid in vertical alignment, observe the mast from a distance and compare it with a known vertical object such as the corner of a building, another antenna mast, or a straight power line pole.
   (5) Correct any misalignment in the mast by tightening the snubber adjustments.
   (6) Repeat the above procedures for the top guy lines of the AB-577/GRC.
   (7) Recheck the launcher with the target level and ensure that all guy lines are taut and secure.
   (8) If double antennas are being used, stake the guy lines holding the T-bar until they are relocated during radio system lineup.

10. Adjust the Antenna Azimuth. To point the antenna in the desired direction or to change its direction, proceed as described below.
    a. Release the hand brake.
    b. Set the spanner wrench into the holes in the mast base bearing.
    c. Rotate the mast until the antenna faces the desired direction. Exact antenna azimuth is achieved during lineup of the radio system.
    d. Tighten the hand brake.

11. Connect the External Connections.
    a. Power unit to shelter.
       (1) Perform the initial setup procedures. (Refer to the technical manual covering the power units.)

WARNING

Do not start the power units until all connections are made and the appropriate safety precautions taken. Personnel installing the AN/TSC-61B may be exposed to 208 volts of alternating current.

   (2) Connect one of the 100-foot power cables between the output connector of the power unit and the POWER IN receptacle in the power entrance panel.
   (3) Arrange each power unit for an output of 208 volts, 60 Hz AC, as indicated in the power unit technical manual.
   (4) For each power unit, drive a grounding rod into the ground and connect it to the power unit-grounding stud with a grounding strap.
   (5) Drive a grounding rod into the ground near the power entrance panel and connect it to the grounding terminal with a grounding strap.
    b. Antenna cables. Connect the antenna cables to the antenna entrance panels. Be sure to secure all the antenna cables so that they do not place any undue strain on the antennas or on the antenna entry panel connections. Provide a drip loop to keep the connectors dry.
    c. Telephone lines. Connect the telephone lines to the telephone entrance panel as described below.

(1) Connect the 15 pairs of telephone lines to the binding posts pairs 1 through 15.
(2) Secure the cables to the cable guide ring to prevent undue strain on the binding posts; provide a drip loop.
(3) Connect the grounding stud to a grounding rod.

12. Protect the Launcher in Areas Where the Ground is Frozen, if applicable. During disassembly, the launcher base is usually severely damaged as it is pulled and twisted to break it and the stakes out of frozen ground. To prevent this damage, make an expendable wooden base and put it under the launcher when it is erected. Then during disassembly, the launcher can be removed from the wooden base even if the base must be broken apart. The stakes can be dug out of the frozen ground later. A wooden base can also be used in spongy ground areas to provide a broader flat base for the launcher.
    a. During erection of the launcher, put the wooden base on the bottom of the launcher with the hinge stake through the launcher and side stringers of the base. Drive the stakes into the holes at the corners of the base instead of the launcher. Driving the stakes deep into the ground is unnecessary; the stakes help keep the wooden base from shifting.
    b. If the launcher is frozen to the ground during disassembly, chop away the ice and snow and the break the wooden base to free the launcher.

CAUTION

Do not pull and jerk the launcher to break it loose from the ice and frozen snow. Rough handling will severely damage the framework.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment.

Brief Soldier: Tell the soldier that he will be evaluated on installing the AN/TSC-61B according to the appropriate TMs and unit SOP.

Performance Measures	**GO**	**NO GO**
NOTE: Applicable performance measures are determined by local conditions, mission requirements, and assigned equipment. Use TMs 11-5820-538-12 and 11-5895-469-12 and the power source TM.		
1. Selects the site.	____	____
2. Unpacks the equipment.	____	____
3. Assembles the antenna (installs NR1).	____	____
4. Assembles the antenna (installs NR2).	____	____
5. Installs the AB-577/GRC mast (installs NR2 only).	____	____
6. Grounds the shelter.	____	____
7. Installs the generator set.	____	____
8. Connects the telephone lines.	____	____

Performance Measures	GO	NO GO
9. Raise the mast.	___	___
10. Adjust the antenna azimuth.	___	___
11. Connect the external connections. a. Power unit to shelter. b. Antenna cables. c. Telephone cables.	___	___
12. Protect the launcher in areas where the ground is frozen, if applicable.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
TM 11-5820-538-12 TM 11-5895-469-12	None

Install the Air Traffic Control Facility, AN/TSQ-97
011-143-1003

Conditions: Operating as a member of an ATC tower team at a predetermined site, the team is required to set up the air traffic control facility, you are given an AN/TSQ-97, TM 11-5895-800-12, power source and auxiliary power cable W702, if using vehicular power.

Standards: Position, assemble, and connect power source to the AN/TSQ-97 according to TM 11-5895-800-12 and power source TM.

Performance Steps

1. Emplacement Site. Select an area that is level and affords a clear view of the movement area, taking into consideration—
   a. Obstructions to radio signals such as buildings, hills, power lines, and other natural or man-made obstructions.
   b. The same types of obstructions as in "a" above could generate air currents that could cause erratic wind detector readings. Areas with high magnetic content could also cause problems.
   c. Cover and concealment because the facility is designed to be deployed in forward areas.

NOTE: Figure 1003-1 shows a closed AN/TSQ-97 and Figure 1003-2 shows an/TSQ-97 that has been fully set up.

2. Assemble the AN/TSQ-97. The following procedures provide a logical step-by-step sequence for placing the facility in operation once the site of operation has been established. When assembled, the maximum height of the facility is 12 feet.
   a. Antenna mast and boom. Assemble the antenna mast and boom as described in the following steps:
      (1) Remove the four quick-release pins that secure the carrying handles to the equipment case. Remove the handles.
      (2) Set the case in an upright position. Press the red button on the pressure-relief valve on the side of the case. Release the ten latches and remove the front and back covers.
      (3) Remove the twist-lock cap from the bottom of the mast and remove the AS-1703/ARC-54 (FM) antennas. If only an AN/ARC-114A (FM) is being used, leave one element in the mast and replace the cap. Put the elements aside in a safe place until they are needed.
      (4) Remove the quick-release pin from the top of the mast.
      (5) Pull the mast extension out of the mast approximately eight inches until a .25-diameter spotface appears. Align the mast extension holes with the mast holes (two inches from the top of the mast) and insert the quick-release pin.
      (6) Secure the mast to the case (eight-sided) by inserting the lower two brackets on the mast into the brackets on the side of the case. Engage the quick-release pins.
      (7) Unwind the guy lines from the boom and attach the boom to the top of the mast extension. The pin on the inside of the fixed portion of the hinged clamp mates with a hole located five inches from the plug in the mast extension. Tighten the thumbscrews.
      (8) Shorten the guy lines so that the keepers are approximately halfway and hook the triangularly shaped brackets on the two inner hooks on the boom.

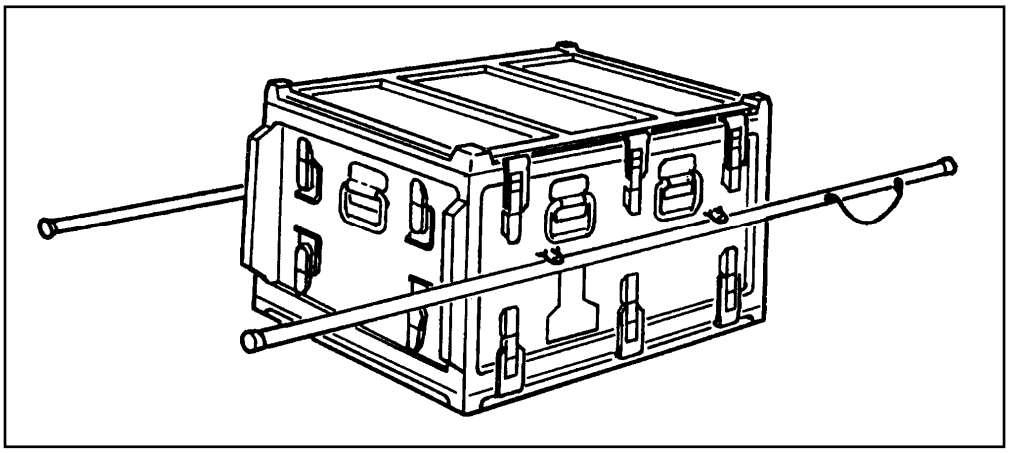


Figure 1003-1. Closed AN/TSQ-97.

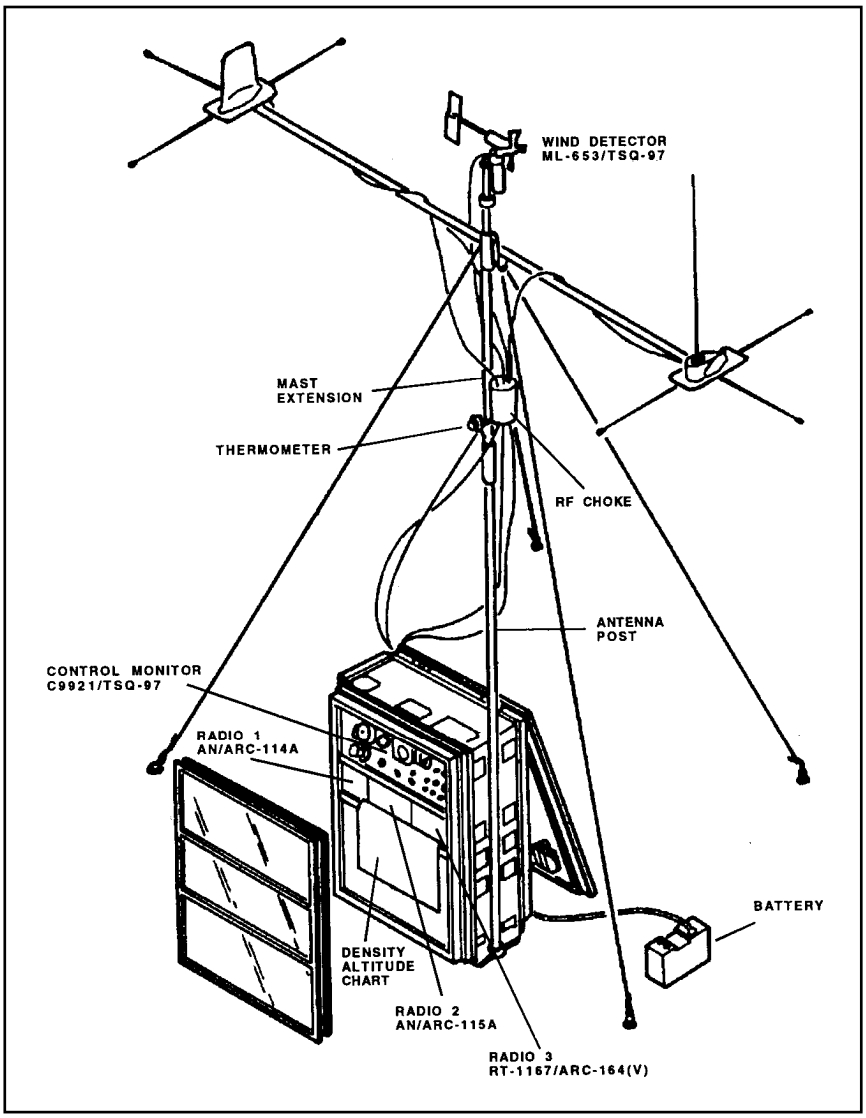


Figure 1003-2. Fully set-up AN/TSQ-97.

(9) Insert a stake in each of the other brackets on the guy lines and drive the stakes into the ground. (Refer to Figure 1003-3 for the recommended guy-line positions.)

NOTE: If the ground is extremely hard, has excessive rocks, or is spongy or soft, use any suitable means to anchor the guy lines.

(10) Tighten the guy lines so that the mast and boom are held securely in position. The guy lines will be loosened to raise the mast to its full height later in this procedure.

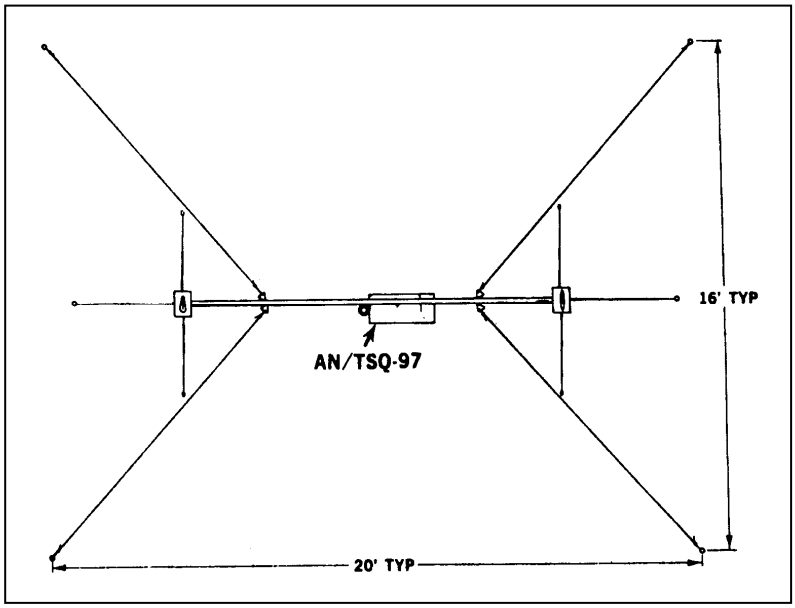


Figure 1003-3. Guy-line and anchor-pin positioning.

b. Antenna mounting. Mount the antennas to the boom as described below.

(1) Assemble the CU-942B/ARC-54 antenna couplers, which are mounted on a plate, to one end of the mast.

(2) Assemble the AT-1108/ARC antennas, which are mounted on a plate, to the other end of the boom.

CAUTION

Do not remove the BNC/TNC connector adapter (Amphenol part number 79675 and Pomona electronics part number 38440) from the uhf connector on the antenna. This adapter is required when using the RT-1167/ARC-164(V).

(3) Screw four AS-4034/TSQ-97 antenna elements (ground planes) into the mounting plate (finger tight). Screw the AS-1703/ARC-54 antenna (whip type) into the threaded hole on the CU-942B/ARC-54 antenna coupler. (Figure 1003-4 shows the AS-1703/ARC-54 with the CU-942B/ARC-54 antenna coupler assembly in the mounted configuration. Figure 1003-5 shows the AT-1108/ARC antennas in the mounted configuration.)

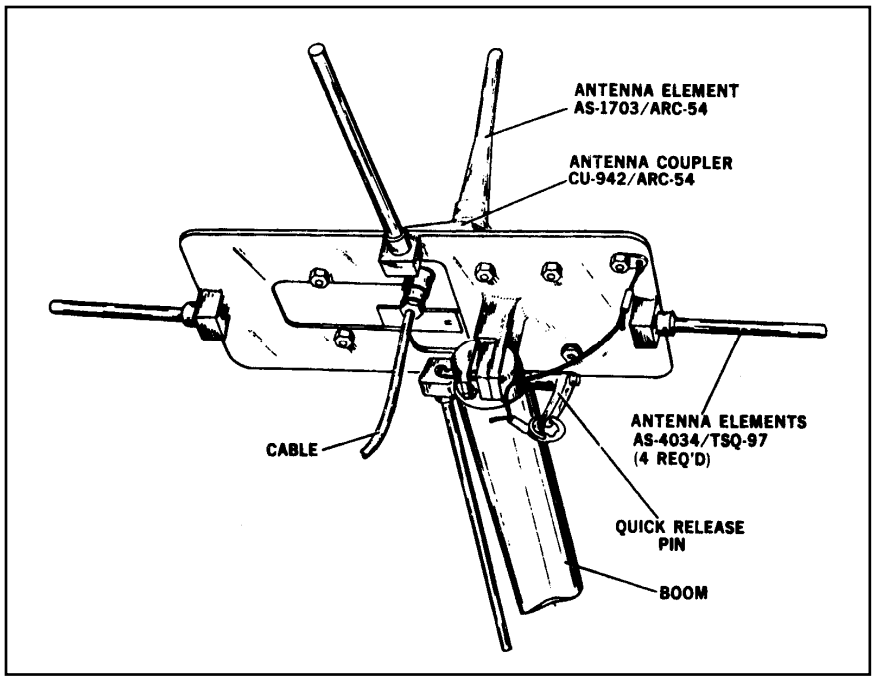


Figure 1003-4. AS-1703/ARC-54 with antenna coupler assembly CU-942B/ARC-54 (mounted configuration).

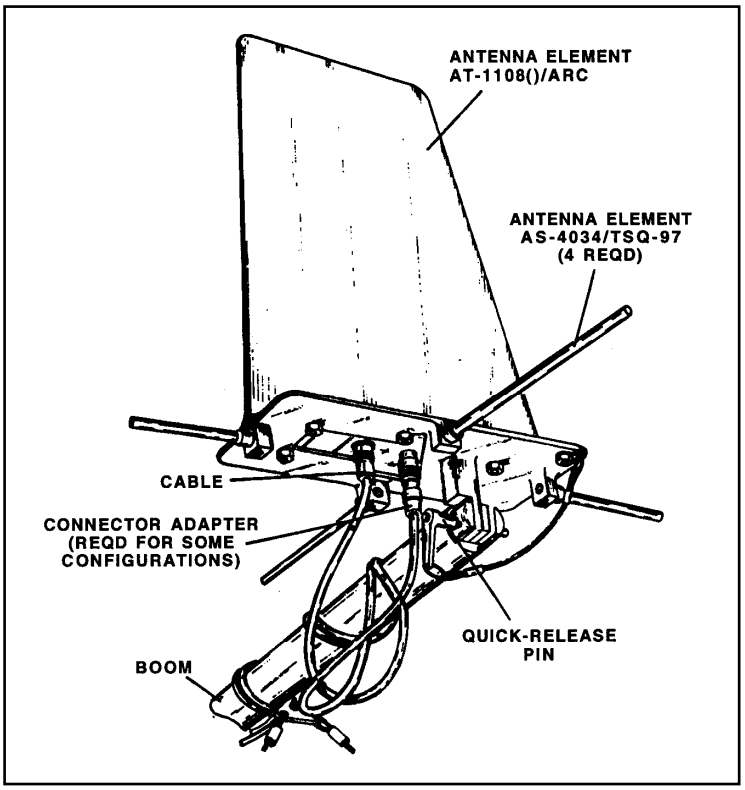


Figure 1003-5. AT-1108/ARC antennas (mounted configuration)

(4) Screw four ground plane elements into the AT-1108/ARC antenna mounting plate.
(5) Connect the appropriate cables to the antennas. Connect the cables from the radios (ANTENNA INPUT J2) to the bottom end of the RF choke. The antenna cables will be attached to the top of the choke after the mast is extended.

NOTE: Overload protection circuits in the radios may cause them to shut off if the antenna is improperly loaded. Therefore, make sure the antenna cables are attached to the proper radio. During windy or icing conditions, loop all cables around the mast and boom to prevent damage to the connectors.

(6) Refer to the cabling diagram in Figure 1003-6 for the proper connection sequence.

c. Wind direction and speed indicator (Figure 1003-7). Remove the detector, vane, and standoff from the rear storage compartment. Insert the vane connection end into the detent socket in the end of the wind speed generator. Mount the standoff on top of the antenna mast.
(1) Attach the detector assembly to the top of the standoff.
(2) Connect the W402 cable and the RF choke to the detector as shown in the cabling diagram. Orient the reference mark on the detector housing to magnetic north as indicated on the magnetic compass. Tighten the thumbscrew.

CAUTION

If the position of the ML-653/TSQ-97 is changed by accidentally bumping the equipment case, repositioning the equipment case, or repositioning the ML-653/TSQ-97, the ML-653/TSQ-97 must be realigned with magnetic north.

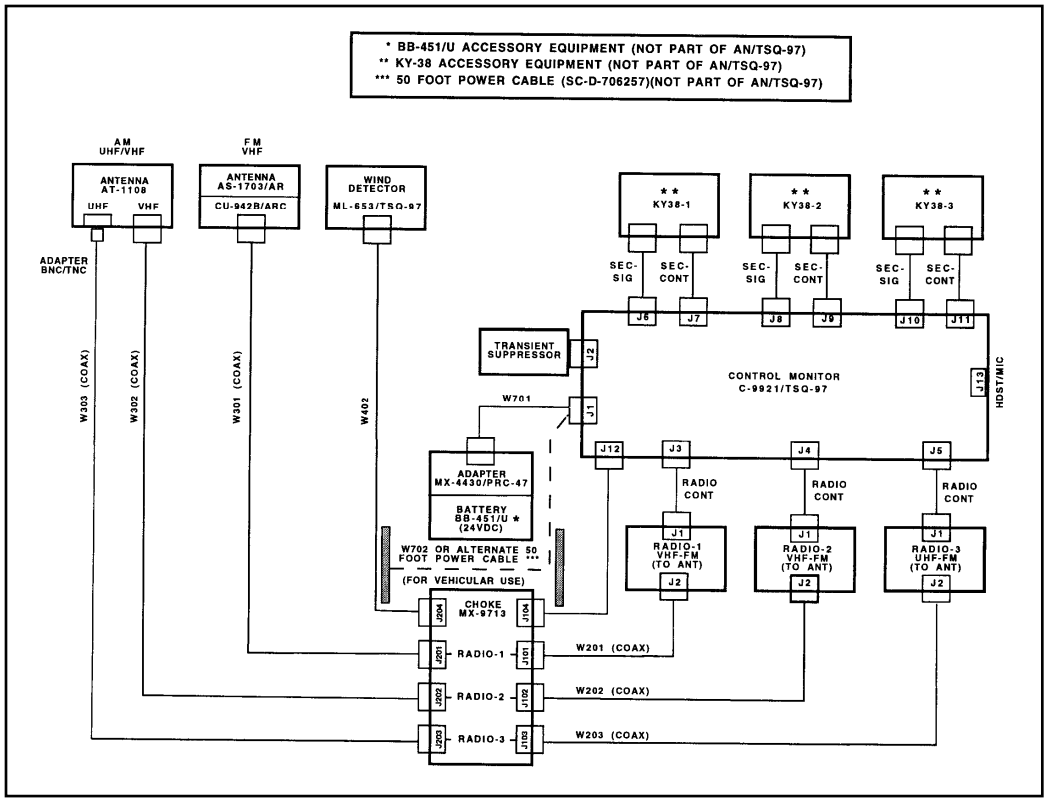


Figure 1003-6. Cabling diagram showing TSEC/KY-38 security equipment.

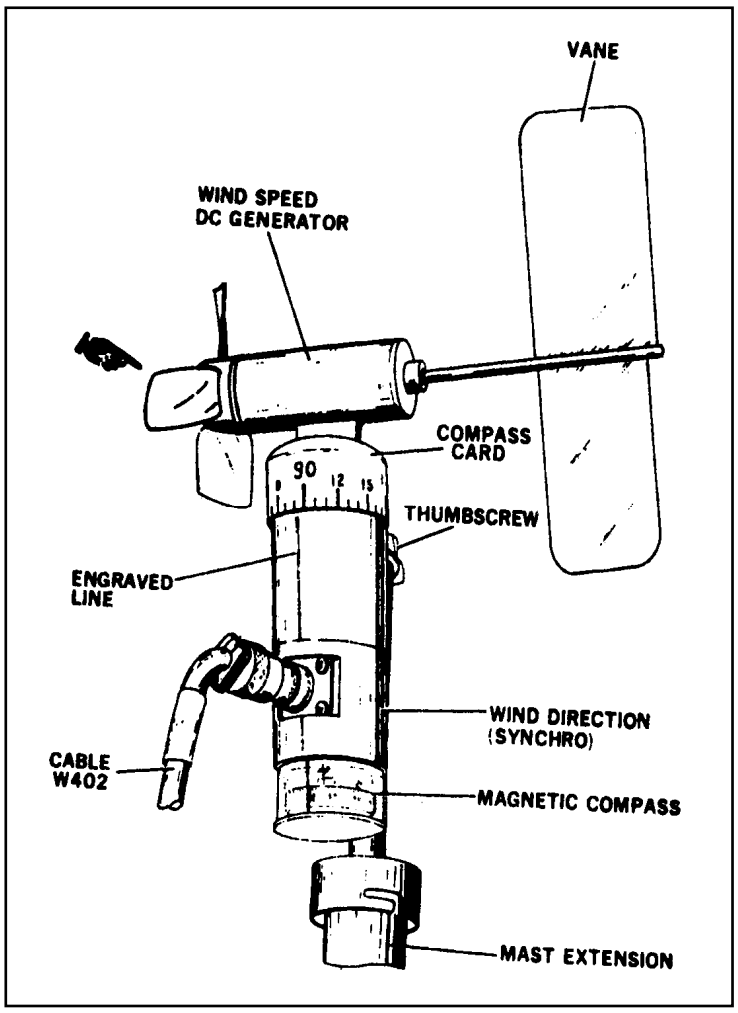


Figure 1003-7. Wind direction and speed detector (ML-653/TSQ-97)

d. Mast extension.
   (1) Have one person hold the mast to keep it from tipping over and loosen the guy lines by moving the keepers all the way to the stakes.
   (2) Remove the quick-release pin from the top of the mast and pull out the mast until a .25-diameter spotface is exposed to help align the holes in both the mast and the mast extension. Insert the quick-release pin through the mast and the extension.
   (3) Tighten the guy lines evenly so that the mast and boom are held securely in place.

CAUTION

Hereafter, each time the position of the ML-653/TSQ-97 is changed by repositioning the equipment case or wind detector, the wind detector must be realigned with magnetic North.

e. Radio frequency choke.
   (1) Attach the clip on the MX-9713/TSQ-97 radio frequency choke to the mast extension. Attach the cables from the antennas to the top of the choke.
   (2) Refer to the cabling diagram in Figure 1003-6 for the proper connection sequence.
f. Thermometer. Clamp the thermometer bracket to the mast just below the RF choke and insert the thermometer so that the operator can easily see it.
g. Radio cables. Check to ensure that the radio control cables are connected between the radios and the associated connector on the control monitor.

3. Connect the Power Cables to the Power Source.

CAUTION

To avoid damage to the transistors and integrated circuits, make sure that the power on/off switch on the control monitor and the function selector switch on each radio is set to off before making or changing power cable connections. Check the source voltage and polarity before applying power to the facility.

a. Battery. Connect the battery cable to the BB-451/U storage battery and the POWER IN connector on the rear panel of the C-9921/TSQ-97. The battery can be left in its storage position or removed and set on the ground.
b. Vehicular power. In the absence of other battery power, a W702 auxiliary power cable is provided for operating the facility from a vehicular power system. Vehicular power may also be obtained from a remote source by using an alternate 50-foot CX-13202/TSQ-97 power cable which is included with the AN/TSQ-97 facility. Connect one end of the cable to the POWER IN connector J1. Polarity must be observed when connecting the alligator clips of the cable to the battery. Always determine which is the positive battery terminal and which is the negative terminal before attaching the clips. Attach the red clip to the positive terminal. Attach the black clip to the negative terminal. **When using vehicular power, the transient suppressor must always be connected to the J2 connector on the rear panel**. Figure 1003-8 shows the vehicular battery configuration (28V DC).

CAUTION

Failure to observe polarity can result in damage to circuit components when the facility is turned on. Do not energize the facility if the battery meter indicates less than 20 volts or more than 30 volts.

NOTE: A current generator operator license is required to connect the AN/TSQ-97 to a generator power source.

c. Generator power (28V DC) (Figure 1003-9). Connect one end of the W702 cable or CX-13202/TSQ-97 alternate cable to the **POWER IN** connector J1. Once again, polarity must be observed when connecting the alligator clips. Make sure that the generator is grounded. Determine which is the positive terminal and which is the negative terminal before connecting the clips. Attach the red clip to the positive terminal and the black clip to the negative terminal.

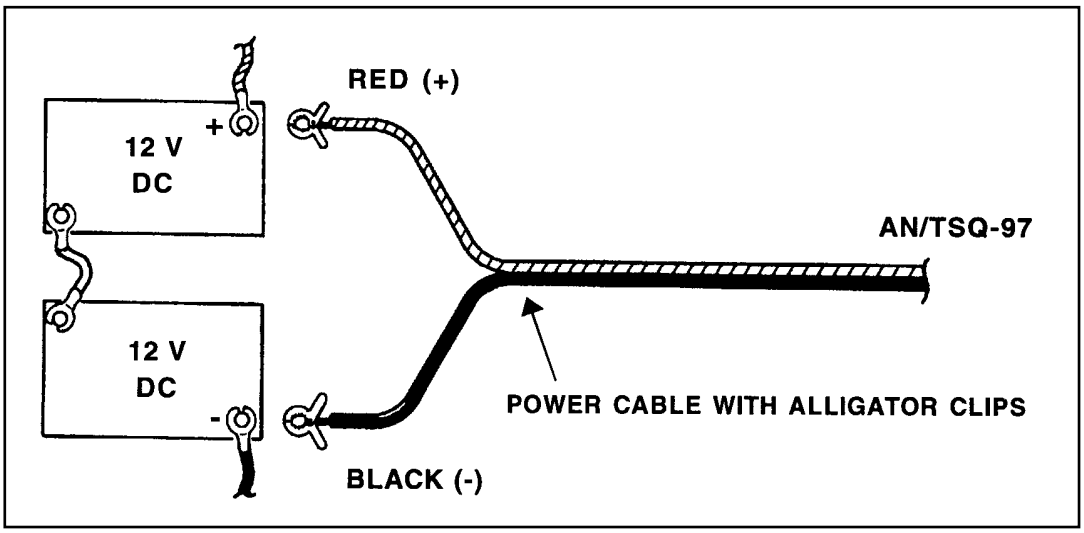


Figure 1003-8. Vehicular battery configuration (28V DC

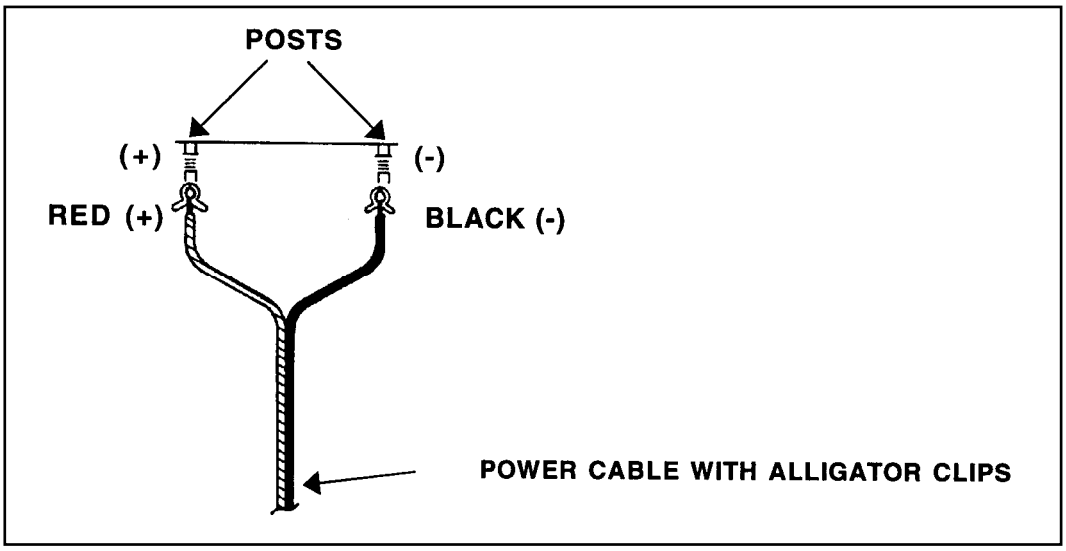


Figure 1003-9. Generator power configuration (28V DC, 1-5 kw).

NOTE: The rear cover can be leaned against the top of the equipment case or attached to the top to act as a rain shield.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements and the assigned equipment. Have the soldier perform the task in an actual setting or provide a training site.

Brief Soldier: Tell the soldier that he will be evaluated on installing the AN/TSQ-97 according to the appropriate TMs and unit SOP. Tell the soldier that he will not be informed of his progress during performance of the task except to prevent personnel injury or damage to the equipment.

Performance Measures	**GO**	**NO GO**
NOTE: Use TM 11-5895-800-12 and the power source technical manual.		
1. Positions equipment on the designated site.	___	___
2. Performs the facility setup. a. Wind direction and speed indicator. b. Mast Extension. c. Radio Frequency Choke. d. Thermometer. e. Radio Cables.	___	___
3. Connect the power cables to the power source.	___	___
4. Performs the final assembly. a. Battery. b. Vehicular power. c. Generator power (28V DC).	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
TM 11-5895-800-12	None

Install the Landing Control Central, AN/TSQ-71B
011-143-1009

Conditions: As a member of a GCA team at a predetermined site and have a requirement to install the landing control central, you are provided an AN/TSQ-71B, TM 11-5895-474-12, TM 11-5840-281-12, TM 11-5840-281-12-1, generator set and appropriate TM, pioneer tools, and standard tool kit.

Standards: Position, unpack, and install the AN/TSQ-71B and power source according to above listed TMs.

Performance Steps

1. Select the Site for the AN/TSQ-71B and the Receiver-transmitter Group. The site selected for the installation will depend upon the configuration of the airfield and the tactical use to be made of the AN/TSQ-71B or AN/TSQ-71B (modified).
   a. The site selected for the radar trailer should be as level as possible and should not exceed a 2.5-degree incline in any plane. Although the shelter is watertight, the shelter area should have adequate drainage.
   b. Make certain that the shelter is placed for convenient cabling to the power unit, radar trailer, and IFF interrogator antenna. The site selected for the radar receiver-transmitter group trailer will depend upon the configuration of the airfield and the tactical use to be made of the AN/TSQ-71B or AN/TSQ-71B (modified) system. Siting instructions for the radar set are contained in TM 11-5840-281-12-1. When the site has been determined, remove the large ground anchor from bag 13 on the transit skid. Remove the large grounding rod driver, which is clamped to the roadside fender of the radar set trailer. Drive the large grounding anchor into the ground so that it will be under the cutout of the trailer bed. If the selected site is not flat, the maximum incline should not exceed 2.5 degrees.

2. Unpack the Radar Trailer.

NOTE: When the trailer has been placed in position at the site, remove only the components stated in paragraphs a through s below. Some components will be placed in their operating positions directly from their stowed positions.

   a. Lower the trailer support leg at the apex of the trailer tongue and insert the locking pin. Engage the hand brakes and unhitch the trailer from the tow vehicle. Disconnect the power cable from the tow vehicle and place the connector in the bracket provided on the trailer tongue.
   b. Untie the hold-downs that secure the protective canvas cover over the radar trailer. Fold the cover in half and place it on the ground.

CAUTION

Avoid striking any part of the azimuth and elevation antennas when removing the trailer-stowed components.

NOTE 1: Unless otherwise noted, reinstall the attaching hardware and clamps after removing the components. Place the brackets on the transit skid for temporary storage.

NOTE 2: Figure 1009-1 shows the location of the lettered clamps and brackets referred to in paragraphs c through s below.

c. Loosen the two clamps (Q and R) that secure the IFF antenna mast and antenna drive to the radar trailer (curbside). Place the antenna mast and antenna drive at the site of the IFF antenna.

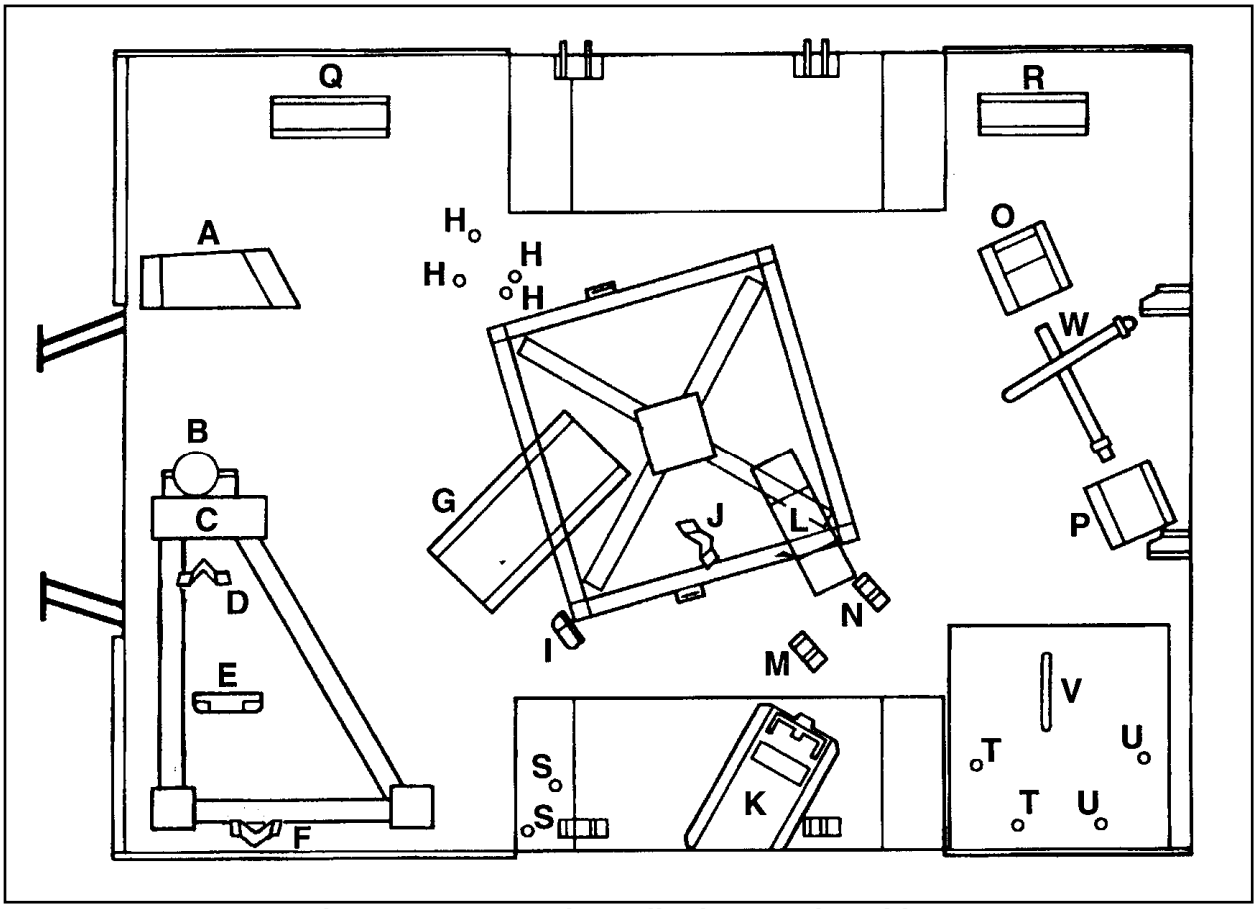


Figure 1009-1. Radar trailer in stored position.

d. Remove the bolts that secure the IFF antenna backfill reflector to the side of the radar receiver-transmitter cage. Place the backfill reflector at the site of the IFF antenna.

WARNING

The azimuth antenna weights 155 pounds. To prevent injury to personnel, do not attempt to lift the antenna without the necessary manpower or a lifting device with the suitable weight capacity.

e. Loosen the captive hardware on the bracket holding the top of the azimuth antenna to the rear of the receiver-transmitter cage. Remove the bolts holding the bracket to the

rear roadside of the receiver-transmitter cage. Loosen the clamps (L, O, and P) holding the azimuth antenna on the trailer bed. Use three people to lift the antenna off the trailer. Place the antenna on the canvas near the trailer.

f. Loosen the strap (V) and remove the four bolts (T and U) that hold the two Saginaw jacks on the lid of the storage box. Remove the third jack from the forward section of the roadside fender (S). Put the jacks aside for later use.
g. Remove the elevation and azimuth antenna drive assembly from the support brackets (A and C) as described below.
   (1) Separate the two tube sections connected to the azimuth and elevation antenna drive trains by removing the four bolt and washer sets from the holes in the corners of the square flange plates which are located above the drive motor.
   (2) Remove the metal strap (B) that holds the drive motor to the vertical tubular support member of the bracket (C). Remove the two bolt and washer sets at the curbside end of the support bracket (A).
   (3) Remove the two bolt and washer sets that hold the base of the A-frame on the bracket (C).
   (4) Remove the two bolt and washer sets at the apex of the A-frame.
   (5) Remove the two bolt and washer sets that hold the elevation drive to the top of the tubular support bracket (C) (roadside).
   (6) Remove the three bolt and washer sets that hold the mounting lug of the elevation drive tube to the top of the tubular support bracket (C).
   (7) Remove the safety shield from the elevation drive (forward roadside corner of the trailer) by removing the four bolts and two screws.
   (8) Remove the azimuth section of the drive with the azimuth yoke attached. Set the azimuth section aside.
h. Remove the elevation drive assembly. Set the assembly on the ground on the roadside of the trailer.
i. Remove the UVU and VUV antennas from the tubes at the rear of the trailer. Carry the antennas to the shelter site.
j. Remove the two leveling legs stored in an upright position against the curbside of the receiver-transmitter cage as described below.
   (1) Remove the nut and washer from one end of the threaded rod through the upper end of the legs. Remove the rod. Keep the rod, spacer, and hardware intact.
   (2) Remove the four captive bolts that hold the two brackets to the forward curbside of the receiver-transmitter cage.
   (3) Remove the four bolts that hold the legs to the rivnuts (H) on the trailer bed.
   (4) Set the legs aside. Reassemble the hardware and brackets.
k. Remove the leveling leg from the rear roadside of the receiver-transmitter cage as described below.
   (1) Remove the four bolts that secure the leg to the brackets (M and N) on the trailer bed.
   (2) Remove the bolt, washer, and nut that secure the top of the leg to the mounting bracket on the receiver-transmitter cage.
   (3) Store the hardware with the bracket.
l. Install the Saginaw jack on the mounting plate of each leg by securing a bolt and washer to each plate.
m. Remove the elevation antenna yoke as described below.
   (1) Loosen the straps and detach the anchors of the two web straps on the reflector.
   (2) Loosen the two screw clamps on the concave side of the reflector.
   (3) Remove the four bolts from the bracket (G). Two bolts are installed on the top and two are on the forward end.

n. Loosen the straps (W) that hold the storage bag to the trailer bed. Place the bag near the location of the IFF antenna. The bag contains three guy line wires and three anchors.
o. Loosen the clamps (D, E, F, and I and J) that hold the three cone reflectors on the trailer bed. Place the reflectors near the location of the IFF antenna.
p. Remove the nine reflector legs from the storage rack on the trailer bed under the receiver-transmitter.
q. Remove the three polarized screens from the triangular rack under the receiver-transmitter. Assemble the cone reflectors, polarizers, and legs to form the target simulator assemblies.
r. Remove the waveguide connectors and azimuth tilt actuator from the storage box at the rear roadside of the trailer. Place the foam packing in the storage box and secure the cover.
s. Remove the IFF antenna backfill from the forward curbside face of the receiver-transmitter cage by removing the three bolts and three washers. Place the antenna backfill at the location of the IFF antenna.

3. Install the Landing Control Central.

CAUTION
Before installing the leveling legs, loosen the bolts on the yoke assembly mount on the trailer. The leveling legs cause the trailer to bow in the middle, which results in misalignment of the yoke, assembly-mounting bolts.

a. Install the leveling legs (with the Saginaw jacks attached) on the mounting plates on the sides and rear of the trailer. Use the bolts and washers stored in the threaded holes of the plates. Tighten the bolts on the yoke assembly.
b. Using the Saginaw jacks, place the trailer in an approximate level position.
c. Remove the two bolts that secure each of the three right-angle brackets that attach the base of the receiver-transmitter cage to the pedestal.
d. Rotate the receiver-transmitter cage on the trailer until the electrical connectors on the receiver-transmitter face roadside.
e. Remove the radar service platforms from the storage racks on the outside forward wall of the shelter by removing the captive quick-release pins from the lugs on the mounting bracket.
f. Hold one platform horizontally with the flush side facing up. Insert the lugs into the mating pair of lugs on the arc brackets on the curbside of the radar pedestal. Secure the platform to the lugs using the captive pins. Remove the pins holding the two legs in the retracted position and allow the legs and the platform to pivot so that the legs engage in the brackets mounted on the fender. Secure the legs in the brackets using the captive pins.
g. Install the second platform at the rear lugs of the arc brackets following the procedures in step f.
h. Pick up the elevation antenna drive assembly using two people. The assembly is then handed to two people on the platforms. Lift the elevation antenna drive assembly into position at the top curbside edge of the receiver-transmitter cage. With the three bolts and three washers that were used to secure the assembly at the transit location, secure

the assembly to the rivnuts at the top of the forward frame member. Install the elevation safety shield using the screws that were retained.

i. Reposition the platform from curbside to roadside.
j. Pick up the azimuth antenna drive assembly using four people. The assembly is then handed to two people on the platforms. Lift the azimuth antenna drive assembly into position at the top roadside of the receiver-transmitter cage. Secure the square flanges of the assembly using four bolts and four washers.
k. Rotate the azimuth antenna drive assembly until the azimuth antenna can be easily attached to the azimuth yoke by individuals standing on the platforms at the roadside and rear positions.
l. Pick up the azimuth antenna using two people and hand the antenna to two people on the platforms. Lift the azimuth antenna into position so that the bearings rest in the cradles of the yoke arms. Fasten the latches over the bearings. Secure the azimuth tilt actuator to the rear side of the antenna reflector with the captive pins.
m. Remove the elevation antenna reflector from the elevation antenna yoke by removing the quick-release pin from the bracket on the rear side of the reflector.
n. Reposition the platform from the roadside to the curbside position.
o. Install the elevation antenna yoke on the elevation antenna drive assembly using the four bolts that were used to store the yoke in the transit location.

WARNING

The elevation antenna weighs 227 pounds. To prevent injury to personnel, do not attempt to lift the antenna without the necessary manpower or a lifting device with suitable weight capacity.

p. Pick up the elevation antenna reflector using two people and hand the antenna reflector to two people on the rear and curbside service platforms. Lift the reflector into position and insert the bottom bearing in the lower hole of the yoke. Push the upper bearing into the upper hole. Secure the lower bearing with a captive pin.
q. Remove the elevation antenna feedhorn with an attached support leg plus two additional support legs from the transit skid. Mount two support legs on the elevation antenna feedhorn with the hardware that is furnished. Attach the elevation antenna feedhorn assembly to the elevation antenna reflector.
r. Refer to TM 11-5840-281-12-1 for the installation instructions on the waveguide connectors.
s. Refer to TM 11-5840-281-12-1 for the placement of the target simulators and the orientation of the radar set.
t. When the radar set is assembled, make a fine leveling adjustment using the Saginaw jacks that are mounted on the pedestal legs. Secure the trailer to the ground anchor cable using the ratchet strap that is stored in bag 13 on the transit skid. Attach the ratchet strap to the base of the receiver-transmitter and pass it through the hole in the trailer bed. Attach the ratchet strap to the grounding anchor cable. Recheck the level bubble; make minor corrections if needed.
u. Secure the pedestal legs with the small grounding anchor that is stored in bag 13 on the transit skid.

CAUTION

Check all bolts and nuts to ensure that they are secure and in place.

v. Drive a grounding rod into the ground close to the receiver-transmitter to connect the grounding strap. The grounding strap is secured to the base of the receiver-transmitter.
w. Note that five cable reels mounted on the cable pallet contain cables to hook up the IFF, the radar equipment, and the shelter.
   (1) Cable reel number 1 contains 250 feet of W3002 cable. This cable is connected between the radar receiver-transmitter and the shelter.
   (2) Cable reel number 2 contains 50 feet of W7005 cable, which is the shelter power cable. In addition, two 50-foot IFF cables (W40001 and W40002) are wound on cable reel number 2.
   (3) Cable reel number 3 contains 135 feet of W3003 radar power cable. This cable is connected between the radar receiver-transmitter and the AC junction box.
   (4) Cable reel number 4 contains 250 feet of W3001 cable and 250 feet of W3005 cable W3005. These two cables are connected between the radar receiver-transmitter and the shelter.
   (5) Cable reel number 5 contains 135 feet of W3004 radar power cable. This cable is connected between the AC junction box and the shelter.

WARNING

The empty cable palette weighs approximately 175 pounds. To prevent injury to personnel, use care when handling the palette.

4. Install the IFF, if used.
   a. Location of stowed IFF equipment. The AS-1905/TPX-44 antenna is stowed in the shelter. The backfill reflector (E1002) and IFF antenna drive assembly and mast are stored on the radar trailer during periods of limited storage or transit. The two 50-foot IFF cables (RF and control) are stored on a cable reel on the cable pallet. The grounding anchor driving rod is stored with the radar and shelter grounding rods on the trailer. The three guy wire cable assemblies and three large grounding anchors for the IFF are stored in bag 13 on the transit skid. The two grounding pins for the IFF antenna base are stored in the radar trailer storage box. All the remaining IFF equipment is mounted in the shelter and does not require any handling or interconnection hookup. Refer to the technical manual that accompanied the equipment for installation and siting instructions.
   b. Cable hookup between the IFF and the shelter. Connect the cables between the IFF and shelter as described below.
      (1) Connect the P40103 end of the W40001 cable to J40103 on the AB-958/TXP IFF antenna pedestal.
      (2) Connect the P9003 end of the W40001 cable to J9003 on the IFF shelter entrance panel.
      (3) Connect the P40104 end of the W440002 cable to J40104 on the AB-958/TPX IFF antenna pedestal.

(4) Connect the P9006 end of the W40002 cable to J9006 of the IFF shelter entrance panel.

5. Install the Power Unit.

NOTE: The maximum length of the power cable that connects the power unit to the shelter power entrance panel is 50 feet.

a. Determine the position of the power unit.
b. Ground the power unit using a grounding rod, grounding strap, and grounding terminal on the power unit.
c. Connect the W7005 power cable to the shelter as described below.
   (1) The P9017 end of the W7005 power cable should be connected to J9017 on the power entrance panel.
   (2) The other end of the W7005 power cable is connected to the power generator.

6. Install the Antennas. Communication antennas are mounted on the shelter roof. Install the antennas in the sequence indicated below.

WARNING

Shelter-mounted antenna components are easier to install from the shelter roof. Take care to avoid injury while installing shelter-mounted components.

a. VUV antenna installation.
   (1) Obtain the components listed below from the transit skid and place them on the shelter roof.
      (a) The VUV antenna upper element is in bag 5, which is strapped to the upper curbside frame.
      (b) The VUV antenna-mounting bracket (SM-E-928140) is stored on the bottom pallet of the transit skid.
      (c) The VHF coaxial cables (W40003 and W40004) and the UHF coaxial cable (W3012) are stored in bag 13.
   (2) Remove the VUV antenna lower element from the curbside carrying tube that is stored underneath the radar trailer; place it on the shelter roof.
   (3) Install the VUV antenna as described below.
      (a) Climb onto the shelter roof using the two steps on the curbside of the shelter. Place the VUV antenna-mounting bracket into position at the rear curbside corner of the shelter; secure it with the four T-bolts.
      (b) Remove the threaded collar from the lower antenna element and slide the upper and lower antenna elements together. Ensure that the detent locks in place. Slide the threaded collar over the upper antenna element and screw the collar to the lower antenna element.
      (c) Slide the antenna-mounting cap over the shaft on the antenna-mounting bracket so that the lower antenna element passes through the hole in the antenna-mounting bracket. Tighten the antenna-mounting clamp.
b. UVU antenna installation.
   (1) Obtain the components listed below from the transit skid and place them on the shelter roof.
      (a) The UVU antenna lower mast (SM-D-641820) with an attached adapter is stored in the bag.

(b) The UHF coaxial cables (3010) and VHF coaxial cable (W40005) are stored in bag 13.

(2) Remove the UVU antenna (D-2118) from the roadside carrying tube underneath the radar trailer. Place the antenna on the shelter roof.

(3) Install the UVU antenna as described below.

(a) Climb onto the shelter roof using the two steps on the curbside of the shelter.

(b) Slide the lower mast into the upper and lower antenna brackets and the front roadside corner of the shelter.

(c) When necessary, loosen the wing nut so the pin in the lower mast fits into the slot in the upper bracket.

(d) Tighten the wing nut.

(e) Slide the antenna-mounting clamp over the adapter on the lower mast.

(f) Tighten the clamp.

c. FM antenna installation.

(1) Obtain the components listed below from the transit skid and place them on the shelter roof.

(a) The FM antenna lower mast (SM-D-641820) is stored in bag 6.

(b) The FM antenna-matching base (MX-6707/VRC) is attached to the FM antenna bracket at the rear of the lower pallet.

(c) The FM antenna-mounting bracket (SM-D-928098) with the antenna-matching base (MX-6707/VRC) assembled is stored in bag 4.

(d) The FM antenna and two lower elements are stored in bag 7.

(e) Two FM antenna control cables (W3007 and W3009) and two FM antenna coaxial cables (W3006 and W3008) are stored in bag 13.

(2) Install the FM number 1 antenna.

(a) Place the FM antenna bracket and matching base on the rear roadside corner of the shelter; secure it with four T-bolts.

(b) Screw the two antenna elements (AT-1095/VRC) into the two antenna elements (AS-1730/VRC).

(c) Screw one antenna (AS-1730/VRC) into the antenna-matching base (MX-6707/VRC).

7. Install the Sunshield and the Vestibule.

a. Sunshield.

NOTE: The canvas sunshield and a 30-foot nylon rope is stored on the upper pallet of the transit skid.

(1) Spread the sunshield flat on the shelter roof.

(2) Insert the top into hole A.

(3) Pass the end of the rope through the eyebolt on the curbside FM lower mast.

(4) Continue to pass the end of the rope through the eyebolt on the UVU lower mast.

(5) Continue to pass the end of the rope through the small hole on the roadside FM antenna bracket.

(6) The rope ends should emerge through hole B. Pull both ends of the rope until the sunshield is raised to the desired level. Tie the rope securely.

b. Vestibule.

(1) The vestibule is stored on the bottom pallet of the transit skid. The two poles and the two 6-foot nylon ropes are in bag 6 on the top pallet of the transit skid.

(2) Insert a pole into the top hem on each side of the vestibule canvas.

(3) When both poles have been pushed through the hem, insert the emerging end into the brackets, which are mounted on the shelter roof.

(4) While one person holds the vestibule in place, another person should tie the rope to the FM and VUV brackets.
(5) Tie the rope to the large hole.
(6) The sides of the vestibule and the rear wall of the shelter contain an adhesive. Press the sides of the vestibule against the mating surface so that the vestibule adheres to the shelter rear wall.

NOTE: Call out number 9 is called the drip hole.

8. Ground the Shelter.
   a. After the shelter is positioned, install the grounding rod. Proper grounding occurs when the grounding rod is 8 feet into the ground with 1 foot sticking out.
   b. The grounding rod for the shelter is stored on the radar trailer with the trailer grounding rods and support legs for the target reflectors. The W7006 grounding strap is stored on the transit skid in bag 13. Drive the rod into the ground and connect the grounding strap between terminal E9023 on the power entrance panel and the grounding rod.
9. Install the Telephone Lines. When more than one telephone line is to be connected to the telephone entrance panel, determine which line will be used as telephone line 1 through telephone line 4. To connect each side of the line, press the spring-loaded terminal and insert the end of the line (with the insulation removed) into the hole. Release the terminal so that it clamps the wire in the hole. Loosen the wing nut on the ground terminal below the telephone line and connect the shield (when shielded wire is used) to the ground terminal.
10. Unpack IFF.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment. Have the soldier perform the task in an actual setting or provide a training site.

Brief Soldier: Tell the soldier that he will be evaluated on installing the AN/TSQ-71B according to the appropriate TMs and unit SOP. Tell the soldier that he will not be informed of his progress during performance of the task except to prevent personnel injury or damage to the equipment.

Performance Measures	**GO**	**NO GO**
NOTE: Use TMs 11-5840-281-12-1; 11-5895-468-12; 11-5895-474-12, and the power source TM.		
1. Selects the site.	____	____
2. Unpacks the radar trailer.	____	____
3. Assembles the radar receiver/transmitter group.	____	____
4. Connects the cables between the radar and the shelter.	____	____
5. Unpacks and installs the IFF.	____	____
6. Installs the power unit.	____	____
7. Installs the UVU antenna.	____	____

Performance Measures	GO	NO GO
8. Grounds the shelter.	____	____
9. Installs the VUV antenna.	____	____
10. Installs the telephone lines.	____	____
11. Installs the FM antenna.	____	____
12. Installs the sunshield and the vestibule.	____	____
13. Grounds the shelter.	____	____
14. Installs the telephone lines.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
TM 11-5840-281-12	None
TM 11-5840-281-12-1	
TM 11-5895-474-12	

Install the Air Traffic Control Central, AN/TSW-7A
011-143-1061

Conditions: You are a member of an ATC tower team. The team is required to set up on the ATC Central at a predetermined site. The team is provided with an AN/TSW-7A, TM 11-5895-801-12, power supply with appropriate TM, and pioneer tools.

Standards: : Position the shelter, unpack the equipment, and install the AN/TSW-7A according to TM 11-5895-801-12.

Performance Steps

1. Position the Equipment.
   a. Siting requirements. The shelter, skid platform, and generator trailers must be positioned in the operational locations. The front of the shelter must face the airfield. The access door is on the rear of the shelter. Position the skid platform directly in front of the shelter five feet away (between the shelter and the runway). Make sure that the outboard sides of the ECUs are in line with the ECU air duct covers on the shelter. When it is installed, the shelter will be raised on jacks approximately 5 feet or it can be left mounted on the truck. The skid platform will be left on the truck or be lowered to the ground. Personnel in the shelter must have an unobstructed frontal view of airfield runways. The diesel power generators are positioned about 100 feet from the shelter to prevent generator noise from interfering with controller activity. Position the wind transmitter close to the airfield traffic area. Two 250-foot cables are supplied for connection to the wind transmitter. These cables can be used separately or joined to make a 500-foot cable. The multifuel heater is mounted to the left of the ECUs.
   b. Site selection. When selecting a site for the AN/TSW-7A facility, the following factors should be considered:
      (1) View. The site for the shelter must provide an unobstructed 360-degree view of the airfield and surrounding airspace. The site should be clear of all RF reflecting objects over two feet tall for a distance of 250 feet from the shelter. It will also be clear of all reflecting and radiating objects over 25 feet tall for a distance of 1,000 feet from the shelter. (Reflecting and radiating objects include hills, trees, fences, water towers, buildings, and overhead wires and cables.)
      (2) Terrain. Select elevated terrain if possible. The site should be reasonably level and flat, although the shelter can be erected on sloping terrain if all other conditions are met. Ground slope, however, must not exceed 10 degrees.
      (3) Drainage. The soil in the siting area must be well drained and firm. Avoid soft or marshy ground. If the facility is to be fully deployed, the soil must accept anchors for the antenna and shelter guy lines.
      (4) Wind. Avoid areas with strong currents, updrafts, or funneled winds.
      (5) Accessibility. If commercial power is to be used, be sure power requirements are met. Accessibility to roads and additional storage should also be considered when conditions warrant.

2. Unpack the Equipment. Before unpacking the shelter, skid platform, and power generator trailers, position them in their operational locations while they are still in the transit mode.

NOTE: The tool bag should be available if minor land clearance is required before the shelter and skid platform can be placed in their final positions. Remove the tool bag from the skid

platform. Release the straps on the tool bag and remove the needed tools. Be sure to place the tools back in the tool bag when the work is finished.

a. Checking the equipment.
   (1) Inspect the equipment for damage incurred during shipment. If any equipment has been damaged, report the damage.
   (2) Check the equipment as it is unpacked against the contents of the transit containers and the packaging slip. If the shipment is not complete, report the discrepancies. The equipment should be placed in service even though a minor assembly or part that does not affect proper functioning is missing.
   (3) Check to see if the equipment has been modified. (Equipment, which has been modified, will have the MWO number on the front panel near the nomenclature plate.) Check also to see if all applicable MWOs have been applied. (Current MWOs applicable to the equipment are listed in DA Pamphlet 25-30.)

b. Unpacking the equipment.
   (1) Four people are required to unpack the shelter and the skid platform assembly.

WARNING

Two people are needed to lift some items of equipment. Although not necessarily heavy, these items are so bulky that two people should handle them to avoid injury to personnel and/or damage to the equipment.

   (2) The items that are too heavy and/or too bulky for one person to handle safely are listed below.
      (a) Shelter jacks.
      (b) Power cables.
      (c) The shelter platform and stairway assembly.
      (d) The ECU plenum.
   (3) Two people should unpack items on the skid platform, and two people should unpack items in the shelter.

NOTE: When removing items from the skid platform, place them as close as possible to the area where they will be used.

   (4) Unpacking the AN/TSW-7A from the transportable mode involves removing various equipment from the skid platform and setting it where it will be assembled or used on the site. This requires four people. To unpack the AN/TSW-7A with minimum time and effort, refer to the Table 1061-1 for a list of the transit containers and their contents.

c. Unpacking the shelter. Two people can unpack equipment stowed in the shelter. Proceed as described below.
   (1) Remove the protective screens from the shelter windows and stack them out of the way.
   (2) Unlock the shelter door padlock and open the door. Remove the compression bar and lay it on the ground.

NOTE: Use the roof ladder to enter the shelter before the stairway and the platform are installed.

   (3) Fold out and secure the stairway, platform, and handrails as described in the following paragraphs (two people required).

Table 1061-1. Contents of transit bags.

Transit Bag	Contents	Quantity
Shelter bags		
SM-D-8847382-9	Windset mast base	1
	Windset guy line stakes	3
SM-DM-886365	Vacuum cleaner with accessories	1
Skid platform bags		
SM-D-886809-1	Jack foot plates (SM-D-885076)	4
	Jack ratchet wrenches	2
SM-D-886809-2	MX-6707/VRC base/antenna coupling units	2
	FM antenna tripod mount	2
SM-D-886838	Sledge	1
	Ground rod assemblies	3
	GP 112/G guy line stakes with shackles	6
	Ground clamp assembles	4
	Shackles (for 4-foot stakes)	5
SM-D-885867	Tools as follows:	
	Chain wrench	1
	Ripping bar	1
	Measuring tape	1
	Mattock with handle	1
	Axe	1
	Hammer	1
	Machete	1
	Shovel	1
	Extension lamp	1
	Pliers arc joint	1
Mast section bag		
MS-44	FM antenna installation kit	2 sets
	FM antenna	1

(a) Release the hold-down strap securing the stairway and the platform assembly and lower them to the shelter floor.
(b) Attach the safety lanyard to the eye located at the right center of the doorway.
(c) Lift the assembly and swing it out of the doorway on its pivots. The lanyard will prevent the assembly from falling against the doorsill.

(d) The person working outside the shelter will guide the slots in the rear lower edge of the platform over the shoulder screws in the front of the shelter under the doorway.

NOTE: The platform and stairway assembly weighs 51 pounds. If for any reason the assembly is completely removed from the shelter, two people are needed to lift it back into place for reinstallation.

(e) Slide the barrel bolts on the shelter over the platform flange, thus securing the platform to the shelter doorsill.

(f) The strap around the assembly can be removed so that the stairway can be folded outward and down to the ground.

(g) Use the ball-lock pins provided to lock the lower hinge points of the stairway.

(h) Remove the lanyard from the doorway. Install the stairway security lanyard underneath the rear of the platform and to the lower end of the stairway. Use the cable stops and the turnbuckle to adjust the lanyard cable.

(i) Insert the handrail posts into their sockets on either side of the stairway. Secure the posts in the sockets with the captive ball-lock pins provided.

(j) Snap the upper handrail ropes into the eyebolts positioned on the front of the shelter, at either side of the doorway.

(k) Remove the D-rings and the attached tie-down straps from their sockets in the shelter floor and stow them in one of the storage drawers. To prevent dirt and debris from accumulating in the sockets, use a screwdriver to close the sockets.

(4) Release the tie-down straps that hold the chairs in place.

(5) Remove the tie-down straps from their sockets in the floor and close the socket dust covers. Stow the straps in one of the storage drawers.

d. Unpacking the skid platform. In the deployed position, the skid platform is placed in front of the shelter. The rear of the skid platform is closest to the shelter. References to the left and right sides of the skid platform are as you face the platform from the shelter (rear side). Proceed as described below.

NOTE: If the system is to remain truck-mounted while it is operationally deployed, disregard steps 3, 4, 5, and 8.

(1) Remove the two FM antenna tripod leg sections from the transit bag.

(2) Remove the traps and the seven-foot air ducts from their mounting.

NOTE: Use two people to remove the jack stanchions.

(3) Remove the jack stanchions from the skid platform.

(4) Remove the two coupling bars from the skid platform.

NOTE: Only two jacks have guide rollers. They are to be installed on the right end of the shelter.

(5) Carry the jack stanchions to the corners of the shelter.

(6) Bring both air ducts to the rear edge of the platform.

(7) Remove the footplates for the shelter jacks and place them at the corners of the shelter.

(8) Remove the wind measuring set mast from the shelter sill and place it out of the way in front of the skid platform.

(9) Remove the holding straps and the ECU air plenum.

(10) Remove the two ground stakes from the skid platform.

(11) Place one ground stake near the left rear of the skid platform.

(12) Leave one ground stake near the stairway side of the shelter.

(13) Remove the straps securing the antenna transit bag and remove the bag.

3. Install the AN/TSW-7A.
   a. The AN/TSW-7A mobile air traffic control central is designed for rapid deployment and setup for a variety of mission situations and operational environments. To take full advantage of these design characteristics in attaining operational status in minimum time, a recommended deployment procedure has been developed. This procedure is based on the concept that a deployment crew will consist of seven training personnel. It is also based on the concept of three operational modes as described below.
      (1) Mode 1 (Emergency)—operational within 20 minutes of arrival at the site.
      (2) Mode 2 (Full Operation, Limited Duration)—operational within 30 minutes of arrival at the site.
      (3) Mode 3 (Full Operation, Extended Duration)—operational within one hour of arrival at the site.
   b. Figure 1061-1 shows a sequential list of tasks required to place the AN/TSW-7A into operation in each of the modes. The procedure is based upon breaking up the crew complement into three teams of two people each (the seventh crewmember is the supervisor). Team members are identified as either a or b. Note that setup in the emergency mode can be done by only two people in no more than 20 minutes. (In these setup times, crewmembers are assumed to be trained.)
   c. The sequence of deployment tasks and the elapsed time begins after a suitable site has been chosen and staked out and both M35 vehicles have been properly positioned at the site according to the detailed deployment diagram (SM-D-886099). This diagram is imprinted on an aluminum plate sorted in its holder on the back of the console at the ground controller's position. When positioning the skid platform, make sure that the ECU's input/output grills are opposite to the input/output ports on the shelter.

STEP	TEAM		
	1	2	3
Mode 1. Emergency (2 people, 20 minutes)			
1. Lower the tailgate of the vehicle carrying the shelter and remove the roof access ladder. Lock the signal entry panel protective cover in its raised (open) position. Set up the roof access ladder immediately to the right of the shelter door. Open the shelter door and enter the shelter.	a + b		
2. Deploy the shelter folding stairway and platform assembly. Secure the power entry panel protective cover in its open position.	a + b		

Figure 1061-1. Tasks required to place the AN/TSW-7A into operation.

STEP	TEAM		
	1	2	3
3. Remove the vacuum cleaner and wind data transmitter from the shelter. Then install the local controller's headset-microphone and/or hand-held microphone.	a + b		
4. Affix the roof access ladder to the appropriate attachments on the shelter and deploy the roof-mounted antenna systems.	b		
5. Using the 23 VDC battery, power the central in the Emergency Mode and tune the following radios and their associated filters to the assigned operating frequencies: UHF-AM 1, VHF-AM 1 and the FM 1 antenna tuning control.	a		
6. Using the roof access ladder, remove the shelter protective screens and place them on the ground in a way that will allow them to be easily reinstalled. Restow the roof access ladder.	a + b		
7. Set altimeters to field elevation.	a		
Mode 2. Full Operation--Limited Duration (6 people, 30 minutes)			
(Parallel to Steps 1 through 7, the four remaining personnel will conduct the following tasks to satisfy the requirements of the full operation.)			
8. Remove the transit bag containing the FM antenna supports. Remove the transit bag containing the FM 2 and 3 matching units from the top of the power transfer support frame. Remove the transit bag containing the HF and the FM 2 and 3 antenna sections from the skid.	a + b		
9. Remove the sledgehammer from the transit bag (bag # SM-D-886838) located behind the cable reels. Remove the tool kit.	a + b		

Figure 1061-1. Tasks required to place the AN/TSW-7A into operation (continued).

	TEAM

STEP	1	2	3
10. Place the FM antenna supports, FM matching units, and FM antennas in their assigned site location according to SM-D-886099.	a		
11. Erect the FM 2 and 3 antennas. (Use the wrecking bar to drive the auger.)	a + b		
12. Remove the grounding rod storage tubes from the skid. Remove the grounding rods from the tubes. Place one grounding rod at the skid platform and one at the stairway side of the shelter.	a + b		
13. Drive the three grounding rods into the ground and attach grounding cables W11 and W12 (SM-D-886099).	a + b		
14. Store all empty transit bags on the skid. Store the grounding rod tubes on the skid platform in their approximate transit position.	b		
15. Unsecure all cables on the cable reels by removing the cable reel covers.			a + b
16. Remove the power transfer box from the skid platform and place it on the ground next to the main power generators.			a + b
17. Drive the grounding rod for the generator into the ground next to the generators.			a + b
18. Remove the cables from the upper reels first, then remove the rest of the cables and deploy them. Make sure the proper end of each cable is paid out so that the connectors will mate.			a + b
19. Remove the wind data transmitter mast from the front sill of the shelter. Deploy it and the wind data transmitter according to SM-D-886099. Connect S16 and W106 from the transmitter (W30) to J14 on the shelter signal entry panel.			a + b
20. Connect power cable W1. Connect the ground-start generator.			a + b

Figure 1061-1. Tasks required to place the AN/TSW-7A into operation (continued).

	TEAM

STEP	1	2	3
21. Connect W6, W7, and W14 from the air-conditioners to the shelter power entry panels J3, J4, and J6.			a + b
22. Connect W26, W27, W28, and W29 from FM 2 and FM 3 antennas to J9, J10, J11, and J12 on the shelter signal entry panel.			a + b
23. Connect the telephone lines, as applicable, to specified terminals in the landline entry panel. Connect the NAVAID monitor pairs 26 and 21 to specified lines.			a + b
24. Install the remaining microphones, headsets, secure headsets, and telephone headsets.	a		
25. Install the flight strips.	a		
26. Install the light guns.	a		
27. Unstrap and deploy the shelter chains.	a		
28. Remove all interior transit straps and store them in shelter storage drawers. Close the strap socket holes in the floor.			
29. Turn on AC prime power and all applicable equipment and lights. Tune the radios and filters as necessary.	a		
30. Remove the plenum chamber from the skid and mount it on the support frame in front of the air-conditioners. Strap it in place and install the air ducts between the plenum assembly and the shelter.	a + b		
Mode 3. Full Operation--Extended Duration (6 people, 1 hour)			
31. Remove the following items from the equipment skid platform: • Four jack rods. • Two jack interconnecting rods.		a + b	

Figure 1061-1. Tasks required to place the AN/TSW-7A into operation (continued).

	TEAM

STEP	1	2	3
• Four jack gearboxes with derricks.			a + b
• One transit bag containing four jack foot plates and four jack ratchet handles.	a + b		
32. Attach one jack gearbox to each corner of the skid platform.	a + b		
33. Install one jack rack in each jack gearbox.	a + b		
34. Install one jack foot plate under each jack rack.	a + b		
35. Raise to level and install the interconnecting rods.		a + b	
36. Using one jack ratchet at each jack, raise the skid platform clear of the M35 vehicle bed.	a + b		
37. Drive the M-35 vehicle completely clear of the skid platform.	Operator		
38. Lower the skid platform.	a + b		
39. Remove the jack assemblies from the skid platform and install them on the shelter.	a + b		
40. Elevate the shelter clear of the M-36 vehicle bed.			a + b
41. Drive the vehicle forward completely clear of the shelter.	Operator		
42. Lower the shelter, if necessary, to achieve flat treads on the stairway. Level the shelter by adjusting each jack individually as necessary.			a + b

Figure 1061-1. Tasks required to place the AN/TSW-7A into operation (concluded).

d. The following paragraphs provide step-by-step instructions on how to complete the installation. The stability of the operationally deployed shelter varies both with wind loading and operational configuration. Configuration and wind velocity limits used to govern the installation configuration are shown below.
   (1) Shelter on ground (no guy lines)—81-knot (93-mph) wind.
   (2) Shelter raised six feet on jacks (no guy lines)—63-knot (73-mph) wind.
   (3) Shelter on bed of truck (no guy lines)—118-knot (136-mph) wind.
   (4) Shelter raised six feet on jacks (with guy lines)—105-knot (121-mph) wind. (Guy line anchor pullout force must not be less than 3,460 pounds.)

e. The steps required to convert the AN/TSW-7A from a transit mode to a complete installation are described below. The tasks are shown in sequence, but several tasks can be accomplished at the same time. For example, while one person erects the UHF/VHF collinear antennas, two people can remove and distribute the contents of the transit bags or deploy and connect the various cables. Table 1061-2 lists the equipment that must be installed to achieve a mode of operation. Table 1061-3 lists the tasks required to achieve each mode of operation. The points at which limited operation and

full operation can begin and the points at which the tower is fully installed are noted. References are made to repeated procedures and figures, as required.

Table 1061-2. AN/TSW-7A installation modes.

MODE	DEFINITION	TASK
A	Limited operation: UHF/VHF AM radio communications (without VHF/FM, HF, or telephone communications; air-conditioning; or elevated shelter.	Erect collinear antennas (VUV and UVU). Connect signal cables to RF entry panel. Connect primary power cable to power entry panel. Unstrap and position operators' chairs and unsling signal light guns. Start the power generator. Tune and check out AM (UHF/VHF) radios and filters.
B	Full ATC VFR operation: Full radio communications and weather-measuring capability (without telephone communications, air-conditioning, or elevated shelter).	Install VHF/AM antennas. Connect FM antenna signal cables to RF entry panel. Assemble and erect wind mast. Connect wind set cable to signal entry panel. Tune and check out VHF/FM and HF radios. Check out wind speed and direction indicators.
C	Full installation: Full radio, weather, and telephone capability.	Connect telephone landlines and direct lines to telephone entry panel. Check out telephone system. Connect emergency power cables between auxiliary generator and shelter. Elevate and level shelter (if not truck-mounted). Connect ECUs to shelter. Stow loose gear such as tools, straps, dunnage, transit bags, cases, and containers.

Table 1061-3. Installation tasks.

Task Number	Task	Personnel Requirement
1	Erect UHF-VHF antennas.	1
2	Prepare the shelter.	1
	a. Inside:	2
	(1) Fold out and secure stairway and handrail.	
	(2) Check to see that circuit breakers are off.	
	(3) Unstrap equipment.	
	(4) Install bolt hold plugs.	
	(5) Install headsets, mikes, and so forth.	
	(6) Stow straps.	
	b. Outside: Open signal and power entry panels.	2
3	Make power, ground, and RF cable connections.	2
	NOTE: At this point, the facility is capable of limited operation.	
4	Raise VHF/FM antenna whip on shelter.	1
5	Install HF antenna.	2
6	Deploy wind mast.	2
	NOTE: At this point, the facility is capable of full operation.	
7	Deploy ECU plenum and air ducts.	2
8	Connect emergency power cables.	1
9	Elevate and level shelter.	4
10	Guy shelter.	2
11	Stow protective screens.	1
12	Deploy and connect VHF/FM antennas 2 and 3.	2
13	Install telephone landlines and direct lines.	1
14	Stow loose gear.	3
	NOTE: At this point, the facility is fully installed.	

f. The common tools supplied with the TK101 tool kit are required. All special tools and materials required for installation of the AN/TSW-7A are supplied except—
   (1) WD-1/TT field wire for the telephone system.
   (2) A container and diesel fuel for the main power generators.
   (3) Gasoline for the auxiliary generator.

g. All UHF/VHF cables are already connected and remain so even in the transit mode.

h. To raise the shelter, proceed as described below.

NOTE 1: The shelter is now ready to be raised. Two people are needed to operate the jacks if the jack connecting shafts are used; otherwise, four people are needed. One person must be at the right rear corner to read the levels and direct the other jack operator. Keep the shelter as level as possible.
NOTE 2: If wind conditions do not require guying the shelter, disregard the references to guy adjustment in the following steps.

(1) Set the buckles on the shelter guy lines so that each guy line has about a foot of slack.
(2) Use the jacks to raise the unit until the guy lines are almost tight.
(3) Again, allow about a foot of slack in each guy line.
(4) Continue as described in (1) and (2) above until the unit is raised to a height of about 4< feet.
(5) When cranking is finished, remove the connecting shafts from the jacks.
(6) Check the guy lines and make sure that they are tight.
(7) Stow the connecting shafts on the skid platform.

i. If the shelter is to be operated from an M-35 truck, proceed as described in paragraphs (1) through (4) above and then perform the following steps. If the skid platform is to be transported by M-35 truck, follow steps (2) through (6) below.

NOTE: The skid platform is raised approximately 4< feet in the same manner as described in paragraph h above.

(1) Remove the guys from the right end of the shelter, if installed.
(2) Back the truck under the raised shelter or skid platform.
(3) Lower the shelter or skid platform onto the truck bed.
(4) Remove the remaining shelter guys, if used.
(5) Close the tailgate of the truck.
(6) Using the hold-down assemblies, secure the load to the truck bed. (One hold-down assembly, SM-D-886066, is at each corner of the shelter or skid platform.) To do this, hook the plate end of the hold-down assembly around the top edge of the truck rail at the front of the bed and the top edge of the tailgate at the rear. Place the hook on the other end of the hold-down assembly through the lifting ring at each corner of the load with the hook pointed up. Finally, tighten the turnbuckles on all four corners to secure the shelter or skid platform to the truck bed.

j. To install the grounds for the AN/TSW-7A equipment, proceed as described below.

(1) General grounding. The five six-foot grounding stakes supplied with the AN/TSW-7A are for grounding the equipment as described below and shown in Table 1061-4. When driving a grounding stake, drive the full length of the stake into the ground. If bedrock does not allow the stake to be vertically driven to its fullest extent, drive the stake into the ground at an angle. If the earth is frozen, use the mattock from the tool bag to dig down several feet. Drive the stake into the bottom of the hole, allowing for the length of the grounding cable to reach the equipment.

Table 1061-4. System grounds.

Equipment	Cable Designator
Shelter	W11
Diesel generators	Supplied with generator
Skid platform	W12

(2) Shelter grounding.

NOTE: When the shelter is jacked up, the shelter ground stud (E1 system ground) in the power entry panel will be about 5< feet above the terrain. The W11 grounding cable is 8 feet long. Ensure that the grounding stake does not obstruct the shelter jack that will be attached to the corner of the shelter next to the power entry panel.

(a) Remove the grounding stake from the skid platform.
(b) Place the stake within a 5-foot radius of the shelter power entry panel with the shelter lowered. Using the sledgehammer, drive the shelter-grounding stake into the earth.
(c) Remove the W11 cable from the data storage drawer. Attach one lug under the wing nut on the E1 (system ground) terminal in the shelter power entry panel. Attach the other lug to the bolt on the ground stake. Tighten the wing nut and stake bolt securely.

(3) Diesel generator and wind mast grounding.
(a) Remove the two remaining grounding stakes stored on the skid platform.
(b) The grounding stake for the diesel generators is supplied separately.
(c) Drive in the grounding stakes at the diesel generators, skid platform, and wind mast.
(d) Attach the grounding cables to the grounding lugs on the equipment and to the grounding stakes as shown in Table 1061-4. Ensure that all grounding cables attaching hardware is tightened securely.

WARNING

Do not climb to the roof of the shelter to make equipment repairs or adjustments when the AN/ARC-199 HF transceiver is operating. During operation, the AN/ARC-199 HF transceiver emits dangerous levels of radiation; therefore, make sure that all power to the system has been disconnected before climbing to the shelter roof for any reason.

k. The roof ladder is stowed horizontally in brackets on the left end of the shelter. To release the ladder, slide up the keeper block on the left lower corner. Then slide the ladder to the left, releasing the ladder hooks from their mounting brackets. When it is not in use, restow the ladder by reversing the procedure.
l. To remove the protective screens, release the two small draw-latches at the bottom of each screen. Lift each screen up and off the hangers at the top of each window. Stack the screens out of the way temporarily. For long-term deployment, the screens may be stowed either on the skid platform or under the shelter if it is to be elevated.
m. The procedures to erect and emplace the UHF/VHF antenna are simple and convenient. One person can erect the shelter-mounted antenna. However, emplacing and erecting the remote antennas for the FM-1 and FM-2 is best accomplished by two people. After attaching the roof ladder, climb onto the roof and proceed as described below.
(1) AS-3244/TS VHF/UHF/VHF antenna (left rear corner of roof).
(a) Release the quarter turn fasteners securing the antenna and its extension in the roof-mounted stowing clamps.
(b) Elevate the antenna enough so that the antenna extension can be installed.
(c) Thread the antenna enough so that the antenna extension can be installed.
(d) Lift the antenna to a vertical position, pivoting the base on its trunnion mount.
(e) Remove the ball lock pin from its stowed position in the antenna mount.

(f) While holding the antenna erect, align the holes in the antenna mount with the hole in the antenna base and insert the ball lock pin from the top down, thus locking the antenna assembly in its erect position. No guying or other security measures are required.

(2) AS-3242/GRC, UHF/VHF/UHF antenna (right front corner of roof). The procedures for erecting the UVU antenna are identical to those for the VUV except that no antenna extension is required.

(3) AS-3684/VRC, UHF/FM antenna roof mount. To erect the VHF/FM roof-mounted antenna assembly, follow the same general procedures as described for the AS3244/TS antenna. A slightly different pin-locking arrangement is necessary because of the configuration of the antenna base impedance matching unit.

(4) AB-1311/VRC-86, HF antenna base and MS-116/117/118 HF antenna (left center roof edge). Erect the HF antenna base and HF antenna in a manner similar to that described in (2) above. Ground or clip the antenna end at the center of the right roof edge.

n. To unpack the storage drawers, proceed as described below. Locating items in the storage drawers is easy because the contents are stenciled on the front of each drawer. The contents of each drawer are listed below.

(1) Drawer 1 contains—
(a) Four H-295/TSW-7 headset/microphones.
(b) Three M-154/TSW-7 dynamic microphones.
(c) Two telephone handsets.

(2) Drawer 2 contains—
(a) Two aircraft signal light guns.
(b) Two light gun cables (W102 and W103).

(3) Drawer 3 contains—
(a) One magnetic compass.
(b) Two pair of binoculars.
(c) Three shelter grounding straps.
(d) Fifty flight data strap holders.
(e) One barometer.

o. To install the VHF/FM-2 antenna, proceed as described below.

NOTE: Since the skid platform and shelter are already unpacked, the required parts are on the ground near the shelter.

(1) Lay out the W26 and W27 cables.

(2) Take the antenna tripod legs and anchor, antenna tripod mount, antenna whip, and mast clamp for the VHF/FM-2 to the selected spot.

CAUTION

If this procedure is performed before the shelter is raised, be sure to leave enough slack in the cable to elevate the shelter.

(3) Unpack the two FM antenna couplers from their bag and place one at each of the two installation sites.

(4) Unpack the tripod leg bags and place three legs at each of the installation sites.

(5) Screw the whips into the antenna couplers.

(6) Assemble the three legs for each tripod and insert two of them into the tripod mount sockets.

(7) Raise the antenna to an erect position on the two tripod legs and insert the third leg. The antenna assembly will now remain erect on the tripod.

NOTE: If the antenna must be erected on a surface that slopes approximately 10 degrees or more, dig a hole for the uphill leg of the tripod to level the assembly.

(8) To secure the antenna installation against high winds, install and rig the hold-down kit as described below.
   (a) Screw the ground stake (auger) into the ground directly under the apex of the tripod.
   (b) Attach the snap on one end of the nylon line into the ring on the bottom of the tripod apex.
   (c) Run the other end of the line through the grounding stake eyelet and pull the line tight before tying it off. This secures the tripod assembly to the ground and prevents tipping even during extremely high wind.
   (d) String out and attach the RF and control cables from each FM antenna to the appropriate connector on the signal entry panel.

p. To install the VHF/FM-3 antenna, repeat steps (1) through (8) using cables W28 and W29.

NOTE: Table 1061-5 shows the FM antennas and the wind transmitter connections.

Table 1061-5. FM antennas and wind transmitter connections.

Function	From Antenna	Cable Designator	To RF Entry Panel
RF and power to FM-1	FM-1 antenna coupler J1, J2	W25 W24	J7 FM-1 and J8
RF and power to FM-2	FM-2 antenna Coupler J1, J2	W26 W27	J9 FM-2 and J-10 J11 FM-3 and
RF and power to FM-3	FM-3 antenna Coupler J1, J2	W28 W29	J12 J14 wind measuring set
Wind transmitter power	Wind transmitter (106)	W16	

q. To install the AN/GMQ-11 or AN/GMQ-20, proceed as described below.

NOTE: Two people are required to install the wind transmitter.

(1) Select a site for the wind transmitter as close to the runway as possible. The site must be reasonably level and free of obstructions that would cause air turbulence. Avoid a site that exposes the wind transmitter to exhaust or other fumes. Place the wind transmitter as close to the airfield as possible in a position that will reflect the speed and direction of the airflow.

(2) With the W30 attached, remove the wind speed and direction transmitter from its stowed position in the shelter.

(3) Release the clamps and remove the wind mast assembly from the outside front sill of the shelter.

(4) Align and assemble the wind set components at the selected site as shown below.
   (a) Place the wind mast on the ground with the base plate to the south and the mast pointing generally north.
   (b) Using the magnetic compass, align the wind mast to point directly north.
   (c) Drive the ground stakes through the holes in the base plate and into the ground, thus securing the mast base.

(d) Slip the wind transmitter socket onto the mast top and secure it with the ball lock pin provided.

(5) Connect cables W30 to W106 and W106 to W16. Connect W16 P1 to J14 on the signal entry panel. Secure the cable to the mast using the clamps supplied on the mast.

(6) Raise the mast off the ground two or three feet. Turn on the power to the wind mast and verify that 000 degrees is shown on the wind direction indicators when the propeller of the wind transmitter points north. If 180 rather than 000 degrees is indicated, pull the ball lock pin to secure the wind transmitter to the mast and rotate the socket 180 degrees on the mat. Reinsert the ball lock pin.

(7) The wind mast may now be raised to its full upright position and guyed using the guy lines and stakes provided.

r. To connect the telephone landlines, proceed as described below.

NOTE: The telephone landlines are connected to the telephone entry panel either as separate pairs or by a cable.

(1) Landline connection to binding posts.

(a) Prepare the paired wires by stripping about one inch of insulation from the ends of the two wires in each line to be connected. Scrape the stripped ends clean.

(b) Open the hinged outer door of the telephone entry panel by releasing the two captive fasteners in the door.

(c) Push down one of the LL1 binding posts. Insert the bare end of one wire into the binding post slot, then release the post. Check to ensure that the wire is securely clamped. If there are four wires, repeat the procedure with the other wires of the pair on the 4WT/2WT/R posts. Secure all wire pairs this way.

(d) After the wires have been installed, gather the wires into a neat bundle and insert them into the wire retainer at the bottom of the door as you close the door. Secure the door.

(2) Landline connection by cable.

(a) Release the connector covers on the 26-pair cable and in the telephone entry panel.

(b) Connect the mating half of the U-187/U connector.

s. To preset the ECU air controls and install the plenums and air duct hoses, proceed as described below.

(1) Unzip the rain cover on each ECU. Roll the cover to the top of the ECU and secure the straps that are provided.

(2) Set the air controls on both ECUs as follows:

(a) Pull the fresh air damper control chain all the way out to close the damper. Then release this spring-loaded chain until two of the chain beads withdraw into the chamber. Lock the chain by lowering it into the holding slot between two beads. This sets the damper in a partially open position.

(b) Fully open the intake grill with the lever that is provided.

(c) Fully open the discharge grill by setting each vane in an open position manually.

(3) Get the three straps, which secure the plenum on the skid platform during transit.

(4) Attach the plenum to the ECUs and strap the plenum.

(5) Remove the covers from the plenum air duct opening.

(6) Remove the two seven-foot air duct hoses from their transit position on the shelter.

(7) Release the captive wind bolts in each of the two shelter air duct covers and secure the covers in the open position with the catches that are provided.

(8) Connect the two air ducts between the ECU plenum opening and the shelter air duct ports. Secure them with the hook clamps that are provided.

t. Only two gearboxes have loading guides; therefore, install these two gearboxes on the right end of the shelter as described below.

NOTE 1: Two people are required to assemble and mount each jack.

NOTE 2: The jacks are self-securing; they will not lower or slip automatically.

(1) Place one of the jack gearboxes so that the mounting bolts (1 and 8) are positioned at the jack mounting holes on the shelter.

NOTE: If the skid platform is to be raised on jacks for transport by truck, attach the gearboxes to the jack adapter bracket and perform steps (2) through (7) below.

(2) Start the mounting bolts into the holes using your fingers.
(3) Remove the combination clevis pin-socket head wrench from the loading guide.
(4) Tighten the mounting bolts with the wrench end of the clevis pin-socket wrench.
(5) Using the combination clevis pin-socket head wrench, lock the two loading guides into the operating position on the bottom of the gearboxes.
(6) Perform steps (1) through (5) above for each of the four jacks.
(7) Loosen the two gate locking screws and open the gate.
(8) Place the jack base below the jack gearbox.
(9) Place the jack stanchion on the jack stand and inside the gate so that the jack stanchion stands straight up.
(10) Close the gate and lock it with the two gate-locking screws.
(11) Tighten the gate-locking screws with the wrench end of the jack handle.
(12) Perform (7) through (11) above for each of the four jacks.
(13) Check the levels mounted at the right rear corner of the shelter.

NOTE: The jacks are self-securing in the raised position; therefore, they require no external latches or clamps to prevent them from being inadvertently lowered.

(14) Level the shelter by using the jacks that are on the low side or end.
(15) Attach a connecting shaft between the two front jacks.
(16) Attach the second connecting shaft between the rear jacks.
(17) Use the jacks as needed to raise the shelter.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment.

Brief Soldier: Tell the soldier that he will be evaluated on installing the AN/TSW-7A according to the appropriate TMs and unit SOP.

Performance Measures	**GO**	**NO GO**
NOTE: Applicable performance measures are determined by local conditions, mission requirements, and assigned equipment. Use TM 11-5895-801-12 and the power source TM.		
1. Positions the equipment.	____	____
2. Unpacks the equipment.	____	____
3. Performs the setup sequence for the emergency mode.	____	____
4. Performs the setup sequence for the full-operation (limited duration) mode.	____	____

Performance Measures	GO	NO GO
5. Performs the setup sequence for the full-operation (extended duration) mode.	___	___
6. Grounds the shelter.	___	___
7. Installs the generator set.	___	___
8. Connects the telephone lines.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
TM 11-5895-801-12	None

Install Beacon Set, AN/TRN-30 (V)1 or AN/TRN-30 (V)2
011-143-5050

Conditions: You are a member of a tactical ATC team and are required to install the AN/TRN-30 (V)1 or AN/TRN-30 (V)2 beacon.

Standards: Position and install the AN/TRN-30 (V)1 or AN/TRN-30 (V)2 beacon set and connect power source according to TM 11-5825-255-12 and power source TM.

Performance Steps

1. Positions Equipment.
   a. Amplifier (V)2.
   b. Transmitter (V)1.

   CONDITION: Site is determined and complies with standards according to TM11-5825-255-12.

2. Installs Antenna.
   a. 15 foot.
   b. 30 foot.
   c. 60 foot.

   CONDITION: Equipment is positioned.

3. Installs Transmitter (V)2.

   CONDITION: Amplifier is positioned and antenna erected.

4. *Connects Power Source.
   a. Generator.
   b. Battery pack.

   CONDITION: Beacon set is installed.

***NOTE:** Current generator operators license is required to operate generator.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment. Have the soldier perform the task in an actual setting or provide a training site.

Brief Soldier: Tell the soldier that he will be evaluated on installing the Beacon Set, AN/TRN-30 (V)1 or AN/TRN-30 (V)2 according to the appropriate TMs and unit SOP. Tell the soldier that he will not be informed of his progress during performance of the task except to prevent personnel injury or damage to the equipment.

Performance Measures	GO	NO GO
1. All safety precautions are followed. Site is selected according to standards listed in TM. Two personnel are used to position	____	____

Performance Measures	GO	NO GO
(V)2 amplifier. Antenna is erected using six personnel for the 60-foot antenna and 2 personnel for the 30-foot antenna in high winds. Radials and guy wires are positioned according to TM. Beacon is connected to required power source. All procedures are according to TM 11-5825-255-12.		

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
TM 11-5825-255-12	None

Introduction to the AN/TSQ-198 (Tactical Terminal Control System)
011-143-7001

Conditions: As an ATC tower operator, given an AN/TSQ-198 TTCS and TM 11-5895-1568-14, you are an ATC TWR Operator and are being introduced to the AN/TSQ-198.

Standards: You will correctly identify the components of the AN/TSQ-198 TTCS and their functions, according to TM 11-5895-1568-14.

Performance Steps

1. Equipment Introduction.

   a. Equipment familiarization.
   b. System Characteristics and capabilities.

   CONDITION: As a member of a four-man team given a predetermined site, an AN/TSQ-198, TM 11-5895-1568-14.

2. Conduct High Frequency Operations.

   a. Introduce propagation theory.
   b. Use the manual method to determine frequency operational skip.
   c. Perform secure operations using automatic link establishment.

   CONDITION: As a member of a four-man team given a predetermined site, an ANT/TSQ-198, TM 11-5895-1568-14.

3. Conduct ultra high and very high frequency operations.

   a. Use Have Quick operations.
      (1) Establish time of day.
      (2) Determine single word of day.
      (3) Use multiple word of day.
   b. Conduct alpha numeric encryption device procedures.
   c. Single channel radio operations.
   d. Frequency hopping.

   CONDITION: AN/TSQ-198 has been positioned at a predetermined site and a requirement exists for an air traffic control facility.

4. Conduct Function Checks.

   CONDITION: AN/TSQ-198 is positioned, radios have been turned on and the team will operate from a vehicular power source.

5. Develop Operational Schematic.
   a. Assist in developing secure radio nets for higher command.
   b. Relay control data as necessary.
   c. Determine operating frequencies.

CONDITION: As a member of a four-man team given a predetermined site, an AN/TSQ-198, TM 11-5895-1568-14.

Evaluation Preparation: Setup: This task may be evaluated using an AN/TSQ-198 TTCS or other media showing its components.

Brief Soldier: Tell the soldier he will be evaluated on his ability to correctly identify the components and his functions of the AN/TSQ-198 TTCS.

Performance Measures	**GO**	**NO GO**
Position equipment affording full view of aircraft operating area.	___	___
Assembles equipment and turn on power (vehicular) according to TM 11-5895-1568-14.		
a. Equipment introduction.		
b. Conduct high frequency operations.		
c. Conduct ultra-high and very-high frequency operations.		
d. Conduct function checks.		
e. Develop operational schematic.		

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
TM 11-5895-1568-14	None

Install the AN/TSQ-198 (Tactical Terminal Control System)
011-143-7003

Conditions: As an ATC tower operator in a field environment, you are given AN/TSQ-198 TTCS and TM 11-5895-1568-14. You are a member of a tactical ATC team instructed to install the AN/TSQ-198 TTCS.

Standards: Position and assemble equipment, affording full view of aircraft operating area, and turn on power (vehicular) according to TM 11-5895-1568-14.

Performance Steps

1. Position the Equipment.
   a. Install the meteorological measuring system.
   b. Emplace the secondary power source.
   c. Determine the site for remote operations and erect the system antennas.

   CONDITION: As a member of a four-man team given a predetermined site, an AN/TSQ-198, TM 11-5895-1568-14.

2. Prepare Radios for Operation.
   a. Turn ON procedures.
   b. Turn OFF procedures.

   CONDITION: AN/TSQ-198 has been positioned at a predetermined site and a requirement exists for an air traffic control facility.

3. Conduct Function Checks.

   CONDITION: AN/TSQ-198 is positioned, radios have been turned on and the team will operate from a vehicular power source.

4. Install the RSC.
   a. Emplace the RSC.
   b. Remote the RSC.
   c. Run BIT test.

   CONDITION: AN/TSQ-198 is positioned, radios have been turned on and the team will operate from a vehicular power source.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment. Have the soldier perform the task in an actual setting or provide a training site.

Brief Soldier: Tell the soldier that he will be evaluated on installing the AN/TSQ-198 TTCS according to the appropriate TMs and unit SOP. Tell the soldier that he will not be informed of his progress during performance of the task except to prevent personnel injury or damage to the equipment.

Performance Measures	GO	NO GO
Positions equipment affording full view of aircraft operating area.	___	___
Assemble equipment and turn on power (vehicular) according to TM 11-5895-1568-14.		
a. Position the equipment.		
b. Prepare radios for operation.		
c. Conduct function checks.		
d. Install the RSC.		

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
TM 11-5895-1568-14	None

SUBJECT AREA 3: OPERATIONAL SUSTAINMENT OF ATC EQUIPMENT

Operate the Air Traffic Control Facility, AN/TSQ-97
011-143-5000

Conditions: As a member of an ATC team in the field, required to provide air traffic services, you are given an AN/TSQ-97, TM 11-5895-800-12, a power source, appropriate operators manual for power source, and pioneer tools.

Standards: Perform starting procedures, operate under normal and unusual conditions, and perform operator maintenance on the AN/TSQ-97 according to TM 11-5895-800-12.

Performance Steps

1. Performs Starting and Checkout Procedures.
   a. Front panel.
   b. Rear panel.
   c. Wind indicator.
   d. Altitude.
2. Operate the Facility.
3. Operate Under Unusual Conditions.
   a. Antijamming.
   b. High humidity.
4. Perform Operator Maintenance.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment. Have the soldier perform the task in an actual setting or provide a training site.

Brief Soldier: Tell the soldier that he will be evaluated on operating the AN/TSQ-97 according to the appropriate TMs and unit SOP. Tell the soldier that he will not be informed of his progress during performance of the task except to prevent personnel injury or damage to the equipment.

Performance Measures	GO	NO GO
All switches and dials are properly set prior to operating the AN/TSQ-97. Antijamming procedures are followed when AN/TSQ-97 is subjected to jamming. When high humidity is encountered, the AN/TSQ-97 is operated according to TM. Operator maintenance is performed. All procedures are according to TM 11-5895-800-12.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required

DA Form 2404
TM 11-5895-800-12

Related

FM 3-04.303(FM 1-303)

Operate the Air Traffic Control Central, AN/TSQ-70A
011-143-5002

Conditions: You are a member of an ATC tower team given an operational AN/TSQ-70A (with generator set), TM 11-5895-579-12, and applicable TM for the generator set.

Standards: Perform preoperational shutdown procedures, operates AN/TSQ-70A and perform operator maintenance according to TM 11-5895-579-12 and TM for the generator set to use.

Performance Steps

1. Perform Preoperational Shutdown Procedures.

   CONDITION: As a member of a 2-man team given an AN/TSQ-70A fully capable of operation, TM 11-5895-579-12, generator power source with appropriate TM.

2. Perform Start-up Procedures.

   CONDITION: All controls are placed in shutdown condition and the AN/TSQ-70A is required to be operational.

   NOTE: Current generator operator's license required to start generator.

3. Operate AN/TSQ-70A.
   a. Nonsecure radios.
   b. Secure radio.
   c. Channels and frequencies.
   d. Telephones.

   CONDITION: All portions of the AN/TSQ-70A are operational.

4. Operate Under Unusual Conditions.
   a. Emergencies.
   b. Jamming.
   c. Antijamming procedures.

   CONDITION: All portions of the AN/TSQ-70A are operational and a situation exits which requires operation under unusual conditions.

5. Perform Operator Maintenance.
   a. Daily.
   b. Weekly.
   c. Monthly.

   CONDITION: Assigned to an operating position in the AN/TSQ-70A and preventative maintenance is required.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment. Have the soldier perform the task in an actual setting or provide a training site.

Brief Soldier: Tell the soldier that he will be evaluated on operating the AN/TSQ-70A according to the appropriate TMs and unit SOP. Tell the soldier that he will not be informed of his progress during performance of the task except to prevent personnel injury or damage to the equipment.

Performance Measures	GO	NO GO
The AN/TSQ-70A is placed in the preoperational (shutdown) condition prior to energizing system and performing startup procedures. Startup procedures are performed in sequence. All radios, secure and nonsecure, telephones, frequencies and channels are operational. All procedures are followed for operating under emergency circumstances. Jamming is recognized and identified as to type and antijamming procedures are followed. Operator maintenance is performed following the checklist in the TM. All above procedures are accomplished according to TM 11-5895-579-12.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
DA Form 2404 TM 11-5895-579-12	None

Operate the Air Traffic Control Central, AN/TSW-7A
011-143-5004

Conditions: You are a member of an ATC tower team given an assembled AN/TSW-7A with generator set, TM 11-5895-801-12, and appropriate TM for the generator set.

Standards: Perform starting procedures, operate and maintain the air traffic control central according to TM 11-5895-801-12.

Performance Steps

1. Perform Preliminary Starting Procedures.
   a. Visual system inspection. Before beginning operations, conduct a thorough visual system inspection. This involves a walk-around to ensure that all cables and connectors are properly laid out and securely connected. Pay particular attention to the RF connectors on the antenna bases. Make sure that the grounding rods are properly installed and the grounding straps are securely connected. Be sure that the cables lying on the ground cannot be run over by vehicular traffic. Open the battery compartment and ensure that the cable connection to the battery is secure and there are no obstructions in the battery vent system. Make sure that the cables are securely connected to the auxiliary generator and that the generator is covered if it is not being used. Make sure that fuel cans and drums are covered and properly stowed and no fuel leaks are evident. Inspect the HF and remote FM antennas for proper guying against strong wind. Also be sure that all loose gear, such as window screens and transit bags, are properly stowed.
   b. Battery operation (emergency mode) only. If the system is to be initially powered from the internal battery, press the MAIN BUS-BATTERY switch down, hold the switch down, and read the LOAD VOLTAGE meter just above it. Make sure that at least 24 volts are available. Then, place the EMERGENCY DC-BATTERY circuit breaker in the ON position (up). Ensure that the ON-LINE lamp illuminates (amber), then press RESET on the power distribution panel. (Table 5004-1 shows examples of equipment electrical loads versus operating times.)

NOTE: Figure 5004-1 shows a front view of the power distribution assembly; Figure 5004-2 shows a side view of the power distribution assembly; Figure 5004-3 shows the PP-6187/TSW-7 power supply; Figure 5004-4 shows the environmental control panel. Table 5004-2 shows the front view of the power distribution assembly controls and indicators. Table 5004-3 shows a side view of the power distribution assembly controls and indicators. Table 5004-4 shows the PP-6187/TSW-7 power supply controls and indicators. Table 5004-5 shows the environmental control panel controls and indicators.

Table 5004-1. Examples of equipment electrical loads versus operating times.

Power Source	Equipment in Use[1]	Operating Time[2]
Battery only	HF/SSB (AN/ARC-199): Console lights for one position	:50 maximum[3]
Battery only	HF/SSB (AN/ARC-199): 1 VHF-AM (AN/ARC-115 or AN/ARC-186) 1 VHF-FM (AN/ARC-114 or AN/ARC-201) 1 UHF-AM (AN/ARC-164)	:45 maximum[3]
Battery only	HF/SSB (AN/ARC-199): 3 VHF-AM (AN/ARC-114 or AN/ARC-201) 3 VHF-FM (AN/ARC-115 or AN/ARC-186) 3 UHF-AM (AN/ARC-164) Console lights for three positions	:35 maximum[3]
Battery only	3 VHF-AM (AN/ARC-115 or AN/ARC-186) 3 VHF-FM (AN/ARC-114 or AN/ARC-201) 3 UHF-AM (AN/ARC-164) 1 voice security group	1:45 maximum[3]
Truck running	HF/SSB (AN/ARC-119): 3 VHF-AM (AN/ARC-115 or AN/ARC-186) 3 VHF-FM (AN/ARC-114 or AN/ARC-201) 3 UHF-AM (AN/ARC-164) Telephone system Console lights for three positions	Continuous operations
Truck running	3 VHF-AM (AN/ARC-115 or AN/ARC-186) 3 VHF-FM (AN/ARC-114 or AN/ARC-201) 3 UHF-AM (AN/ARC-164) Telephone system 3 voice security groups Battery charger 1 light gun	Continuous operations
1 PU-405/AM power unit or other 3 50/60 Hz AC, 15 kw source	All equipment including both ECUs. (This approaches maximum capacity of one PU-405/AM power unit. Additional electrical loads applied, such as turning on the AC maintenance lights, could cause the circuit breaker to trip.)	

[1]The assumption is that the operating duty cycles of the radio equipment is 10 percent; that is, the approximate receive-to-transmit ratio is 10 to 1.

[2]Operating times given are based on the use of a fully charged battery that is in good condition at the start of the operation.

[3]Battery life also depends on climatic conditions.

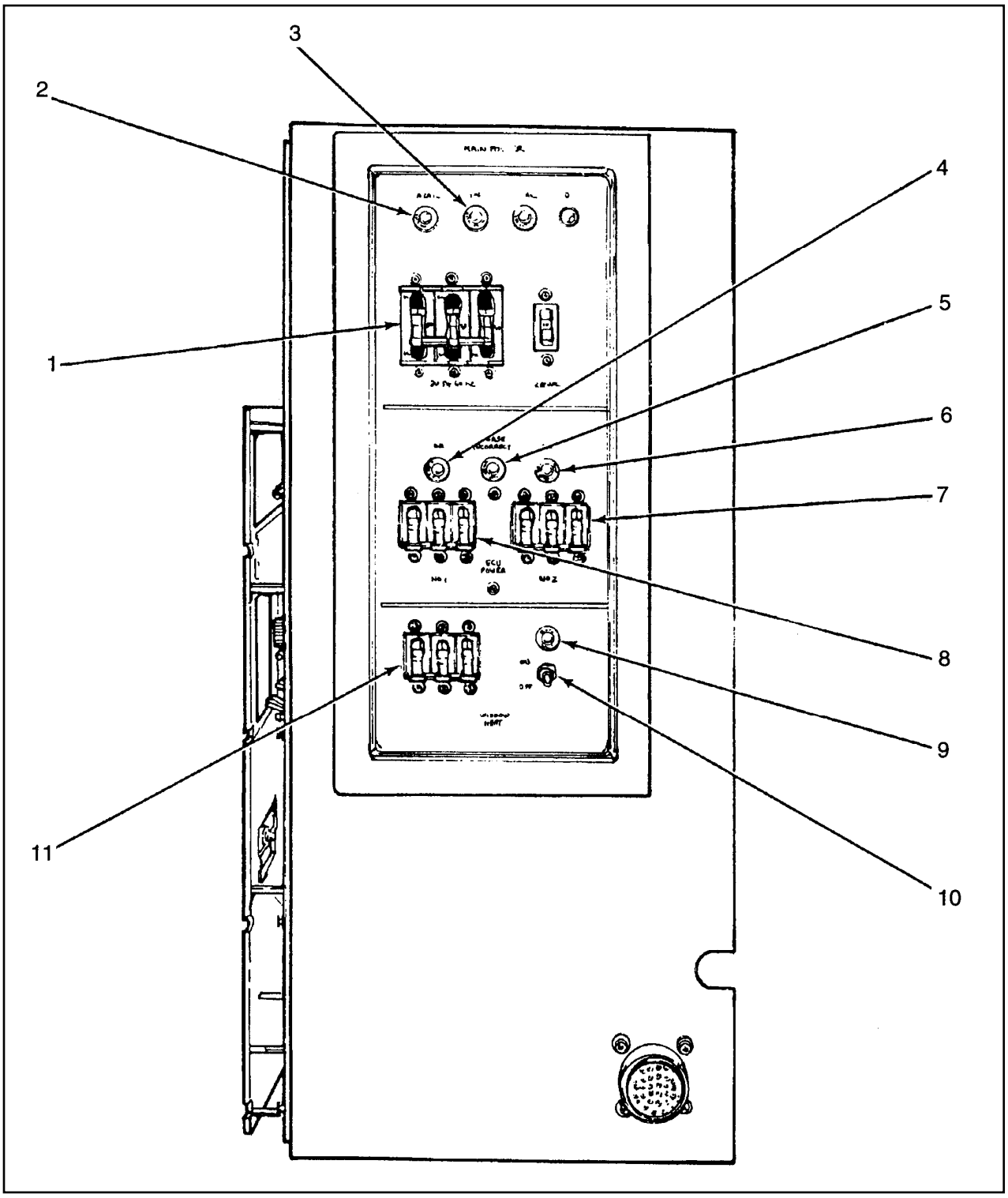


Figure 5004-1. Power distribution assembly (front view).

Table 5004-2. Power distribution assembly controls and indicators (front view).

Item No.	Control/Indicator	Use
1	MAIN POWER 30, 50/60 Hz circuit breaker	Applies main AC power and guards the line to the central.
2	AVAIL light (white)	Lights when main AC power is ready to use.
3	ON light (green)	Lights when main AC power is applied to the central.
4	ECU no. 1 ON light (green)	Lights when ECU I circuit breaker applies AC power to ECU 1.
5	PHASE INCORRECT light (red)	Lights when main AC power is out of phase. (ECUs cannot be used.)
6	ECU 2 ON light (green)	Lights when ECU 2 circuit breaker applies AC power to ECU 2.
7	ECU 2 ON/OFF circuit breaker	Applies AC power to and guards the line to ECU 2.
8	ECU 2 ON/OFF circuit breaker	Applies AC power to and guards the line to ECU 2.
9	WINDOW HEAT ON light (green)	Lights when power is applied to the window heaters.
10	WINDOW HEAT ON/OFF switch S1	Applies power to the window heaters.
11	WINDOW HEAT ON/OFF circuit breaker	Applies power and guards the lines to the window heater circuits.

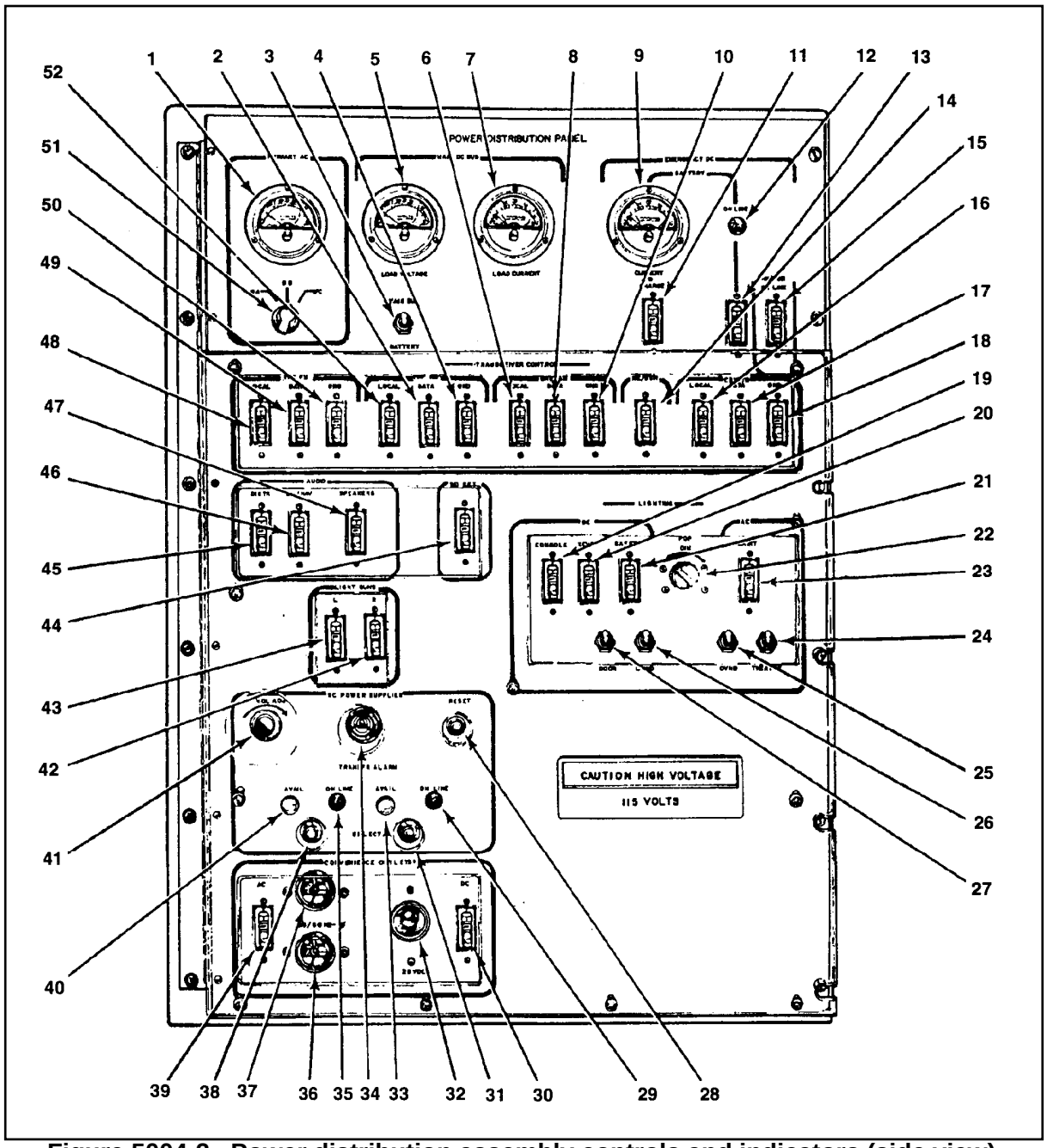


Figure 5004-2. Power distribution assembly controls and indicators (side view).

Table 5004-3. Power distribution assembly controls and indicators (side view).

Item Number	Control/Indicator	Use
1	PRIMARY AC meter	Shows the VRMS value of any AC input phase picked by the PRIMARY AC phase select switch.
2	Communication control data circuit breaker	Applies 28V power to and guards the DATA controller VHF-AM radio.
3	MAIN DC BUS MAIN BUS/BATTERY spring-loaded switch	When the switch (MAIN BUS) is up, lets the LOAD VOLTAGE meter show the MAIN DC BUS volts and the LOAD CURRENT meter show the MAIN DC BUS amperes. When down, the switch lets the LOAD VOLTAGE meter show the battery volts.
4	TRANSCEIVER CONTROL GND controller VHF-AM circuit breaker	Applies 28 VDC power and guards the line to the ground controller VHF-AM radio.
5	MAIN DC BUS LOAD VOLTAGE meter	Shows the DC power volts across the load.
6	TRANSCEIVER CONTROL DATA controller UHF-AM circuit breaker	Applies 28 VDC power and guards the line to the local controller UHF-AM radio.
7	MAIN DC BUS LOAD CURRENT meter	Shows how much 28 VDC is drawn from the main DC bus.
8	TRANSCEIVER CONTROL DATA controller UHF-AM circuit breaker	Applies 28 VDC power and guards the data controller UHF-AM radio.
9	EMERGENCY DC BATTERY meter	Indicates battery charge rate.
10	TRANSCEIVER CONTROL GND controller UHF-AM circuit breaker	Applies 28 VDC power and guards the line to the ground controller.
11	EMERGENCY DC BATTERY CHARGE circuit breaker	Allows on/off control and guards the line to the battery charge circuit.
12	EMERGENCY DC BATTERY ON LINE light (yellow)	Lights when the DC power is supplied by the battery.
13	EMERGENCY DC BATTERY ON LINE circuit breaker	Connects the battery to the central.
14	TRANSCEIVER CONTROL HF/SSF circuit breaker	Applies 28 VDC power and guards the line to the HF radio.
15	HF/SSB ON LINE circuit breaker	Applies battery power and guards the line to the HF radio in the emergency mode.
16	TRANSCEIVER CONTROL CRYPTO LOCAL CONTROLLER circuit breaker	Applies 28 VDC power and guards the line to the local controller crypto gear.
17	TRANSCEIVER CONTROL CRYPTO DATA CONTROLLER circuit breaker	Applies 28 VDC power and guards the line to the data controller crypto gear.
18	TRANSCEIVER CONTROL CRYPTO GND CONTROLLER circuit breaker	Applies 28 VDC power and guards the line to the ground controller crypto gear.

Table 5004-3. Power distribution assembly controls and indicators (side view) (continued).

Item Number	Control/Indicator	Use
19	LIGHTING DC CONSOLE circuit breaker	Applies power and guards the line to all console lamps.
20	LIGHTING DC XCVR circuit breaker	Applies power and guards the line to the transceiver panel lamps.
21	LIGHTING DC SAFETY circuit breaker	Applies DC power and guards the line to the console overhead lamps, the door light through the DOOR switch, and the EMER overhead lights through the OVHD switch.
22	LIGHTING PDP DIM control knob	Turns the PDP panel lights brighter or dimmer.
23	LIGHTING AC MAINT circuit breaker	On/off control. Also guards the line to all AC power lights such as the overhead lights and the theater lights.
24	LIGHTING AC THEATER switch	On/off control for AC power to the theater lights.
25	LIGHTING AC OVHD switch	On/off control for AC power to the overhead lights.
26	LIGHTING DC OVHD switch	On/off control for DC power to the overhead lights.
27	LIGHTING DC DOOR switch	On/off control for 28 VDC power to the door lights.
28	DC POWER SUPPLIES RESET push button switch	When pushed, stops the transfer alarm.
29	DC POWER SUPPLIES B ON LINE light (green)	Lights when B DC power supply is the DC power source.
30	CONVENIENCE OUTLETS DC circuit breaker	On/off control. Also guards the line to the DC convenience outlet (J10).
31	DC POWER SUPPLIES SELECT B push button switch	When pushed, the B DC power supply is selected to give normal DC power to the power bus. If not pushed, the B supply will give power to the standby bus.
32	CONVENIENCE OUTLET 28 VDC jack	Convenience outlet for DC power.
33	DC POWER SUPPLIES B AVAIL light (Power supply is ready to use.)	Lights when power from the B DC power supply is ready to use.
34	DC POWER SUPPLIES TRANSFER ALARM audible alarm	Gives an alarm that is heard when power is switched to or from emergency DC (from A to B supply or from B to A). The alarm sounds until the TRANSFER ALARM RESET button is pushed.
35	DC POWER SUPPLIES A ON LINE light (green)	Lights when the A DC power supply is the DC power source.

Table 5004-3. Power distribution assembly controls and indicators (side view) (concluded).

Item Number	Control/Indicator	Use
36	CONVENIENCE OUTLET 50/60 Hz (1 jack)	Jack for single-phase AC power.
37	CONVENIENCE OUTLET 50/60 Hz (1 jack)	Jack for single-phase AC power.
38	DC POWER SUPPLIES SELECT A push button switch	When pushed, the A DC power supply is selected to give normal DC power to the bus. If not pushed, the A supply will give power to the standby bus.
39	CONVENIENCE OUTLETS AC circuit breaker	On/off control. Also guards the line for the 1050/60 Hz CONVENIENCE OUTLETS (J11 and J19).
40	DC POWER SUPPLIES A AVAIL light (white)	Lights when power from the A DC power supply is ready to use.
41	DC POWER SUPPLIES VOL ADJ variable resistor	Turns the TRANSFER ALARM sound up or down.
42	LIGHT GUNS R circuit breaker	On/off control. Also guards the line for the DC power to the R (right) light gun.
43	LIGHT GUNS L circuit breaker	On/off control. Also guards the line for the DC power to the L (left) light gun.
44	WD SET circuit breaker	On/off control. Also guards the lines for the AC power to the wind measuring set (AN/GMQ-11).
45	AUDIO DISTR circuit breaker	On/off control. Also guards the line for power to the communications selector panels and communications selector panels and communication distribution box.
46	AUDIO LL/NAV circuit breaker	On/off control. Also guards the line for the DC power to the landline subsystem and the NAVAID monitor assembly.
47	AUDIO SPEAKERS circuit breaker	On/off control. Also guards the lines or the power to the four speaker/amplifiers.
48	TRANSCEIVER CONTROL VHF-FM LOCAL controller circuit breaker	Applies 28 VDC power. Also guards the lines to the local controller VHF-FM radio.
49	TRANSCEIVER CONTROL VHF DATA controller circuit breaker	Applies 28 VDC power. Also guards the lines to the data controller VHF-FM radio.
50	TRANSCEIVER CONTROL VHF GND CONTROLLER circuit breaker	Applies 28 VDC power. Also guards the lines to the ground controller VHF-FM radio.
51	PRIMARY AC phase select switch	Shows the display on the PRIMARY AC meter (oA, oB, or oC) of the three-phase power.
52	TRANSCEIVER CONTROL VHF-AM LOCAL CONTROLLER circuit breaker	Applies 28 VDC power and guards the lines to the local controller VHF-AM radio.

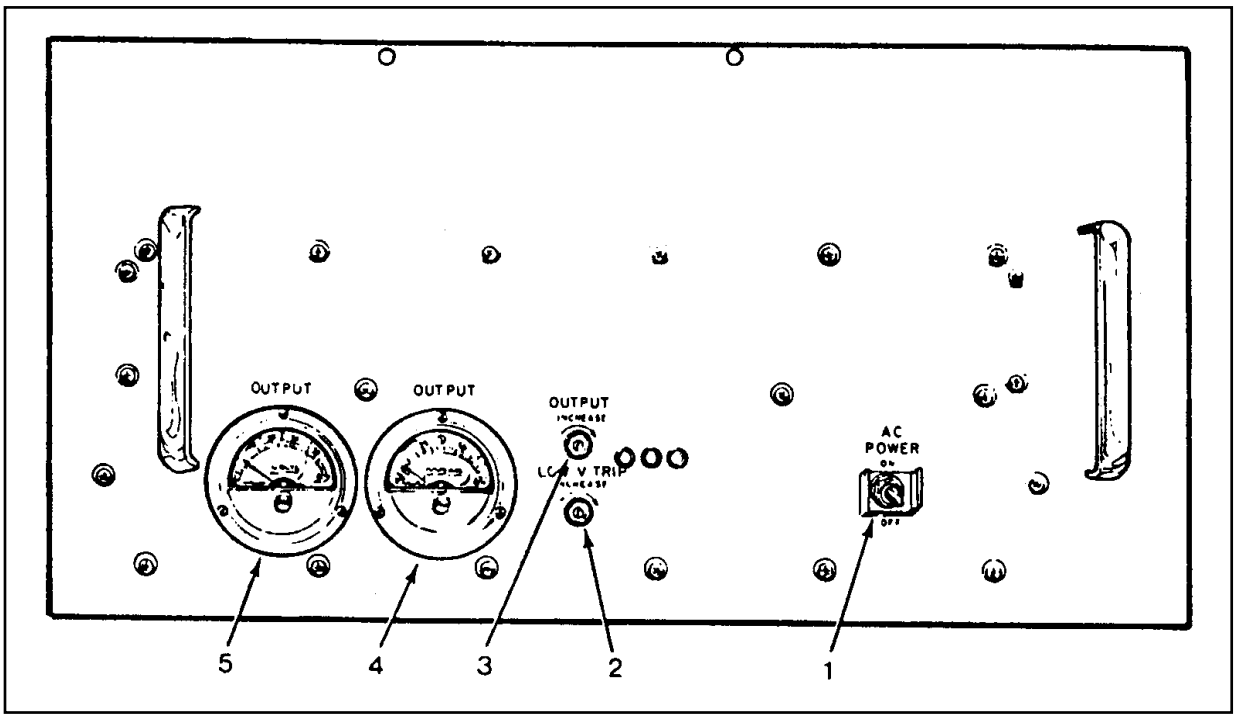


Figure 5004-3. PP-6187/TSW-7 power supply.

Table 5004-4. PP-6187/TSW-7 power supply controls and indicators.

Item Number	Control/Indicator	Use
1	AC POWER circuit breaker	On/off control. Also guards the power-in lines to the power supply.
2	LOW V TRIP INCREASE	Increases or decreases the output voltage point at which the power supply will automatically shut down.
3	OUTPUT V INCREASE	Controls the power supply output voltage.
4	OUTPUT AMPERES meter	Indicates the power supply amperes output.
5	OUTPUT VOLTS meter	Indicates the power supply voltage output.

NOTE: The PP-6187 has two power supplies. One is DC power supply A; the other is DC power supply B. Both supplies are next to the power distribution panel.

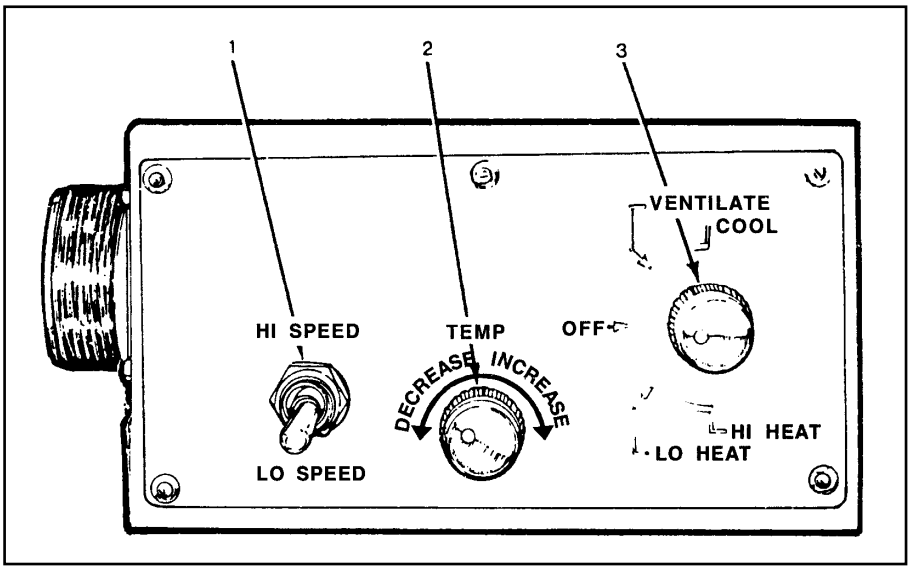


Figure 5004-4. Environmental control panel.

Table 5004-5. Environmental control panel controls and indicators.

Item Number	Control/Indicator	Use
1	Fan (two-position toggle switch)	HI SPEED sets the fan for high-speed air circulation. LOW SPEED sets the fan for low-speed air circulation.
2	TEMP knob	Sets the temperature control point to an operating range from 40 to 90°F (4 to 32°C). Turn right (increase) for warmer air and left (decrease) for cooler air.
3	Select knob (turns five-position switch)	HIGH HEAT gives most heat. LOW HEAT gives medium heat. OFF removes power from the environmental control unit. VENTILATE blows in air that is neither heated nor cooled. COOL delivers cool, conditioned air at the temperature selected on the TEMP knob.

2. Perform Starting Procedures.

NOTE: Before starting the power unit, make the daily preventive maintenance checks according to TM 9-6115-464-12. Refer to the appropriate technical manual for the generator in use.

CAUTION

To avoid a hazard shock, inspect the power unit to ensure that it is grounded. Observe and obey all safety precautions when starting and running the power unit. Do not smoke or use open flame near the power unit when it is being serviced or worked on. Do not try to change a load connection or maintain the power unit while it is running. Electrical power generated by this power unit can cause death by electrocution.

a. Power Distribution Panel Controls. Power distribution panel initial control settings are shown in Table 5004-6.

NOTE: Turning the console ILLUMINATION DIM knob may change the brightness of the overhead lights. Set all the circuit breakers and switches on the power distribution panel to ON.

b. ECU Power. At the power distribution panel, set the ECU 1 circuit breaker and the ECU 2 circuit breaker to ON.

c. Cooling. (Refer to TM 5-4520-241-14 for shelter and ECU references.)

NOTE: The tower (shelter) windowpanes are made of special laminated glass. These panes can be electrically heated. The WINDOW HEAT circuit breaker, the WINDOW HEAT switch, and two thermostats control the maximum temperature of the glass up to 110°F outside temperature and up to 135°F glass temperature. Temperatures higher than those specified will cause the power to the windows to be turned off.

(1) Adjust air outlets for the best airflow. Do not close the air outlets.
(2) Turn the TEMP knob on the ECU fully clockwise.
(3) Set the air knob to COOL.
(4) Turn the TEMP knob slowly left toward DECREASE until the bypass valve makes an audible click.
(5) Continue to turn the knob slowly until a comfortable temperature is reached.
(6) If moisture condenses on the lower corners of the window, turn down the cooling by turning the TEMP knob toward INCREASE or turn on the window heaters.

NOTE: During maximum cooling, the formation of some condensation on the lower corners of the window is normal. The condensation formed while the ECU is cooling will dry during the off phase of cooling.

Table 5004-6. Power distribution panel initial control settings.

Control	Setting*	Control	Setting*
30-50/60 Hz circuit breaker	ON	LIGHT GUNS	
28 VDC circuit breaker	ON	L circuit breaker	ON
ECU Power 1 circuit breaker	ON	R circuit breaker	ON
ECU Power 2 circuit breaker	ON	LIGHTING	
WINDOW HEAT circuit breaker	ON	Console circuit breaker	ON
VHF-FM		Safety circuit breaker	ON
LOCAL circuit breaker	ON	HF/SSB circuit breaker	ON
DATA circuit breaker	ON	HF/SSB amplifier coupler high power S (1)	ON
GND circuit breaker	ON	CRYPTO	
VHF-AM		LOCAL circuit breaker	ON
LOCAL circuit breaker	ON	DATA circuit breaker	ON
DATA circuit breaker	ON	GND circuit breaker	ON
GND circuit breaker	ON	AUDIO	ON
UHF-AM		DISTR circuit breaker	ON
LOCAL circuit breaker	ON	LL/NAV circuit breaker	ON
DATA circuit breaker	ON	SPEAKER	ON

Table 5004-6. Power distribution panel initial control settings (concluded).

Control	Setting*	Control	Setting*
GND circuit breaker	ON	WINDOW HEAT switch	ON
PRIMARY AC switch	A	SAFETY OFF	ON
MAIN BUS-BATTERY switch	MAIN BUS	AC MAIN circuit breaker	ON
EMERGENCY DC CHARGE circuit breaker (System may burn out if left on for an extended period.)	ON	PDP DIMMER control	ON
BATTERY circuit breaker	ON	DOOR switch	ON
HF/SSB on-line circuit breaker (to be used only with generator)	ON	THEATER switch	ON
WD SET circuit breaker	ON	CONVENIENCE OUTLETS AC circuit breaker DC circuit breaker	 ON ON

*Turn ON only as needed.

d. Heating. Set the air knob to HI HEAT or LO HEAT.
e. Ventilating. Set the air knob to VENTILATE on the ECU.
f. Multifuel heater operation. Figure 5004-5 shows the multifuel heater and Table 5004-7 shows the multifuel heater controls and indicators. Table 5004-8 shows the initial control settings of the shelter equipment.

CAUTION

Do not operate the heater with fuel cans in the top storage compartment of the plenum. Remove all loose items from the compartment before starting the heater.

NOTE: The thermostat provides on-off control of the heater. Raising the thermostat setting does not increase the heat output of the heater per unit of operating time. It merely causes the heater to run longer to satisfy the heat demand. Setting the thermostat to the highest setting at start-up does not increase the rate at which the desired temperature will be reached. To prevent temperature overshoot, set the thermostat no higher than that desired in the shelter.

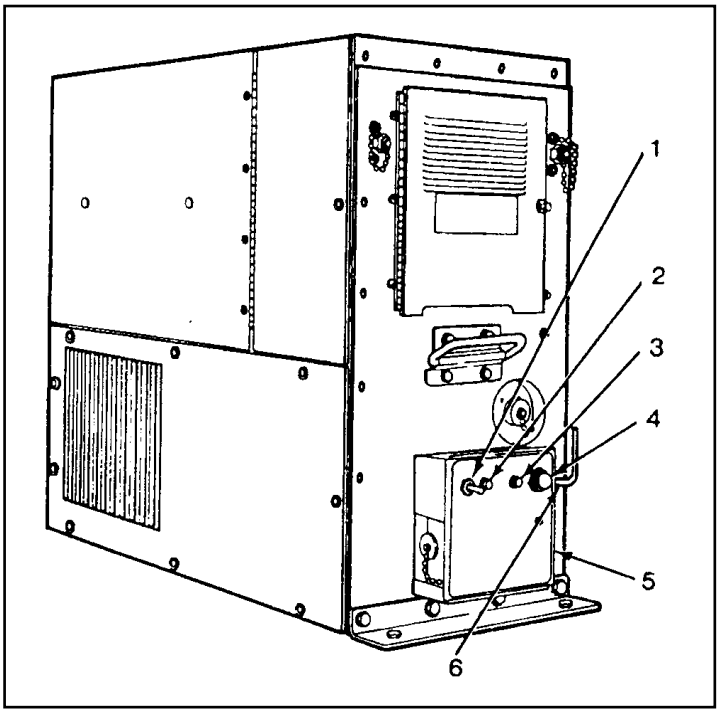


Figure 5004-5. Multifuel heater.

Table 5004-7. Multifuel heater controls and indicators.

Control/Indicator	Use
HEATER-OFF-FAN switch (1)	Applies power to the heater or fan.
White indicator light (2)	When lit, indicates that the heater is operating under control of the room thermostat.
Red indicator light (3)	When lit, indicates that the heater is inoperative.
RESET switch (4)	When pressed, resets the heater start cycle after automatic shutdown.
CIRCUIT BREAKER button (5)	Resets the heater after an electrical overload condition.
Louver operating handle (6)	Allows adjustment of the air outlet louver openings.

Table 5004-8. Shelter equipment initial control settings.

Equipment	Control	Setting
Four speaker amplifier assemblies	CKT BKR VOLUME knobs	ON About 1/4 turn C/W
NAVAID MONITOR assembly	POWER switch ALARM switch	ON ON
Three crypto assemblies	MODE SELECT SECURE/CLEAR switch	CLEAR
VHF-AM 3	Function knob	T/R
UHF-AM 3	Function knob	MAIN
VHF-FM 3	Function knob	*T/R
ECU controls 1 and 2	Mode controls	OFF
UHF-AM 2	Function knob	MAIN
VHF-AM 2	Function knob	T/R
VHF-FM 2	Function knob	*T/R
UHF-AM 1	Function knob	MAIN
VHF-AM 1	Function knob	T/R
VHF-FM 1	Function knob	*T/R

*SEQ ON or OFF if the FM radio is an AN/ARC-201.

NOTE: Set all radio frequencies before turning the radio on.

(1) Check to ensure that the two duct hoses (hot air and return) are properly connected between the heater enclosure and the shelter ports. Two seven-foot lengths of duct are required.
(2) Check the fuel supply to see that it is adequate for the period of operation; verify that the fuel supply valve is open.
(3) Check the external fuel pump and fuel lines for leakage or damage. Notify organizational maintenance if any leakage or damage is detected. Be sure that the fuel pump is clean. Do not run the heater if there is leakage or damage.
(4) Check to ensure that the power cable plug, room thermostat plug, and external fuel pump plug are fully inserted into the mating receptacles and the threaded swivels tightened.
(5) Check the setting of the temperature adjustment knob on the room thermostat in the shelter. Adjust to the desired temperature.
(6) Place the HEATER-OFF-FAN switch in the HEATER position. The white indicator light (2) will come on immediately. The heater will now operate under the control of the room thermostat. It will start when the thermostat calls for heat and stop when the selected temperature is reached.
(7) If the heater is extremely cold and combustion does not occur before flame-failure shutdown, push the RESET button. Then open the front access door and pull out the choke knob on the carburetor. Keep the choke knob pulled out until ignition occurs and you can hear combustion in the burner. The choke is necessary only

when the heater is operating on diesel fuel or fuel oil. While the heater is on, the ventilating motor blows warm air from the discharge outlet.

(8) If the heater stops shortly after starting, the red indicator light will come on. Check the fuel supply and replenish if necessary. Allow three to five minutes for the heater to cool, then press the RESET switch.

(9) Open or close the heater louvers with the louver operating handle (6) to obtain maximum air intake for the ventilating motor.

(10) Leave the heater enclosure outside door open approximately 4 inches to provide enough air intake to support combustion.

(11) To operate the heat in the fan mode only, place the HEATER-OFF-FAN switch in the FAN position.

(12) The ventilating motor will come on immediately with the white indicator light. The thermostat has no control in this mode. If the heater is still warm from operation, warm air will circulate; otherwise, shelter air is only recirculated.

(13) To shut off the heater, turn the HEATER-OFF-FAN switch to OFF.

CAUTION

Do not disconnect the power cable from the power receptacle until the heater has completed its purge cycle.

(14) The combustion and ventilating motors will continue to run for several minutes after operation in the heater mode. This is normal because the burner continues to burn until all fuel has been purged. The heater will shut off after all of the fuel is burned and the heater has cooled sufficiently.

3. Operate Radios. The AN/TSW-7A has 10 radio systems. These systems include controls, transceivers, filters, tuner couplers, cables, and antennas. There are three UHF-AM, three VHF-AM, three VHF-FM, and one HF radio system. Unless shown otherwise, the test for one of a type of radio system is the same for the others of the same type. Each of the 10 systems has a control in the console. Each controller position (local, data, and ground) can access any of the radio systems through the communication selector panel. At each of the communication selector panels, connect one headset-microphone to the SUPERVISOR connector and one hand-held microphone to the MIC/HDST connector. Conduct one test with one microphone and then repeat the test with the other microphone.

NOTE: When a headset-microphone is connected to a MIC/HDST connector, the speaker amplifier is muted.

a. UHF-AM radio test. Conduct this test on all three UHF-AM radio systems and their UHF-AM filters.

CAUTION

The guard channel of each UHF-AM receiver is fixed-tuned to 243.0 MHz. Do not set this guard channel frequency on the transmitter. Send on this frequency only when necessary.

NOTE: After a brief loss of 28 VDC power, such as that which occurs during a switchover between power supplies or a switch to battery, one or more of the communication selector panels may become inoperative. (All lamps will go out.) Even the lamp test function will be inoperative. To correct this situation, push the COMMON FAULT/PUSH-TO-RESET button. This resets the CDB logic and restores normal operation.

(1) UHF-AM 1 test. (Figure 5004-6 shows the UHF-AM radio set. Table 5004-9 shows the AN/ARC-164 UHF-AM radio set controls and indicators. Figure 5004-7 shows the UHF-AM filter. Table 5004-10 shows the UHF-AM radio filter controls and indicators.)

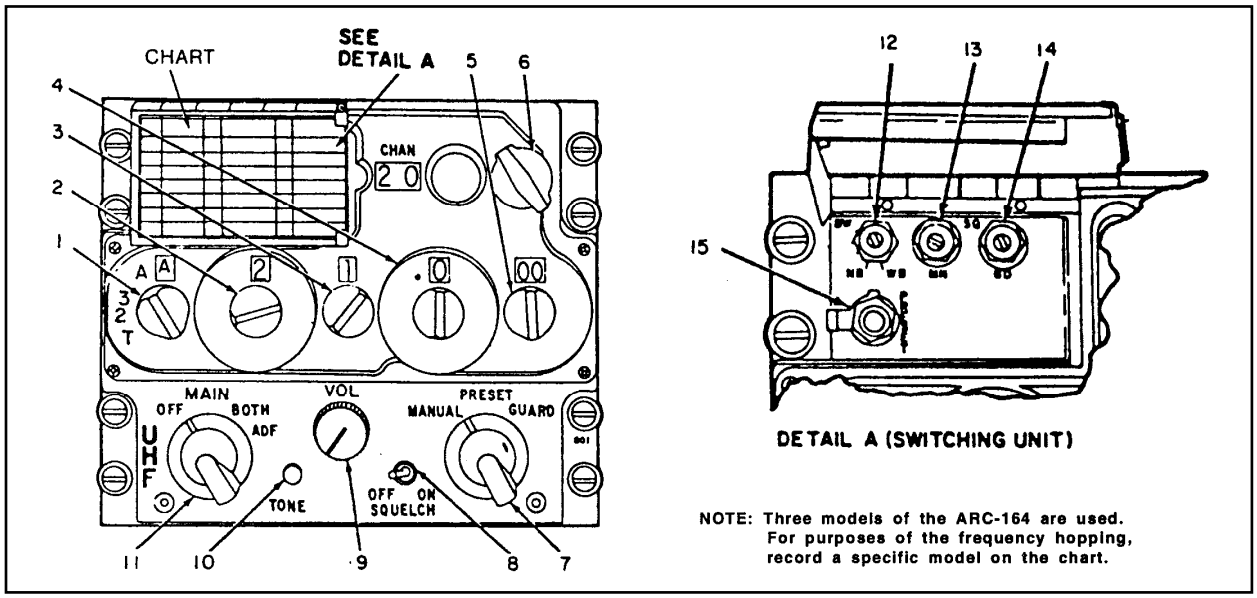


Figure 5004-6. AN/ARC-164 UHF-AM radio set.

Table 5004-9. AN/ARC-164 UHF-AM radio set controls and indicators.

Item Number	Control/Indicator	Use
1	Manual frequency selector switch	Selects the hundredths digit of frequency in MHz (either a 2 or a 3). The "A" position selects the active mode; the "T" position enables the reception of a new TOD.
2	Manual frequency selector switch	Selects the tenths digit of frequency in MHz (0 through 9).
3	Manual frequency selector switch	Selects the units digit of frequency in MHz (0 through 9).
4	Manual frequency switch	Selects the tenths digit of frequency in MHz (0 through 9).
5	Manual frequency switch	Selects hundredths and thousandths digits of frequency in MHz (either 00.25, 00.50, or 00.75).
6	Preset channel selector switch	Selects 1 of 20 preset channels.
7	MANUAL/PRESET/GUARD switch	Selects the method by which the frequency is selected.
	MANUAL	Any one of 7,000 frequencies is manually selected using the five frequency selector switches.
	PRESET	Any one of 20 preset channels may be selected using the five frequency selector switches.
	GUARD	The main receiver and the transmitter are automatically tuned to the guard frequency.
8	SQUELCH ON/OFF switch	
	ON	Mutes the main receiver until a signal strong enough comes in on the receiver.
	OFF	Renders the main receiver open to all signals and noise on the frequency.
9	VOL control	Turns the sound up or down.
10	TONE switch (push button switch)	Push to send a 2,010 Hz tone on the frequency to which the transmitter is tuned.
11	FUNCTION selector switch	
	OFF	Removes the power from the radio set.
	MAIN	Enables only the main receiver and the transmitter.
	BOTH	Enables the main receiver, the transmitter, and the guard receiver.
	ADF	Enables the ADF. (ADF is not used when the radio is used in this air traffic control central.)
NOTE: Items 12 through 15 are for maintenance use.		
12	SBW switch (NB-WB)	
	NB (narrow band)	Selects the narrow band selectivity of the main receiver.
	WB (wide band)	Selects the wide band selectivity of the main receiver.

Table 5004-9. AN/ARC-164 UHF-AM radio set controls and indicators (concluded).

Item Number	Control/Indicator	Use
13	SEQ-MN control	Adjusts threshold level of squelch for the main receiver.
14	SEQ-GD control	Adjusts threshold level of squelch for the guard receiver.
15	Preset switch	Stores selected frequency in selected preset channel.

Figure 5004-7. UHF-AM filter.

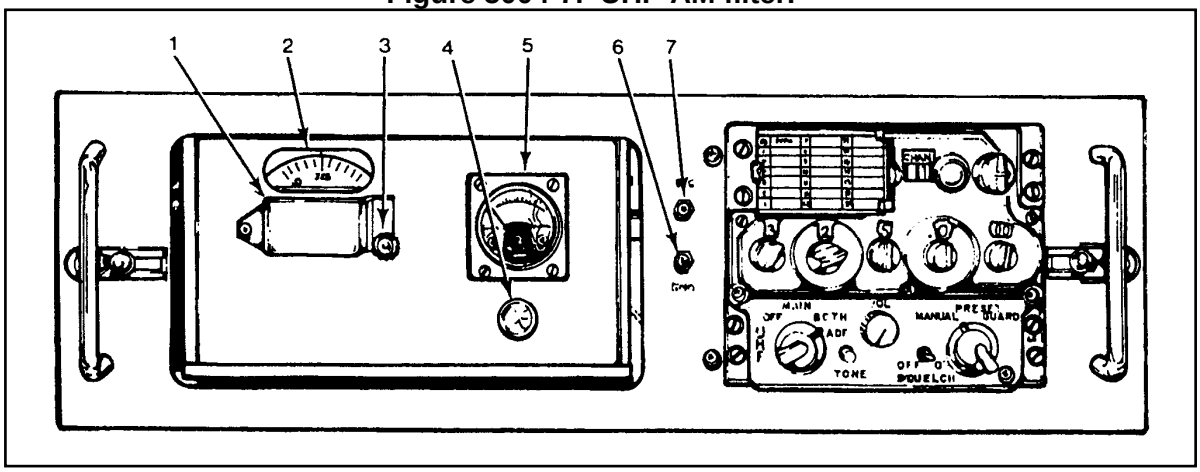


Table 5004-10. UHF-AM radio filter controls and indicators.

Item Number	Control/Indicator	Use
1	Tune knob and tune knob guard bracket	
	Tune knob	Turns the frequency dial which sets the filter frequency.
	Tune knob guard bracket	Shields the tune knob from accidental movement.
2	Frequency dial plate	Shows filter frequency (MHz).
3	Tune knob guard hold knurled thumbnut	Holds the tune knob guard in place. (Must be loosened to use the tune knob.)
4	Meter sensitivity adjust	Sets the sensitivity of the tune meter. Turn the knob to the right to get a larger meter needle swing. Turn the knob to the left if the meter needle pegs to the far right of the meter.
5	Tuning meter	Shows how sharp the filter tune is when the radio set is keyed.
6	GND jack (black)	A meter ground contact to read automatic gain control volts for the UHF-AM radio set. (For maintenance use.)
7	AGC jack (red)	The AGC contact to read the UHF-AM radio set AGC. (For maintenance use.)

NOTE: Before the transmitter is keyed, each bandpass filter must be set to the same frequency as the radio set with which it works. Also confirm that the crypto assembly controls remain set at PLAIN and CLEAR.

(a) Confirm that the function knob is set to MAIN. Set the manual digit frequency knobs to the UHF-AM 1 frequency.
(b) At UHF-AM filter 1, use the tune knob to set the frequency as set for the UHF-AM radio set 1.
(c) At the local communication selector panel, set the UHF-1 select switch to TALK. The green UHF-1 IN-USE lamp should illuminate. The same lights on the data and ground communication panels should also illuminate.
(d) Press the headset-microphone push-to-talk switch. On the local communication selector panel, the blue KEY LAMP should illuminate. Make a test call. You should hear yourself on the headset and the UHF-1 CALL light should illuminate. The speaker amplifier should be mute. Release the microphone key. Only the green IN-USE lamp should be illuminated. At the local communication selector panel, set the UHF-1 select switch to OFF. The green UHF-1 IN-USE lights on all the communication selector panels should extinguish.

NOTE: Reset the filter frequency control for a peak reading on the tuning meter when the transmitter is keyed.

(e) Set the SQUELCH switch to OFF on the UHF-AM 1 radio set. The blue UHF-1 CALL light on all three communication selector panels should illuminate. Turn the HEADSET VOL CONT knob to the best listening level.

(2) UHF-AM 2 test. Repeat the procedures for the UHF-AM test, but use the UHF-AM 2 filter. Conduct this test at the data communication selector panel using the UHF-AM 2 radio frequency.

NOTE: Before testing the UHF-AM 2 radio system, push and release the UHF-FILTER BYPASS push button at the local panel plate assembly until the push button light goes out.

(3) UHF-AM 3 test. Repeat the procedure for the UHF-AM test, but use the UHF-AM 3 filter. Conduct this test at the ground communication selector panel using the UHF-AM 3 radio frequency.

b. VHF-AM radio test. Conduct this test on all three VHF-AM radio systems and their VHF-AM bandpass filters.

CAUTION

The guard channel of each AN/ARC-115A VHF-AM receiver is fixed-tuned to 121.5 MHz. Do not set this guard channel frequency on the transmitter. Send on this frequency only when absolutely necessary. If a constant tone is heard, check to ensure that the lockout switch on the radio is properly set.

(1) VHF-AM 1 test. Figure 5004-8 shows an AN/ARC-115A VHF-AM radio set. Figure 5004-9 shows an AN/ARC-186 VHF-AM radio set. Figure 5004-10 shows a VHF-FM bandpass filter. Table 5004-11 shows the controls and indicators of the VHF-AM radio set. Table 5004-12 shows the controls and indicators of the VHF-FM radio set. Table 5004-13 shows the controls and indicators for the VHF-FM bandpass filter.

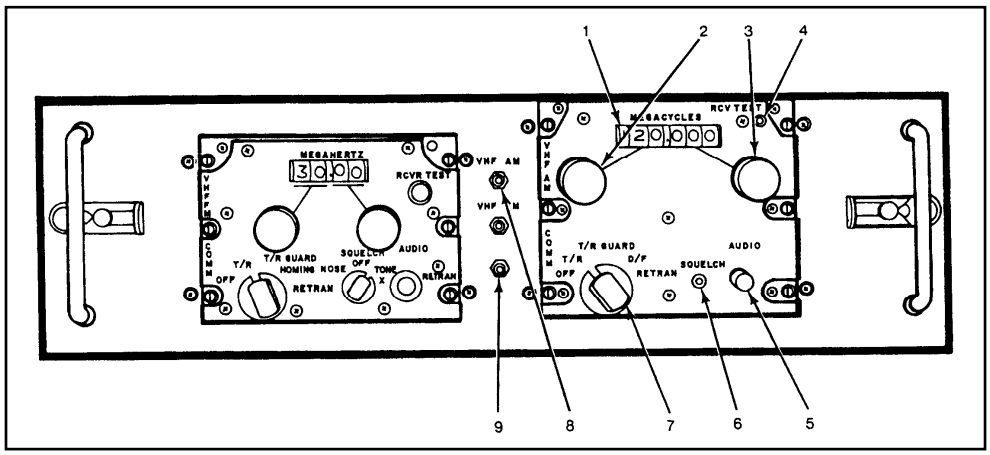


Figure 5004-8. AN/ARC-115A VHF-AM radio set.

Table 5004-11. AN/ARC-115A VHF-AM radio set controls and indicators.

Item Number	Control/Indicator	Use
1	MEGAHERTZ indicator	Displays manually selected receive/transmit frequency.
2	MEGAHERTZ selector	Tunes radio to desired frequency from 30 to 151.975 MHz in increments of 25 KHz.
3	PRESET indicator	Shows selected preset channel.
4	PRESET selector	Selects one of 20 preset channels.
5	FM/AM LOCKOUT switch	Operates AM when switched to FM. Operates FM when switched to AM. Operates AM and FM when in the center position.
6	FM squelch control	Screwdriver-adjustable squelch level potentiometer.
7	LOAD switch	When depressed, puts manually selected frequency into selected preset channel.
8	AM squelch control	Screwdriver-adjustable squelch level potentiometer.
9	VOL control	Used to set receiver volume levels.
10	SQ DIS/TONE switch	Used to select squelch and/or tone.
	Center position DIS position TONE position	Enables squelch. Disables squelch. Momentarily transmits 1,000 Hz tone.
11	MODE select switch	Used to select operating parameters.
	OFF position TR position DF position	Turns radio system off. Enables receive/transmit operation. Enables ADF/homing navigation.
12	FREQUENCY control	Used to pick frequency selection mode.
	PRE position TR position DF position	Enables preset channel selection. Enables manual frequency selection. Selects prestored guard channel.
13	EMERGENCY AM/FM	Selects emergency AM/FM channels.

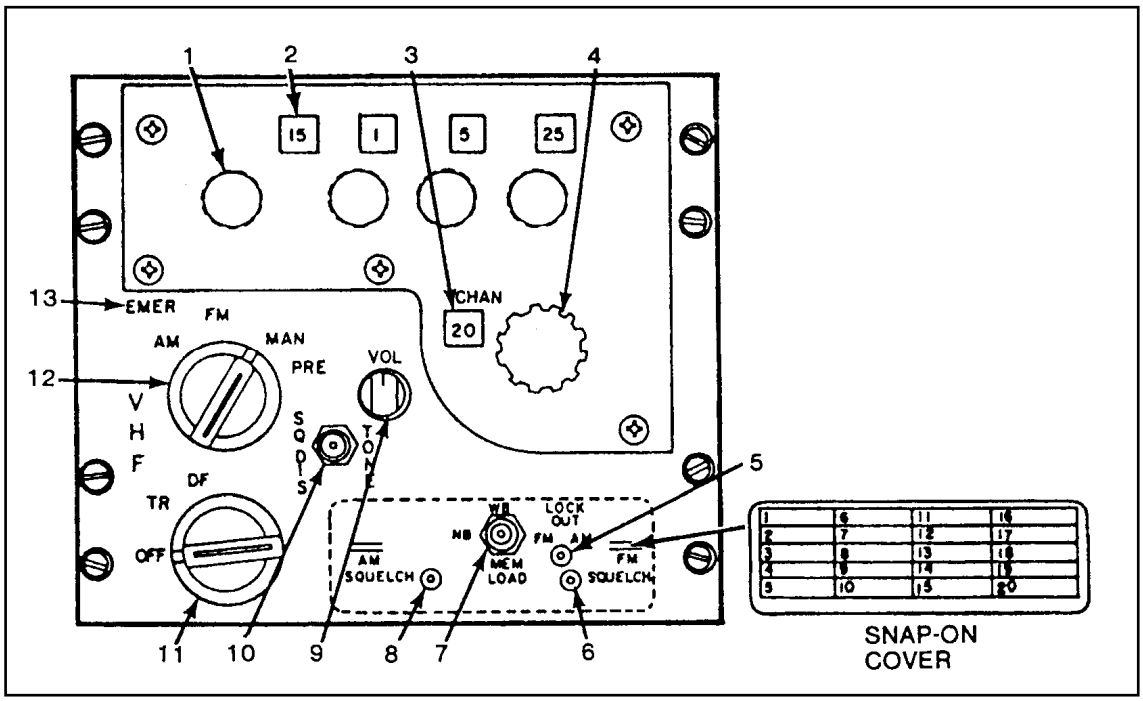


Figure 5004-9. AN/ARC-186 VHF-AM radio set.

Table 5004-12. AN/ARC-115A VHF-AM radio set controls and indicators.

Item Number	Control/Indicator	Use
1	MEGAHERTZ indicator	Indicates the frequency to which the main receiver and the transmitter are tuned.
2	MEGAHERTZ control (rotary)	Tunes the main receiver and the transmitter from 116 to 149 MHz in increments of 1 MHz as shown by the first three digits of the MEGAHERTZ indicator. (The guard receiver is fixed-tuned.)
3	KILOHERTZ control (rotary)	Tunes the main receiver and the transmitter in increments of 25 KHz as shown by the last three digits of the MEGAHERTZ indicator.
4	RCVR TEST push button switch	When pushed, inserts a noise signal in the main receiver. (Provides an audible tone indication of proper receiver performance.)
5	AUDIO-TRAN (volume control)	Adjusts the radio set audio output level in the receive mode and adjusts the modulating audio level when the retransmit mode of operation is used.
6	SQUELCH ON-OFF (squelch switch)	Turns the squelch feature of the main receiver ON or OFF.

Table 5004-12. AN/ARC-115A VHF-AM radio set controls and indicators (concluded).

Item Number	Control/Indicator	Use
7	Function selector switch (six-position rotary)	Determines the operating mode of the radio set.
	OFF	Removes power from the radio set (radio set inoperative).
	T/R	Provides for audio set operation as a transceiver on the main channels indicated on MEGAHERTZ indicator (guard receiver inoperative).
	T/R GUARD	Provides for audio set operation as a transceiver on the main channels indicated on MEGAHERTZ indicator (guard receiver inoperative). Also provides for simultaneous reception on the guard channel.
	D/F	Direction finding mode (not used in this installation.)
	RETRAN	Provides for retransmit operation when properly connected with a second radio set.
	EMER	Disables the multichannel receiver and enables transmit and receive on the guard (EMER) frequency.

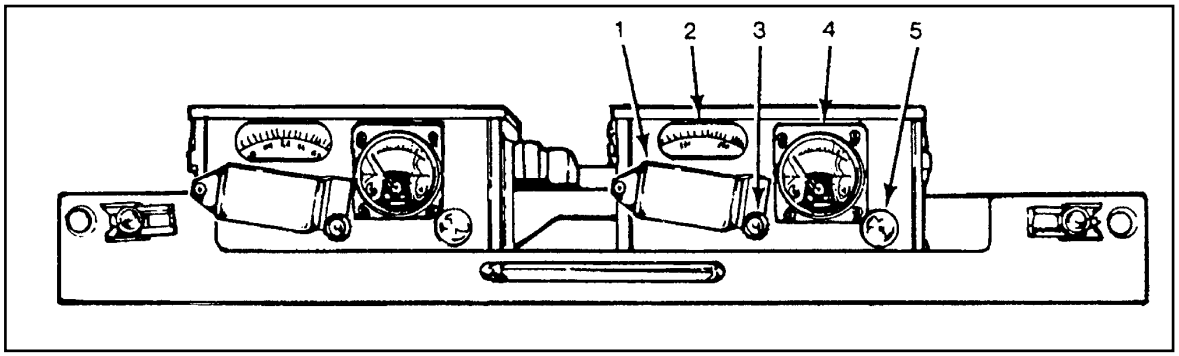


Figure 5004-10. VHF-AM bandpass filter.

Table 5004-13. VHF-AM bandpass filter controls and indicators.

Item Number	Control/Indicator	Use
1	Tune knob and tune knob guard bracket	Tune knob turns the frequency dial which sets the filter frequency.
		Tune knob guard bracket shields the tune knob from accidental movement.
2	Frequency dial plate	Shows filter frequency (MHz).
3	Tune knob guard hold (knurled)	Holds the tune knob guard in place. (Must be loosened to use tune knob.)
4	Tuning meter	Shows how sharp the filter tune is when the radio set is keyed.
5	Meter sensitivity adjustment	Sets the sensitivity of the tune meter. (Turn the knob to the right to get a larger meter needle swing; turn the knob to the left if the meter needle pegs on the far right of the meter.)

(a) Confirm that the function knob is set to T/R. Set the MEGAHERTZ tune knob and the KILOHERTZ tune knob to the VHF-AM 1 frequency.
(b) At the VHF-AM 1 bandpass filter, use the tune knob to set the frequency dial to the same frequency as set for the VHF-AM radio set 1.

NOTE: Before the transmitter is keyed, each bandpass filter must be set to the same frequency as the radio set with which it works.

(c) At the local communication selector panel, set the VHF-1 select switch to TALK. The green VHF-1 IN-USE light should come on. The same lights on the data and ground communication selector panels also should illuminate.
(d) Press the headset-microphone push-to-talk switch. On the local communication selector panel, the VHF-1 CALL lamp and the blue KEY lamp should illuminate. Make a test call. You should hear yourself on the headset and the VHF-1 CALL light should illuminate. The speaker amplifier should be mute.
(e) Push the VHF-AM 1 RCVR TEST switch (AN/ARC-115A) in or push the SQD/TON switch left or right (AN/ARC-186). This action puts a noise signal in the radio set main receiver, which should be heard on the speaker amplifier. Turn the AUDIO knob on the radio set for the best listening level.

NOTE: While the transmitter is keyed, reset the filter bandpass with the tune knob for a peak reading.

(f) Release the microphone push-to-talk switch. Only the green IN-USE light should light. At the local communication selector panel, set the VHF-AM 1 select switch to OFF. The green VHF-1 IN-USE light on all the communication selector panels should extinguish.

(2) VHF-AM 2 test. Repeat the procedures for the VHF-AM 1 test, but use the VHF-AM 2 bandpass filter. Conduct this test at the data communication selector panel. Use the VHF-AM 2 radio frequency.

NOTE: Before testing the VHF-AM 2 radio system, push and release the VHF FILTER BYPASS switch at the local panel assembly until the light extinguishes.

(3) VHF-AM 3 test. Repeat the procedures for the VHF-AM 1 test, but use the VHF-AM 3 bandpass filter. Conduct this test at the ground communication selector panel. Use the VHF-AM 3 radio frequency.

c. VHF-FM radio test. Conduct this test on all three VHF-FM radio systems, the VHF-FM bandpass filter, and the VHF-FM antenna tuning control assemblies on the local, data, and ground panel plate assemblies. The antenna coupling networks are mounted on the VHF-FM antenna bases and are controlled by each of their VHF-FM antenna-tuning control assemblies.

CAUTION

The guard channel of each AN/ARC-114A VHF-FM receiver is fixed-tuned to 40.5 MHz. Do not set this guard channel frequency on the transmitter. Send on this frequency only when there is an absolute emergency. If a constant tone is heard, check to ensure that the lockout switch on the radio is properly set.

(1) VHF-FM 1 test. (Figure 5004-11 shows the AN/ARC-114A VHF-AM radio set. Figure 5004-12 shows the AN/ARC-201 VHF-FM radio set. Figure 5004-13 shows the VHF-FM bandpass filter. Table 5004-14 shows the AN/ARC-114A VHF-FM radio set controls and indicators. Table 5004-15 shows the AN/ARC-201 VHF-FM radio

set controls and indicators. Table 5004-16 shows the VHF bandpass filter controls and indicators.)

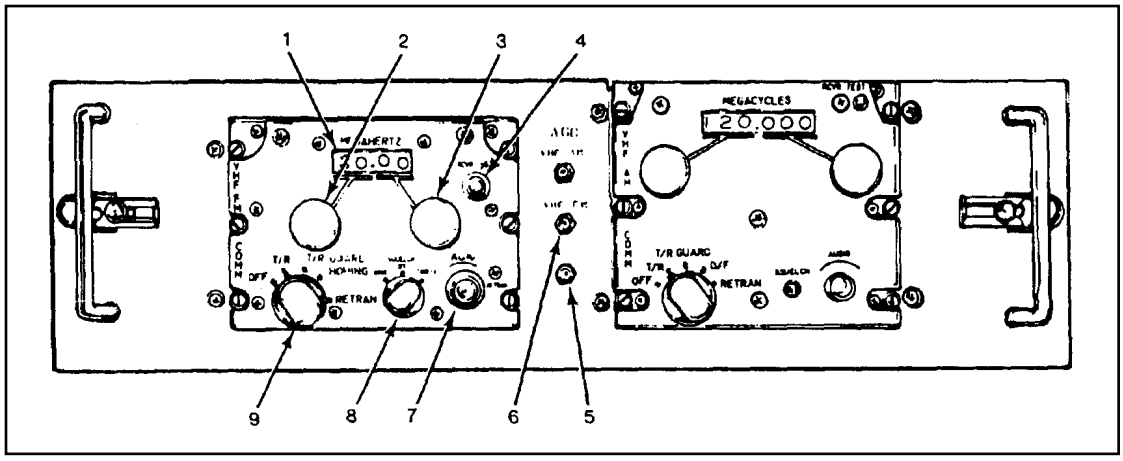


Figure 5004-11. AN/ARC-114A VHF-FM radio set.

Table 5004-14. AN/ARC-114A VHF-FM radio set controls and indicators.

Item Number	Control/Indicator	Use
1	MEGAHERTZ indicator	Indicates frequency to which the main receiver and the transmitter are tuned.
2	MEGAHERTZ control (rotary)	Tunes the main receiver and the transmitter to 10 MHz at increments of 1 MHz as shown by the first two digits of the MEGAHERTZ indicator. (The guard receiver is fixed-tuned.)
3	KILOHERTZ control (rotary)	Tunes the main receiver and the transmitters in 100 KHz in increments of 50 KHz as shown by the last two digits of the MEGAHERTZ indicator.
4	RCVR TEST push button switch	Checks receiver performance when the button is pushed to insert a noise signal in the main receiver.
5	GND jack (black)	Reads automatic gain control volts for the radio set. (A meter ground contact for maintenance use.)
6	AGC jack (red)	Reads the radio set AGC volts. (The AGC contact for maintenance use.)
7	AUDIO/RETRAN control (two-position)	AUDIO turns the sound up or down. RETRAN turns the sound up or down within the range of the RETRAN arch line when used as a relay radio (re-transmission).
8	SQUELCH knob (turns a three-position switch)	
	NOISE OFF TONE/X	Enables noise squelch. Disables squelch. Enables tone squelch.

Table 5004-14. AN/ARC-114A VHF-FM radio set controls and indicators (concluded).

Item Number	Control/Indicator	Use
9	Function selector switch (five-position rotary)	
	OFF	Removes power from the radio set.
	T/R	Enables only the main receiver and the transmitter.
	T/R Guard	Enables the main receiver, the transmitter, and the guard receiver.
	HOMING	Enables the radio set for homing. May also be run as a transceiver on the main channels shown on the MEGAHERTZ indicator (not used).
	RETRAN	Allows the radio set to be run in retransmission mode (relay) when used with a second radio set. May also be run as a transceiver on the main channels shown on the MEGAHERTZ indicator.

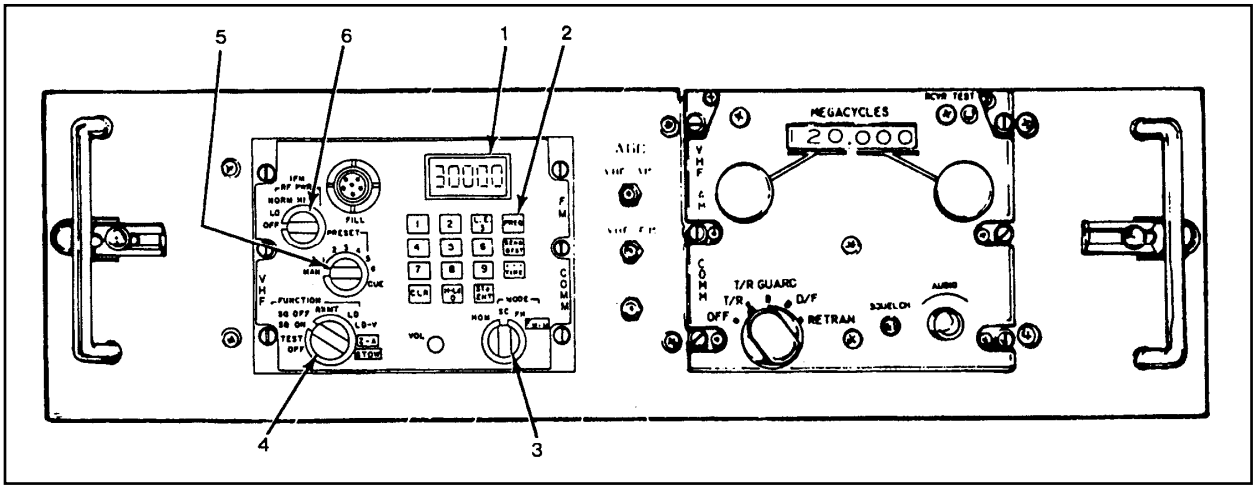


Figure 5004-12. AN/ARC-201 VHF-FM radio set.

Table 5004-15. AN/ARC-201 VHF-FM radio set controls and indicators.

Item		

Number	Control/Indicator	Use
1	DISPLAY	The display operates along with the keyboard. Other displays may be selected with the FUNCTION and MODE switches.
2	KEYBOARD	Used to insert or select date for display.
	Buttons 1 through 9	Used to key in frequencies, load time data, and set offsets.
	CLR	Used to zeroize display and clear erroneous entries.
	O (H-LD)	Used to enter zeroes and initiate ECCM parameters.
3	MODE switch	Used to select operating parameters.
	HOM	Used to activate homing antenna (navigation).
	SC	Used for single-channel operation.
	FH	Used for frequency-hopping operation.
	FH-M	Used to select the control station for frequency hopping time standard.
4	FUNCTION selector	Used to select system parameters.
	OFF	Turns system power off and memory battery on.
	TEST	Perform self-test of ECCM and RT modules. Gives GOOD or FAIL response.
	SQ ON	Turns squelch on.
	SQ OFF	Turns squelch off.
	RXMT	Selects retransmit mode (radio relay link).
4	FUNCTION selector (continued)	
	LD	Permits keyboard loading of preset frequencies.
	LD-V (not on A model)	Permits TRANSEC variable loading.
5	PRESET switch	Used to select or load preset frequencies.
	MAN	Selects 24-KHz increment operating frequencies in single mode.
	POS 1 through 6	Frequency selection in either single or frequency-hopping modes (FH/FH-M).
	CUE	Used by non-ECCM radio to signal ECCM radio.
6	IFM RE	Not used by ATC.

NOTE: Frequency hopping is possible at the center console only.

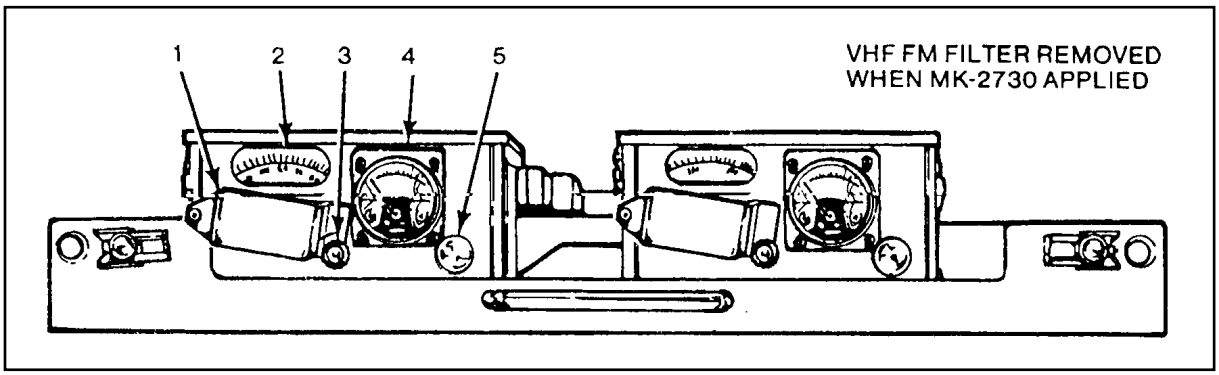


Figure 5004-13. VHF-FM bandpass filter.

Table 5004-16. VHF bandpass filter controls and indicators.

Item Number	Control/Indicator	Use
1	Tune knob and tune knob guard bracket	Tune knob turns the frequency dial, which sets the filter frequency. The tune knob guard bracket from accidental movement.
2	Frequency dial plate	Shows filter frequency in MHz.
3	Tune knob guard hold knurled thumbnut	Holds the tune knob guard in place. (Must be loosened to use the tune knob.)
4	Tuning meter	Shows how sharp the filter tune is when the radio set is keyed.
5	Meter sensitivity adjust	Sets the sensitivity of the tune meter. Turn the knob to the right to get a larger meter needle swing. Turn the knob to the left if the meter needle pegs on the far right of the meter.

(a) Confirm that the function knob is set to T/R. Set the MEGAHERTZ tune knob and the KILOHERTZ tune knob to the VHF-FM 1 frequency.
(b) At the VHF-FM 1 bandpass filter, use the tune knob to set the frequency dial to the same frequency as set for the VHF-FM radio set 1.

NOTE: Before the transmitter is keyed, each bandpass filter must be set to the same frequency as the radio set with which it works.

(c) Refer to the local communication selector panel. Set the VHF-FM 1 select switch to TALK. The green FM 1 IN-USE lamp should illuminate. The same lamps on the data and ground communication panels should also illuminate.
(d) Set the frequency band knob to the band containing the VHF-FM 1 frequency. Press the tune push button. The antenna will tune to the selected frequency.
(e) Press the headset-microphone PUSH-TO-TALK switch. On the local communication selector panel, the FM 1 CALL lamp should illuminate. Make a test call. You should hear yourself on the headset and the blue KEY lamp should illuminate. The speaker amplifier should be mute.
(f) Push the VHF-FM 1 RCVR TEST switch (AN/ARC-114A only). Break squelch (AN/ARC-201). This puts a noise signal in the radio set main receiver, which

should be heard on the speaker amplifier (with HDST-MIC disconnected). Turn the AUDIO/RETRAN knob for the best listening level.

NOTE: While the transmitter is keyed, reset the filter bandpass with the tune knob for a peak reading.

(g) Release the microphone PUSH-TO-TALK switch. Only the green IN-USE light should illuminate. At the local communication selector panel, set the VHF-FM 1 select switch to OFF. The green FM 1 IN-USE light on all the communication selector panels should extinguish.

(2) VHF-FM 2 test. Repeat the procedures for the VHF-FM 1 test for the VHF-FM 2 test, but use the VHF-FM 2-filter bypass and antenna tuning control. Conduct this test at the data communication selector panel using the VHF-FM 2 radio frequency. Before keying, confirm that the cryptoassembly controls remain set at CLEAR and PLAIN.

(3) VHF-FM 3 test. Repeat the procedures for the VHF-FM 1 test for the VHF-FM 3 test, but use the VHF-FM 3-filter bypass and antenna tuning control. Conduct this test at the ground communication selector panel using the VHF-FM 3 frequency.

NOTE: Before testing the VHF-FM 3 radio system, push and release the FM FILTER BYPASS switch at the local panel plate assembly until the switch light extinguishes.

d. HF radio test. Figure 5004-14 shows the HF control panel, and Table 5004-17 shows the HF control assembly controls and indicators.

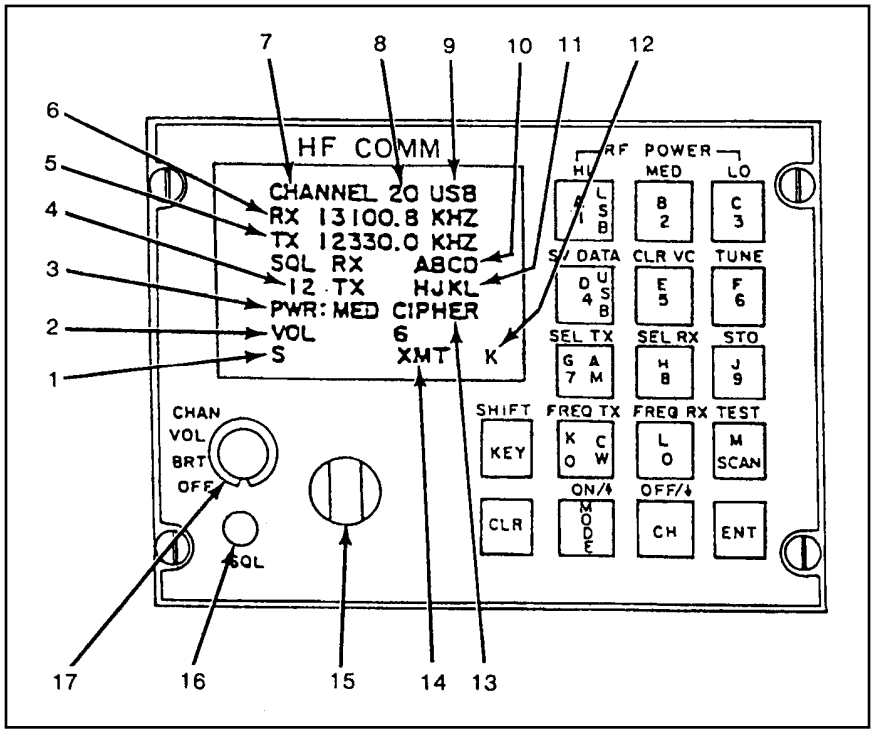


Figure 5004-14. HF control panel.

Table 5004-17. HF control assembly controls and indicators.

Item Number	Control/Indicator	Use
	DISPLAY	The display operates along with the keyboard. Other displays may be selected with the FUNCTION and MODE switches.
	Fields	
1	Scan list	"S" indicates currently displayed channel is on the scan list.
2	Fault field	Displays: NOTE TUNED or DATA NOT SAVED or displays audio level VOL 1 (minimum), 2, 3, 14 (maximum).
3	Output power	Displays transmitter output power (LOW, MED, or HI).
4	Squelch level	1 (minimum), 2, 3,.14 (maximum).
5	TX frequency	Transmit frequency in kilohertz.
6	RX frequency	Receive frequency in kilohertz.
7	Current channel	Reverse video indicates channel information not stored.
8	Active channel number	Number 0 through 20.
9	Modulation mode	Displays USB, LSB, AM, CW. CW may be used with microphone key to transmit code.
10	RX address	Receive selective address. (ON indicates SELADR is operational.)
11	TX address	Transmit selective address. (ON indicates SELADR is operational.)
12	Key function	Indicates key pressed/function selected:
	K	KEY--function marked above keys which are active.
	M	MODE--select USB, LSB, AM, or CW next. Scan flag set/cleared. Slew may be used.
13	Modulation	Displays modulation source.
	DATA	Indicates 600 ohm data input.
	CIPHER	Indicates KY-75 input.
	CUR-VC	Indicates nonencrypted KY-75 input.
14	System mode	If not blank, display indicates--
	XMT	Transmitter is keyed and channel tuned.
	TEST	Built-in-test mode is active.
	SCAN	Scan mode is active.
	TUNE	Channel tuning.
15	SET	Increases or decreases (clockwise or counterclock-wise) CRT brightness, audio volume, or channel number.

Table 5004-17. HF control assembly controls and indicators (concluded).

Item		

Number	Control/Indicator	Use
16	SQL	Squelch control-level shown in field 4.
17	Function switch	Selected power ON/OFF, CRT brightness, audio volume, and channel number along with SET control.

NOTE: The HF radio should be operated only under generator (not battery) power.

(1) At the HF control panel, set the function selector to BRT.
(2) When the raster appears, rotate the SET switch to adjust the level of brightness.
(3) Set the function selector to VOL.
(4) Rotate the set switch clockwise until the CRT indicates MAX volume level.
(5) Set the speaker VOLUME knob, located on the communication panel, to a comfortable listening level.
(6) Set the function selector to CHAN.
(7) Initiate the system built-in-test by first pushing TEST, then pushing ENTER. When the test is complete, push CLEAR.

NOTE: TM 11-5895-801-12 provides more details on built-in test procedures.

(8) If the test is successful, enter the assigned receive and transmit frequencies.
(9) Make a test call. You should hear yourself on the headset, and the blue HF/SSB CALL lamp should light. The speaker amplifier should be mute.
(10) Release the microphone PUSH-TO-TALK switch. Only the green IN-USE lamp should light. At the local communication selector panel, set the HF/SSB switch to OFF. The green IN-USE lamp should go out.
(11) Test the HF system at two other communication select panels.

4. Operate Telephone System. (Figure 5004-15 shows the telephone line control unit, and Table 5004-18 shows the telephone line control unit controls and indicators.)

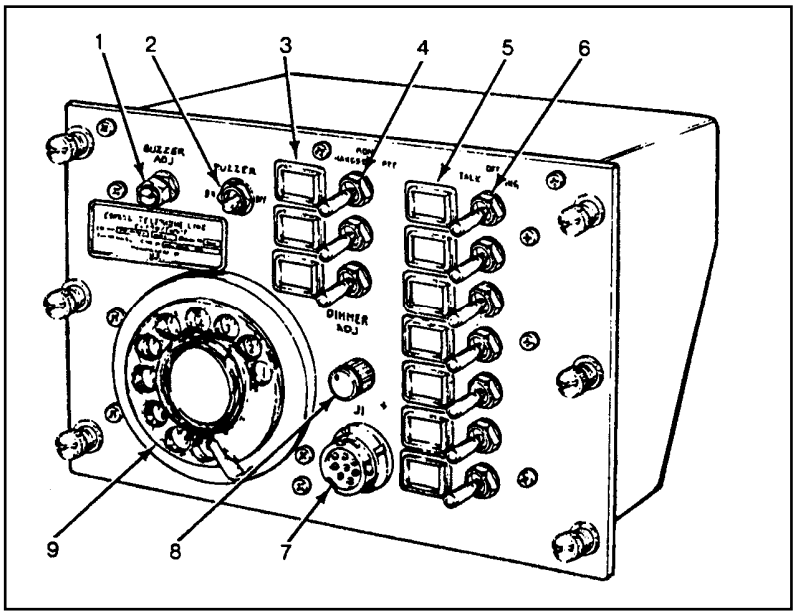


Figure 5004-15. Telephone line control unit.

Table 5004-18. Telephone line control unit controls and indicators.

Item		

Number	Control/Indicator	Use
1	BUZZER ADJ (screwdriver shaft slot)	Turns the buzzer sound up or down when the BUZZER ON/OFF switch is set to ON.
2	BUZZER (two-position lever switch)	
	ON	BUZZER sounds for incoming calls.
	OFF	BUZZER does not sound for incoming calls.
3	Direct line call/busy lights (three)	Brightly lit when associated direct line is in use. Flash bright and then dim for direct line incoming call. If unanswered within one minute, stops flashing but stays bright. The effects of the three-position direct line switch on the direct line call/busy lights is shown below.
	MON switch (center)	Dimly lit when the line is idle. Brightly lit when a call comes in.
	HANDSET (left)	Brightly lit when busy.
4	Direct line (HANDSET-MON-PTT)	
	HANDSET	Allows the use of the handset at the J1 connector and mutes the speaker/amplifier.
	MON	Lets calls that come in on a direct line be heard on the speaker/amplifier.
	PTT (push-to-talk)	Lets the desk microphone of the associated controller be used to talk on a direct line. The switch is held in PTT while talking and released to MON (spring-loaded return) to listen on the speaker amplifier.
5	Landline call busy lights (eight)	Lights flash indicating an incoming call. Landline switch (TALK-OFF-RING) controls light on all but incoming calls. (See Item 6.)
6	Landline switches (TALK-OFF)	
	TALK	The lamp is brightly lit and landline is in use with the connected handset.
	OFF	The handset is out of the circuit.
	RING (momentary light)	A buzzer and/or flashing light starts at the called telephone terminal on that landline. All seven landline switches work the same way.
7	J1 connector	Provides entry for a handset to the telephone control unit.
8	Dimmer ADJ knob	Adjusts the lamps from bright to dim.
9	Dial assembly	Dials a telephone number if a landline is connected to a central dial office.

NOTE: TM 11-5895-801-12 provides a complete check of the telephone equipment group.

a. There are two telephone line control units. Test the unit at the local controller position first and then at the ground controller position.
b. To test the landline local battery, perform the following procedure:
   (1) Confirm that all legend and dial lamps illuminate.
   (2) Set the BUZZER switch to ON.
   (3) Set the three direct line switches to MON.

(4) Set the seven landline switches to OFF.

NOTE: If a standard telephone instrument (or field telephone) has been connected to the telephone access panel, make a communication test as in step (5) below. Figure 5004-16 shows the hookup configuration.

(5) Make a ring-out, ring-in, and talk test with all LB telephone circuits, which connect with the central. On all circuits, test for the following:
   (a) The legend lights flash for all lines.
   (b) The buzzer sounds for all lines.
   (c) The buzzer sounds when the BUZZER switch is set to ON. When the switch is set to OFF, the buzzer does not sound.
   (d) The BUZZER ADJ shaft turns the buzzer sound louder. Set the buzzer sound to a comfortable level.
   (e) The lights and buzzer operate for about one minute from the start of a call; if the call is not answered, they stop operating.
   (f) The buzzer stops sounding and the lights stop flashing and stay bright if the call is answered within one minute.

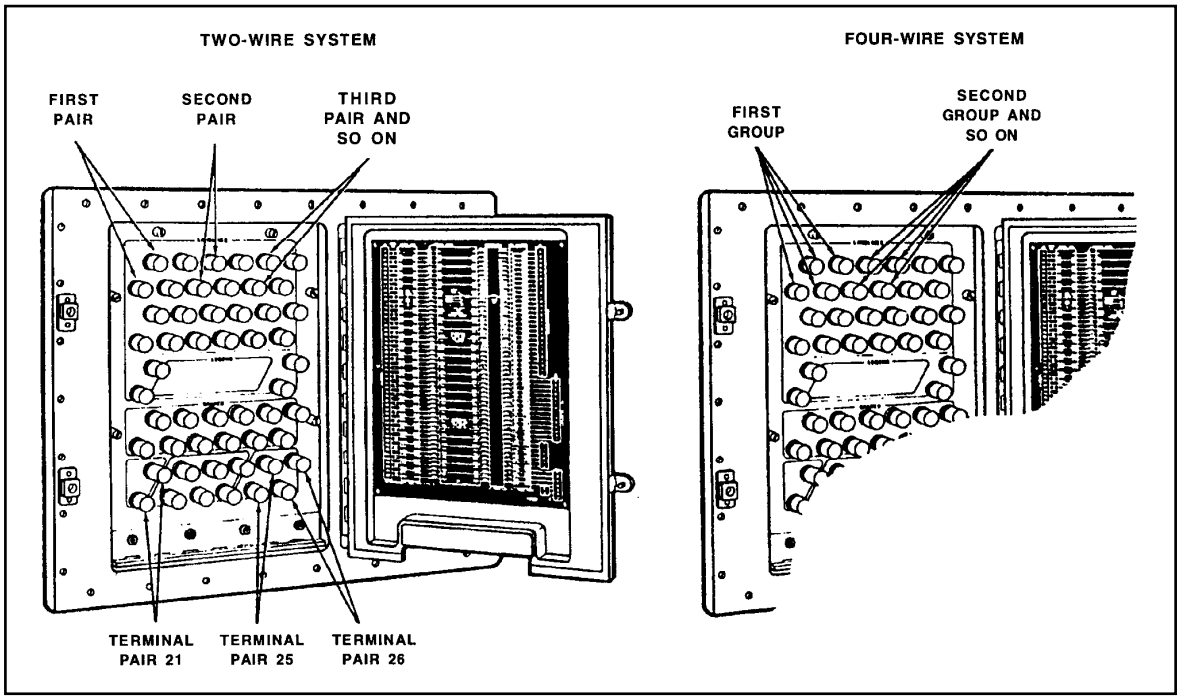


Figure 5004-16. Telephone interconnecting box.

NOTE: When the landlines are arranged to run on a common battery, the telephone equipment connects either the local telephone company circuits or a field-common battery telephone switchboard.

c. Conduct a landline common battery test. Make a ring-out and talk test with the local telephone control (switchboard) or telephone dial station. Ask the station to call back to confirm ring-in and the talk capability on all of the common battery landlines. Check to

ensure that the dial operates properly when calling. The lights and buzzer work the same as during the landline local battery test.

d. Conduct A Direct Line Test.

(1) Using the telephone handset, confirm the following at the data controller station during the test:

(a) The call/busy lights on the telephone control panel are brightly illuminated while receiving a signal.

(b) After the topmost HANDSET/MON/PTT (D/L 1) switch on the telephone control unit is set to MON, the incoming call should be heard on the D/L speaker amplifier (third speaker from the left).

(c) After the D/L 1 switch is set to HANDSET, you should not hear your voice over the D/L speaker amplifier when you talk into the telephone handset.

NOTE: Set the D/L speaker amplifier VOLUME knob to a comfortable listening level at the data controller position.

(2) At the local or ground control position, confirm the following during the test of the direct line using the hand-held microphone.

(a) With the D/L 2 switch set to PTT, the call/busy lights on the telephone control unit are illuminated.

(b) When the D/L 1 switch is returned to MON, the call/busy lights go dim.

(3) Repeat steps (1) and (2) above to test the other direct lines.

5. Operate Secure Voice Equipment. The four cryptoassemblies are shown in Figure 5004-17. Each controller station has a cryptoassembly to which a certain radio set makes contact for secure (cipher) voice radio communication. The local controller cryptoassembly is wired so that it can switch the UHF-AM 1 radio set to its associated cipher set and control indicator. The data controller cryptoassembly is wired so that it can switch the VHF-FM 2 radio set to its associated cipher set and control indicator. The ground controller cryptoassembly is wired so that it can switch the VHF-AM 3 radio set to its associated cipher set and control indicator. The HF cryptoassembly can be controlled from the supervisor position. The controls and indicators are the same on each cryptoassembly. The wiring of a certain radio set to a certain cryptoassembly does not restrict the use of these radio sets to a certain controller. When not in the crypto mode, the radio can be used by other controllers through the communication selector panel at each controller station. To help avoid breaking crypto security, set the MODE SELECT and PLAIN/CIPHER switches at the same time. Conduct this test at each controller position with the associated equipment for that position.

NOTE: This test is conducted with a cipher set installed. UHF and VHF frequency-hopping operation is possible only at the center console.

a. First test.

(1) Set the POWER ON switch to ON.

(2) Connect the voice security headset to the HEADSET connector.

(3) Set the VOLUME knob to MIDRANGE.

(4) At the radio set control, set the frequency tune dials to the frequency for that radio set.

(5) At the cryptoassembly, set the MODE SELECT switch to CLEAR and the PLAIN/CIPHER switch to PLAIN.

(6) Press the headset transmit switch and talk into the mouthpiece. Confirm that the transmitter cannot be keyed and that the sidetone is not present in the earphones. (You will be unable to hear yourself.)

b. Plain mode test.

(1) Set the PLAIN/CIPHER switch to PLAIN.
(2) At the VHF-FM radio set, press the RCVR TEST switch. Check to ensure that the tone is heard on the VHF-FM speaker amplifier but not in the voice security headset. (See Figure 5004-11 and Table 5004-14.)
(3) Set the MODE SELECT switch to SECURE. Press the VHF-FM radio set RCVR TEST switch again. Check to ensure that the tone is heard in the voice security headset but not on the speaker amplifier.
(4) Press the voice security headset transmit switch and talk into the mouthpiece. Check to ensure that the transmitter cannot be keyed and that the sidetone is not present in the earphones. (You will be unable to hear yourself.)

c. Cipher mode test. The cipher mode test can be conducted only at the center console. Figure 5004-17 shows the cryptoassembly and Figure 5004-18 shows the H-341/TSW-7A voice security headset. Table 5004-19 shows the cryptoassembly controls and indicators and Table 5004-20 shows the H-341/TSW-7A voice security headset controls and indicators.

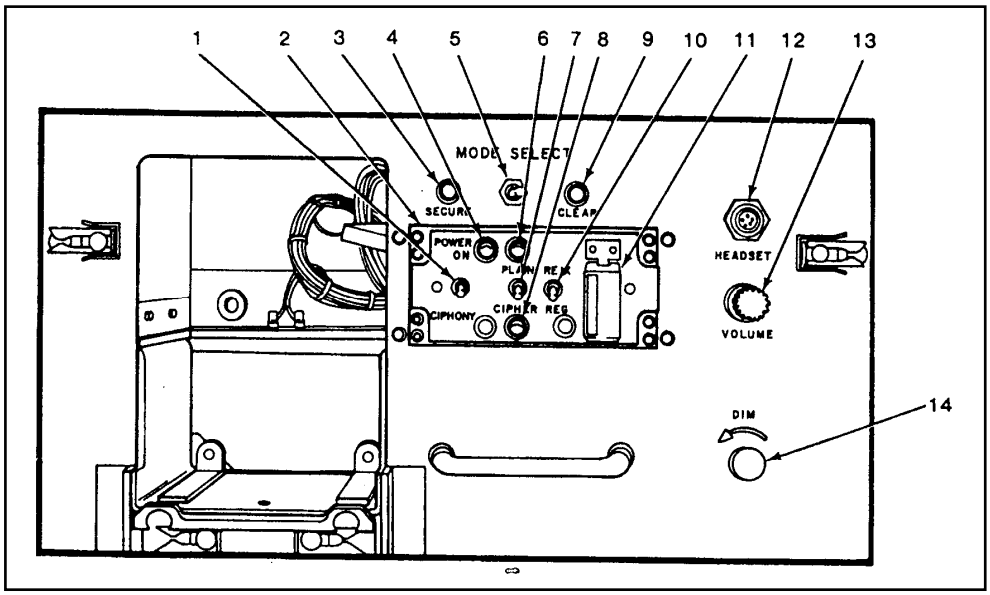


Figure 5004-17. Cryptoassembly.

NOTE 1: Each controller position has a cryptoassembly that operates with a designated radio for secure (cipher) voice radio communications. The local controller cryptoassembly (A8) is wired so that it can switch the UHF-AM 2 radio set to its associated TSEC/KY-28 cipher set and control-indicator C-8157/ARC. The data controller cryptoassembly (A11) is wired so that it can switch the VHF-FM 2 radio set to its associated TSEC/KY-28 cipher set and control-indicator C-8157/ARC. The ground controller cryptoassembly (A17) is wired so that it can switch the VHF-AM 3 radio set to its associated TSEC/KY-28 cipher set and control-indicator C-8157/ARC. The controls and indicators are the same on each cryptoassembly. The wiring of a certain radio set to a certain cryptoassembly does not restrict the use of these radio sets to a certain controller. Other controllers can use them whenever they are not being operated in the secure mode.

NOTE 2: To help avoid breaking crypto-secure, set the MODE SELECT and PLAIN/CIPHER switches at the same time.
NOTE: Items 1, 4, 6, 7, 8, and 11 in Table 5004-19 are part of the C-8157/ARC control-indicator.

Table 5004-19. Cryptoassembly controls and indicators.

Item Number	Control/Indicator	Use
1	POWER ON (two-position switch)	Provides on/off control and guards the power in the lines to the control-indicator C-8157/ARC and associated TSEC/KY-28 cipher set.
2	C-8157/ARC control-indicator	Controls the cipher set.
3	SECURE light (amber)	Lights when the MODE SELECT switch is set to SECURE and the PLAIN/CIPHER switch is set to CIPHER.
4	POWER ON light (amber)	Lights when the POWER ON switch is set to ON.
5	MODE SELECT (two-position toggle switch)	SECURE selects the secure mode for the radio set when the PLAIN/CIPHER switch is set to CIPHER. CLEAR clears the mode for the radio set. The associated cipher set and control-indicator are switched out.
6	PLAIN light (red)	Lights when the PLAIN/CIPHER switch is set to PLAIN.
7	Plain/cipher (two-position switch)	PLAIN (not used). The cryptoassembly switches away the CLEAR (PLAIN) speech from the cipher set (bypass). CIPHER allows secure (ciphered) speech to and from its associated radio set. Set the MODE SELECT switch to SECURE.
8	CIPHER light (green)	Lights when the PLAIN/CIPHER switch is set to CIPHER. Set the MODE SELECT switch to SECURE.
9	CLEAR light DS1 (green)	Lights when CLEAR (plain) mode is selected by the MODE SELECT switch and the PLAIN/CIPHER switch is set to PLAIN.
10	RE-X/REG (two-position toggle switch)	RE-X allows retransmission of ciphered communications through the associated retransmission unit.
11	ZEROIZE switch (under cover). **DO NOT PLACE THE ZEROIZE SWITCH IN UP (ON) POSITION UNLESS CAPTURE IS CLOSED.**	Normally in the down (OFF) position. When up (ON), neutralizes and makes the associated TSEC KY-28 cipher set inoperative.
12	HEADSET connector J2	Entry for the voice security headset.
13	VOLUME knob	Adjusts the volume in the voice security headset.
14	DIM knob	Controls brightness of all indicator lights on the crypto panel and also controls panel illumination.

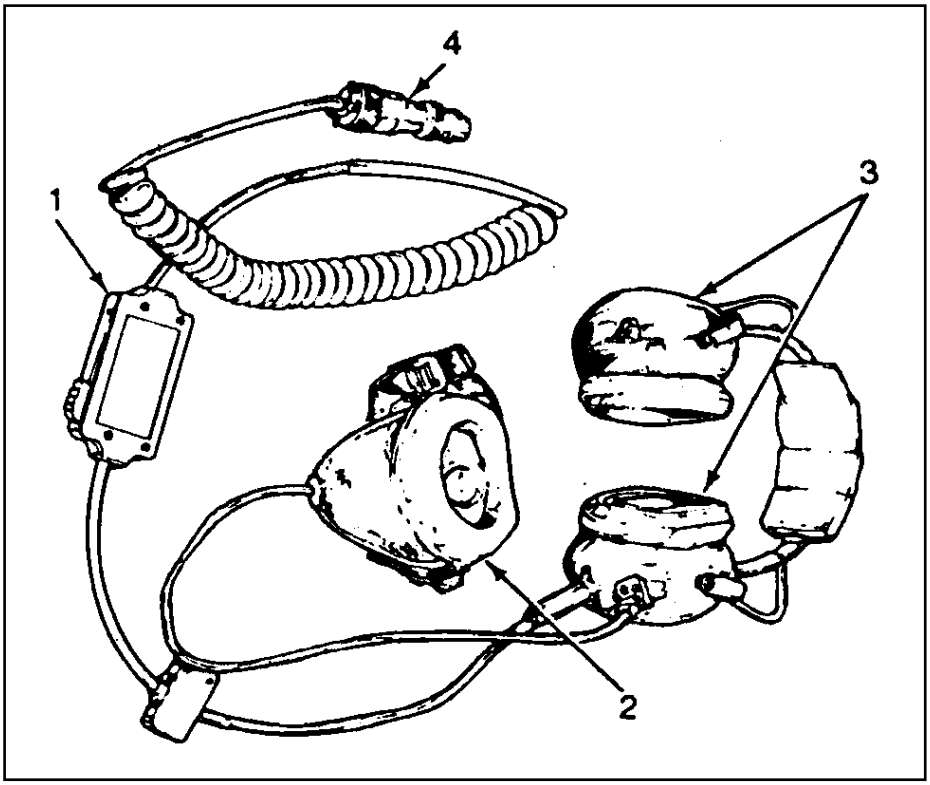


Figure 5004-18. H-341/TSW-7A voice security headset.

Table 5004-20. H-341/TSW-7A voice security headset controls and indicators.

Item Number	Control/Indicator	Use
1	Transmit switch	Allows voice transmission.
2	Mouthpiece and amplifier transmitter	Is the transmit unit that the voice secure controller wears.
3	Earphones	Are the receiving units that the voice secure controller wears.
4	Connector	Provides entry to cryptoassembly headset connector J2.

(1) Program the cryptoassembly according to established procedure.
(2) Set the PLAIN/CIPHER switch to CIPHER. The PLAIN light should go out, and the CIPHER light should illuminate.
(3) Put on the voice security headset. You should hear a steady 1,200-Hz tone for about two seconds, after which the tone pulses slowly.
(4) Press and immediately let go of the headset transmit switch. The tone should stop.
(5) Press and hold the headset transmit switch. In about one-half second you should hear a short beep. After the beep, talk into the headset mouthpiece. You should hear yourself in the earphones.

(6) Set the PLAIN/CIPHER switch to PLAIN and the POWER ON switch to OFF. Set the MODE SELECT switch to CLEAR. All lights except the CLEAR light should extinguish.

NOTE: If the crypto program is lost when the cryptoassembly is switched to PLAIN, check the internal battery condition and presence.

(7) Disconnect and stow the voice security headset.

NOTE 1: Test the other cryptoassembly using the UHF and HF radio systems from the local controller position and the VHF-AM and HF radio systems from the ground controller position.

NOTE 2: Encryptographics are at the supervisor's console only.

6. Operate Wind Direction and Speed Indicators.
   a. Wind direction test. Figure 5004-19 shows the wind direction and speed indicator; Table 5004-21 shows the wind direction and speed indicator controls and indicators.

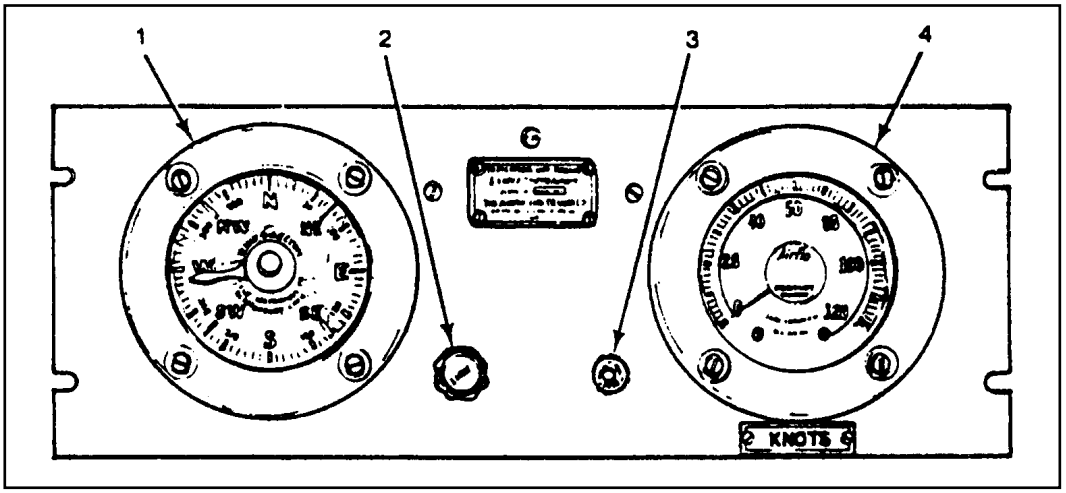


Figure 5004-19. Wind direction and speed indicator.

Table 5004-21. Wind direction and speed indicator controls and indicators.

Item Number	Control/Indicator	Use
1	WIND DIRECTION dial	The arrow shows the wind direction in relation to magnetic north.
2	LIGHT knob	Turns the panel light brighter or dimmer.
3	FUSE	Guards the line for the wind direction and speed instruments.
4	KNOTS dial	Indicates the wind speed in knots. The data comes from a wind speed transmitter outside the tower.

(1) Turn the wind set transmitter (wind vane) until the propeller blade is facing north (000 degrees). (Use a hand-held magnetic compass.)
(2) Go inside the shelter. The WIND DIRECTION dial should point to "N" (000 degrees) on the wind set display panel at the local and ground controller positions.
(3) Repeat steps (1) and (2) for the directions of east (090 degrees), south (180 degrees), and west (270 degrees).

b. Wind speed test.
(1) At the wind set transmitter, spin the propeller counterclockwise (facing the propeller).
(2) At the wind set display panels, confirm that the KNOTS dial reads upscale (pointer moves away from 0).
(3) Turn the LIGHT knob to read the dials best.

7. Operate NAVAID Monitors. This test is conducted to confirm that the NAVAID monitor is operating properly. The operation failure modes of the monitored remote equipment are simulated for this test. (Figure 5004-20 shows the NAVAID monitor. Table 5004-22 shows the NAVAID monitor controls and indicators.)

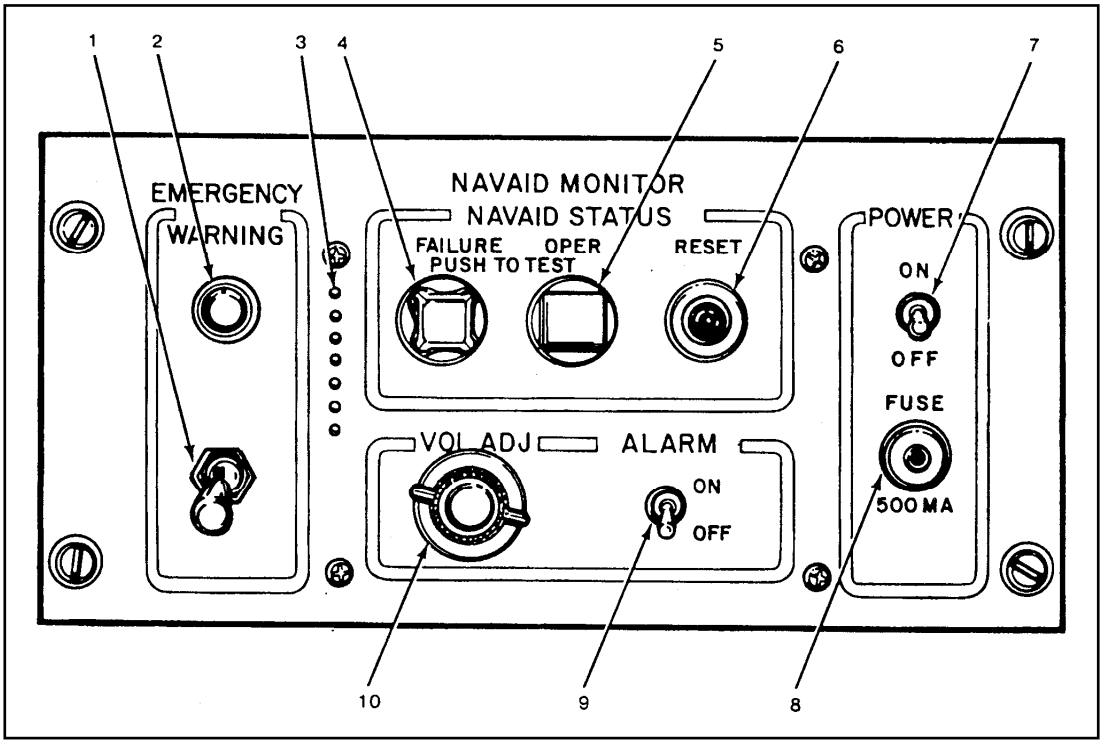


Figure 5004-20. NAVAID monitor.

NOTE: The NAVAID monitor alarm inside the assembly sounds whenever the NAVAID, such as VORTAC and TACAN, being monitored changes from operative to inoperative.

Table 5004-22. NAVAID monitor controls and indicators.

Item Number	Control/Indicator	Use
1	EMERGENCY WARNING (two-position pullout switch that unlocks the toggle switch)	When the switch is pulled out and up, it lights the EMERGENCY WARNING light and sounds the emergency signal in other facilities on the airfield.
2	EMERGENCY WARNING light (red)	Lights when the EMERGENCY WARNING switch is set to WARNING.
3	Holes in the front panel plate	Allows emission of sound from the audible alarm.
4	NAVAID STATUS FAILURE PUSH-TO-TEST (two-position push button switch and lamp) (red)	Shows red when a NAVAID fails or when the push-button is pressed to test the lamp inside the switch.
5	NAVAID STATUS OPER PUSH-TO-TEST (two-position push button switch and lamp) (green)	Shows white when the associated NAVAID is operational or when the push button is pressed to test the lamp inside the switch.
6	NAVAID STATUS RESET (two-position push button switch)	When pressed, stops the audible alarm and resets the alarm system.
7	POWER (two-position toggle switch)	Provides on/off power control to the NAVAID monitor assembly.
8	FUSE (500 MA)	Guards the power line for the NAVAID monitor assembly.
9	ALARM	Provides on/off control of the audible alarm. The alarm will not operate when set to OFF.
10	VOL ADJ knob	Adjusts audible alarm volume.

a. At the telephone interconnecting box, open the door to the box. Remove, tag, and bend back two wires (a pair) going to two terminals 25 for local battery operation and terminals 26 for common battery operation and to the two wires (another pair) going to two terminals 21 (lower left corner of the interconnecting box).
b. Place a jumper wire between the two terminals 21.
c. At the NAVAID monitor assembly, set the POWER switch to ON and the ALARM switch to ON.

NOTE: When the NAVAID monitor assembly is first turned on, the alarm may sound. This does not necessarily indicate a fault. Stop the alarm by pressing the NAVAID STATUS RESET switch.

d. The NAVAID STATUS OPER switch lamp should illuminate.
e. Press the NAVAID STATUS FAILURE switch. The lamp should illuminate.
f. Press the NAVAID STATUS OPER switch. The switch lamp should illuminate, and the alarm should sound.
g. Go to the interconnecting box and remove the jumper wire. (This will simulate an opening in the contact pair of wires at the remote navigational aid being watched.)
h. Go back inside to the NAVAID monitor assembly. The NAVAID STATUS FAILURE should illuminate, and the alarm should sound. The NAVAID STATUS OPER switch lamp should extinguish.
i. Press the NAVAID STATUS RESET switch. The alarm should stop.
j. Go back to the interconnecting box and restore the jumper wire.
k. Go back inside to the NAVAID monitor assembly. The alarm may sound.
l. Press the NAVAID RESET switch to stop the alarm.

8. Operate Accessories.
   a. Light gun test. Figure 5004-21 shows the light gun. Table 5004-23 shows the light gun controls and indicators.

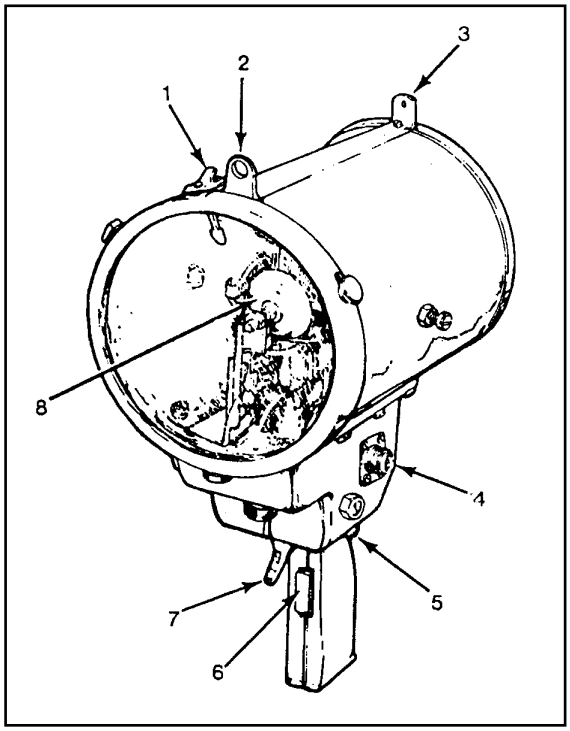


Figure 5004-21. Light gun.

Table 5004-23. Light gun controls and indications.

Item Number	Control/Indicator	Use
1	Light monitor prism (plastic rod)	Indicates when the light is on and which color filter, if any, is in place. (Gives the light gun user a sample of the light beam.)
2	Front sight (metal ring)	When used with the rear sight, helps the user aim the light gun at the desired target.
3	Rear sight (metal peep sight blade)	When used with the front sight, helps the user aim the light gun at the desired target.
4	Electric power connector	Provides an entry for a 6.0 VDC electric power for the light gun.
5	Filter trigger stop	When not pressed, the filter trigger stop prevents the color filter trigger from being pulled all the way and leaves the filter in the path of the beam.
		When pressed at the rear of the pistol grip, lets the color filter trigger be pulled all the way to turn the color filter out of the path of the beam.

Table 5004-23. Light gun controls and indications (concluded).

Item Number	Control/Indicator	Use
6	ON/OFF light push button (two-position press switch)	Press to light the lamp in the gun.
7	Color filter trigger (three-position lever)	When not pressed, the beam is red. When pressed with the filter trigger stop not pressed, the beam is green. When pressed together with the filter trigger stop, the beam is white (unfiltered).
8	Color filters	One is red; one is green.

CAUTION: TO AVOID SENDING THE WRONG LIGHT SIGNAL TO AIRCRAFT OR GROUND TRAFFIC, AIM THE LIGHT GUN AT THE FLOOR.

(1) Test both light guns.
(2) The color of the light can be seen by reflection or by the light monitor prism. Make sure that the right cable is connected at the electric power connector, the gun lens is clean and whole, and that the front and rear sights are undamaged and unobstructed.
(3) Press the ON/OFF light switch. The lamp should illuminate. The color of the light depends on where the color filter trigger is set. When not pressed, a red light shows. When pressed, a green light shows. When pressed together by pressing the filter trigger stop, a white light shows.
(4) Check the light gun suspension lines for easy movement.

b. Altimeter test. Figure 5004-22 shows the altimeter. Table 5004-24 shows the altimeter controls and indicators.

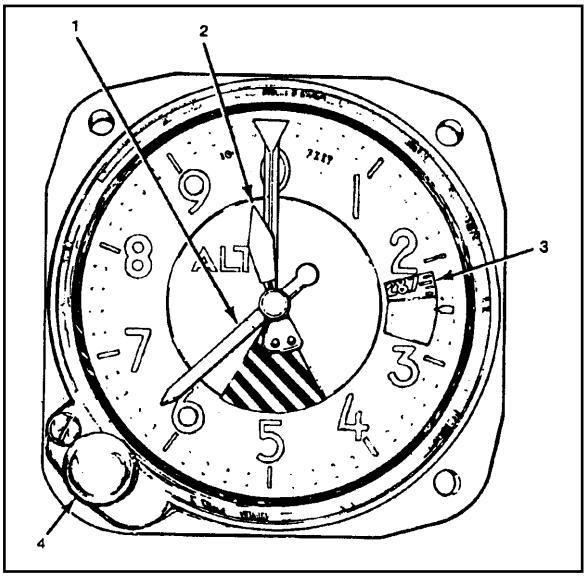


Figure 5004-22. Altimeter.

Table 5004-24. Altimeter controls and indicators.

Item Number	Control/Indicator	Use
1	100-foot needle	Points to 100-foot height above sea level as an offset for barometric pressure.
2	1,000-foot needle	Points to 1,000-foot height above sea level as an offset for barometric pressure.
3	Pressure window	Shows barometric pressure in an inches of mercury setting.
4	Pressure knob	Turn the knob to set the barometric pressure in the pressure window. Obtain barometric pressure from an aneroid barometer.

(1) Remove the pressure screw from the barometer and allow it to stabilize.
(2) Read the barometric pressure from the barometer.
(3) Using the pressure-altitude chart supplied with the barometer, obtain an altitude corresponding to the barometric pressure obtained in step (2).
(4) Read the temperature from the thermometer.
(5) Obtain the relative humidity from the local weather detachment. If this information is not available, assume a relative humidity of 50 percent.
(6) Using the temperature-relative humidity chart supplied with the barometer, obtain an altitude correction factor for the temperature and relative humidity obtained in steps (4) and (5).
(7) Divide the surveyed altitude of the shelter by the correction factor obtained in step (6).
(8) Subtract the figure obtained in step (7) from the figure obtained in step (3).
(9) Using the pressure-altitude chart, obtain the true barometric pressure at sea level using the altitude obtained in step (8).
(10) Set the altimeter to the barometric pressure obtained in step (9). Tap the altimeter until the reading does not change; reset the barometric reading each time.
(11) Repeat steps (1) through (10) for the other altimeter. An example of an altimeter test is provided below.
  (a) The barometer reading is 29.3.
  (b) The altitude obtained from the pressure-altitude chart is 1,590.
  (c) The temperature is 30 degrees F.
  (d) The relative humidity is 50 percent.
  (e) The altitude correction factor obtained from the temperature-relative humidity chart is 0.96.
  (f) The surveyed altitude is 131 feet.
  (g) Step (f) divided by the correction factor is 131/0.96 = 136.4.
  (h) Step (b) minus step (g) is 1,590 minus 136 equals 1,454.
  (i) The true barometric pressure at sea level obtained from the pressure-altitude chart is 29.42.

c. Twenty-four-hour clock test. The clock should be checked daily for accuracy and wound once each week. (Figure 5004-23 shows a 24-hour clock. Table 5004-25 shows the 24-hour clock controls and indicators.

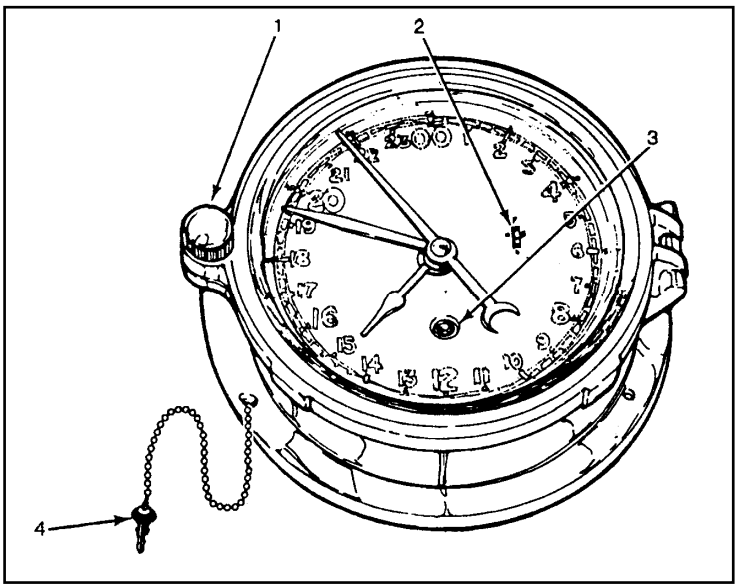


Figure 5004-23. Twenty-four-hour clock.

Table 5004-25. Twenty-four-hour clock controls and indicators.

Item Number	Control/Indicator	Use
1	Bezel thumbscrew	Allows the window to be opened for access to the hands and winder.
2	Slow/fast adjustment	Used to adjust clock speed.
3	Winding arbor	Is the socket for the winding key.
4	Key	Used to wind the clock.

CAUTION: BENDING OR FORCING THE HANDS OF THE CLOCK MAY CAUSE THEM TO SLIP ON THEIR SHAFTS.

(1) To wind the clock, open the front face and insert the key into the winding arbor. Wind the clock until the spring feels tight. Do not wind the clock too tight.
(2) To set the clock, proceed as described below.
  (a) Open the face of the clock.
  (b) Move the minute hand back to a point three or four minutes behind the correct time minute.
  (c) When the sweep-second hand reaches the zero point (12 o'clock), hold it there by placing a figure in front of it.
  (d) When the exact second is about to be reached, set the minute hand ahead to the correct minute.
  (e) When the exact zero second is reached, release the sweep-second hand. The clock will run normally and is synchronized to the second with the time reference.
(3) To light the clock, set the brightness with the CLOCK ILLUMINATION DIM knob located at the ground controller position.

9. Perform Shutdown to a Standby Status. To shut down the central to a standby status, proceed as described below.

a. At the power distribution panel assembly, set the following switches and circuit breakers to OFF in any order. Leave the MAIN POWER circuit breakers ON.
   (1) The TRANSCEIVER CONTROL bank of 13 circuit breakers.
   (2) The AUDIO bank of three circuit breakers.
   (3) The WD SET circuit breaker.
   (4) The LIGHT GUNS bank of two circuit breakers.
   (5) The CONVENIENCE OUTLETS bank of two circuit breakers.
   (6) The LIGHTING DC and AC bank of four circuit breakers and the DOOR, OVHD DC, OVHD AC, and THEATER switches.
   (7) The EMERGENCY DC bank of three circuit breakers. Do not set all of the circuit breakers on the front panel of the power distribution panel to OFF.
b. At each of the two ECU control units, set the select knob to OFF.
c. At the power distribution panel side panel, set the ECU POWER two banks of circuit breakers to OFF. Also, set the WINDOW HEAT circuit breaker and one switch to OFF.

10. Operate Under Unusual Conditions. The central is designed to operate in extremely cold weather, hot weather, high humidity, high moisture, and sandy conditions. The ECUs generally give all the air-conditioning needed.
    a. High winds. When extremely high winds or winds of hurricane force are expected, ensure that the guy lines for the shelter, the antennas, and the wind vane mast are tight and secure.

CAUTION

If winds greater than 100 knots are expected, set the WD set circuit breaker on the power distribution panel to off before the wind van mast is lowered and the wind transmitter is removed.

    b. Cold weather. For arctic-type climates, prepare the central as described below.
       (1) Clear away excessive ice or snow from the shelter. Remove heavy accumulations from the roof of the shelter.
       (2) Remove heavy ice or snow from the wind transmitter, the communications antenna, the generators, the power cables, the air ducts, and the ECUs.
    c. Dusty areas. In desert-type climates, guard the shelter from sand or dust by keeping the door and access panels closed. Clean the ECU screens and filters daily or more often as needed.
    d. Auxiliary power.
       (1) Emergency battery mode (main power fault).

NOTE: The DC-powered equipment can be run only for a limited time; therefore, log the time when the auxiliary mode starts. To cut down on use of the battery, turn off any equipment not needed.

   (a) On the peer distribution panel, the DC POWER SUPPLIES A ON-LINE lamp or the DC POWER SUPPLIES B ON-LINE lamp extinguishes and the EMERGENCY DC BATTERY ON LINE amber light should illuminate.
   (b) The DC POWER SUPPLIES TRANSFER ALARM will sound. Stop the alarm by pushing the DC POWER SUPPLIES RESET switch.
   (c) The MAIN POWER 30 50/60 HZ AVAIL lamp will extinguish.

NOTE: Set the MAIN POWER 30 50/60 Hz circuit breaker to OFF until the MAIN POWER AVAIL lamp lights again.

(d) All the equipment will stay powered, except ECUs (CH-620-2), wind measuring set (AN/GMQ-11), HF radio set (should be turned off), and DC A and B power supplies (PP-6187/TSW-7).
(e) The theater and overhead AC lights will not be illuminated.
(f) No 50/60 Hz convenience outlets will have power.

(2) Battery-to-normal-power mode.
(a) When main AC power returns, the MAIN POWER 30 50/60 HZ AVAIL lamp will illuminate. The PHASE INCORRECT lamp should be out.
(b) Leave the EMERGENCY DC BATTERY ON LINE circuit breaker to ON.
(c) Set the MAIN POWER 28 VDC circuit breaker to OFF. The 28 VDC ON lamp will go out and the 28 VDC AVAIL lamp will light if the generator is running.
(d) Set the MAIN POWER 30 50/60 HZ circuit breaker to ON. The EMERGENCY DC BATTERY ON LINE lamp will go out.
(e) The DC POWER SUPPLIES TRANSFER ALARM should sound. Stop the alarm by pushing the DC POWER SUPPLIES RESET switch.
(f) Turn on any equipment that was shut down during limited operation of the battery mode.

(3) Shutdown (battery power). Set all circuit breakers on the power distribution panel assembly to OFF.

11. Perform Operator Maintenance. Using Tables 5004-26 and 5004-27, perform preventive maintenance checks and services.

CAUTION

Do not use solvent to clean any part of the console. Solvent may damage console surfaces.

WARNING 1

When the HF AN/ARC-199 transceiver is being operated, high levels of radiation make climbing to the roof of the shelter to make equipment repairs or adjustments dangerous. Be certain that all power to the HF system has been disconnected before climbing to the roof of the shelter.

WARNING 2

Avoid contact with energized equipment when using water, a damp cloth, or a solvent.

WARNING 3

Do not use trichorotriflouroethane without adequate ventilation and avoid prolonged breathing of its vapor. Do not use the solvent near heat or open flame. Its products of decomposition are toxic and irritating. Trichlorotriflouroethane dissolves natural oils; therefore, prolonged contact with skin should be avoided. When necessary, use gloves that the solvent cannot penetrate. If taken internally, consult a physician immediately.

NOTE 1: If you find a routine check in your PMCS, other operators have reported problems with these items.
NOTE 2: When performing PMCS or routine checks, observe all warnings and cautions.
NOTE 3: If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.
NOTE 4: The procedures column in the PMCS charts gives instructions on how to perform the required checks and services. Follow these instructions carefully and, if tools are needed or the chart so instructs, get organizational maintenance to perform the work.
NOTE 5: If your equipment must be in operation at all times, check those items that can be checked and serviced without disrupting operation. Make the complete checks and services when the equipment can be shut down.

a. Daily. The time required for during operations PMCS is 2.1 hours. Daily operator maintenance checks and services are shown in Table 5004-26. Time intervals are shown as D for during, W for weekly, and Q for quarterly.
b. Weekly checks and services. Weekly checks and services are shown in Table 5004-27.
c. Quarterly checks and services. Quarterly checks and services are also shown in Table 5004-27.

Table 5004-26. Daily maintenance checks and services.

Item Number	Interval	Item to be inspected	Procedures check; repair or adjust as necessary	Equipment not ready/ available if
1	D	Interior windows	Clean with glass cleaner; use soft cloth. Dry and polish with clean, lint-free cloth.	
2	D	Shelter floor	Scrape off mud, grease, or other foreign matter and vacuum. Do not use water or solvent unless it is needed.	
3	D	Shelter interior	Dust with soft cloth and vacuum. Clean all console equipment with a damp cloth and mild detergent. Dry with lint-free cloth. Clean front panels of rack-mounted communications equipment, the fire extinguisher, and the door faces of the radio frequency indicators with a damp cloth. Dry with lint-free cloth.	

Table 5004-26. Daily maintenance checks and services (concluded).

Item Number	Interval	Item to be inspected	Procedures check; repair or adjust as necessary	Equipment not ready/ available if
4	D	Light guns	Clean with damp cloth.	
5	D	Binoculars	Clean lenses with lens tissue cleaner. Place binoculars in case when not in use.	
6	D	Clock	Clean with damp cloth. Dry with lint-free cloth.	
7	D	Controls	Inspect to ensure that all knobs, dials, and switches operate without binding.	
8	D	Exterior windows	Clean with glass cleaner and a soft cloth. Dry and polish with a clean, lint-free cloth.	
9	D	Platform stairway	Sweep and clean with a scrub brush, soap, and water. Use solvent to cut grease. Check to ensure that the platform and stairway are securely fastened.	
10	D	Exterior equipment	Check to ensure that all equipment is complete and intact, free from fungus or corrosion, clean, and free from foreign matter. Check to ensure that all cable connections are tight; antennas, guy lines, anchors, and stakes are secure; and all equipment appears in good working condition. Sweep and clean as necessary.	

Table 5004-27. Weekly and quarterly maintenance checks and services.

Item Number	Interval	Item to be inspected	Procedures check; repair or adjust as necessary	Equipment not ready/ available if
1	W Q	Operator chairs (3)	Inspect for chipped paint, corrosion, and physical damage.	Operator chair has physical damage.
2	W Q	Racks and panels	Use lusterless black paint.	
3	W Q	Walls (below air ducts)	Use semigloss green enamel.	
4	W Q	Walls (above air ducts) and ceiling	Use lusterless black paint.	
5	W Q	Shelter exterior, skid platform, stair-way, and all other exterior equipment	Use forest green paint.	

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment. Have the soldier perform the task in an actual setting or provide a training site.

Brief Soldier: Tell the soldier that he will be evaluated on operating the AN/TSW-7A according to the appropriate TMs and unit SOP. Tell the soldier that he will not be informed of his progress during performance of the task except to prevent personnel injury or damage to the equipment.

Performance Measures	**GO**	**NO GO**
NOTE: Applicable performance measures are determined by local conditions, mission requirements, and assigned equipment. Use TM 11-5895-801-12 and the power source technical manual.		
1. Performs preliminary starting procedures.	____	____
2. Sets initial shelter equipment controls.	____	____
3. Performs starting procedures.	____	____
4. Performs the preoperational equipment test.	____	____
5. Performs shutdown-to-standby status procedures.	____	____
6. Operates under unusual conditions. a. Prepares for high winds. b. Prepares for cold weather. c. Prepares for dusty areas. d. Operates with auxiliary power.	____	____
7. Performs operator preventive maintenance and services. a. Dusty areas. b. Auxiliary.	____	____
8. Perform operator maintenance. a. Daily. b. Weekly. c. Quarterly.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
DA Form 2404	None
TM 11-5895-801-12	
TM 9-6115-464-12	

Operate the Landing Control Central, AN/TSQ-71B
011-143-5006

Conditions: You are a member of a GCA shift and given an installed AN/TSQ-71B, generator set, TM 11-5895-474-12, TM 11-5821-260-12, TM 11-5821-311-12, and power source TM.

Standards: Perform starting procedures, operate equipment, perform normal shutoff, emergency shutoff, and standby procedures. Perform operator maintenance. All procedures are performed according to TM 11-5895-474-12, TM 11-5840-281-12-1, and power source TM.

Performance Steps

1. Perform Starting Procedures. Observe the procedures shown in Table 5006-1 when applying power to the various units inside and outside the shelter.
   a. Set all circuit breakers on the SB-322/TSQ-71B power distribution panel to the OFF position.
   b. Start the power generator. (Refer to the TM for operating instructions for the power source.)

Table 5006-1. Turn-on procedures circuit breaker priority.

Step	Procedure	Action or Indication
1	Turn the power generator on and the SB-322/TSQ-71B MAIN AC POWER circuit breaker to the OFF position.	a. PHASE FAULT indicator light should not be illuminated. b. The frequency as indicated on the FREQUENCY meter is within 5 percent of 400 Hz. If it is not within this limit, refer to TM 5-6115-628-14&P for adjustments to the AN/MJQ-15. c. Rotate the PHASE switch to the A, B, and C positions while checking the VOLTAGE meter. The voltage should be within 5 percent of 120 volts for each phase. **NOTE:** If the PHASE FAULT indicator light illuminates, the phase of the power line is incorrect and the MAIN AC POWER circuit breaker transfers to the tripped position. If the voltage exceeds tolerance, the MAIN AC POWER circuit breaker will not stay in the ON position; it transfers to the tripped position.

Table 5006-1. Turn-on procedures circuit breaker priority (continued).

Step	Procedure	Action or Indication
2	Place the MAIN AC POWER circuit breaker in the ON position.	The MAIN AC POWER circuit breaker should remain in the ON position.
3	Place the LIGHTS circuit breaker in the ON position.	The two shelter lights come on if the shelter door is closed or the NORMAL OVERRIDE switch is in the OVERRIDE position and the door is opened.
	ENSURE THAT THE IFF EQUIPMENT SWITCHES ARE IN THE OFF POSITION.	
4	Place the IFF circuit breaker (located on the power distribution panel) in the ON position.	Primary power available at the IFF.
	Ensure that the POWER switch on the RT-1172/ TPN-8 receiver-transmitter is in the OFF position. Ensure that the POWER switches on both C-6988A/ TPN-18 control indicators are in the OFF position.	
5	Place the RADAR circuit breaker (located on the power distribution panel) in the ON position.	Primary power available at the AN/ TPN-18A radar set.
6	(Mode C-406) When the air conditioners are to be used, open the ports. Then place AIR CONDITIONER 1 and 2 circuit breakers in the ON position.	
	NOTE: A time delay prevents simultaneous operation of the two air conditioners. The order in which the air conditioners turn on is determined by the position of the time delay unit switch on the shelter rear wall. The roadside air conditioner should be kept in the cool position. Steps a through e apply to the curbside air conditioner.	
	a. Place SW 2 on the evaporator in the ON position.	a. Evaporator fans operate.
	b. Place SW 3 in the VENT position.	b. Evaporator fans operate.
	c. Turn switch SW 4 fully counterclockwise.	c. Evaporator fans operate.
	d. Turn SW 4 clockwise.	d. The condenser fan and compressor start. Check the condenser fan rotation. Rotation should be clockwise when seen through the rear of the condenser section. After a few minutes of operation, check the sight glass to ensure that it is clear and free of bubbles.
	e. Turn SW 1 for the amount of fresh air needed.	
	NOTE: If the air conditioner fails to start, open the front access panel and push the reset control on the circuit breaker.	
	When the air conditioners are to be used for ventilation--	
	a. Place the selector switch in the VENT position.	
	b. Place the fan speed toggle switch in the desired position.	Air conditioner fan runs.

Table 5006-1. Turn-on procedures circuit breaker priority (continued).

Step	Procedure	Action or Indication
	c. For ventilation, open the damper door and close the grill damper.	
7	(Model VM 6000-208)	
	a. When the air conditioners are to be used for cooling--	
	(1) Position the thermostat to the desired temperature.	Air conditioner fan runs.
	(2) Place the fan speed toggle switch in the desired position.	Air conditioner compressor runs.
	(3) Place the selector switch in the COOL position.	Air conditioner compressor runs.
	(4) For cooling with 100 percent recirculated air, close the damper door.	
	(5) For cooling with fresh air, open the damper door and partially close the intake grill damper.	
	(6) For cooling with fresh air drawn through a chemical-biological filter unit when the outdoor air is contaminated, close the damper door and partially close the intake grill damper.	
	b. When the air conditioners are to be used for heating--	
	(1) Position the thermostat at the desired temperature.	
	(2) Place the fan speed toggle switch in the desired position.	
	(3) Place the selector switch to the LO-HEAT or HI-HEAT position.	
	(4) For heating with 100 percent recirculated air, close the damper door.	
	(5) For heating with fresh air, open the damper door and partially close the intake grill damper.	Air conditioner fan runs.
	(6) For heating with fresh air drawn through a chemical-biological filter unit when the outdoor air is contaminated, close the damper door and partially close the intake grill damper.	Heat turns on.

Table 5006-1. Turn-on procedures circuit breaker priority (concluded).

Step	Procedure	Action or Indication
8	When the fans are to be used, open the fan ports and the door vent. Place the FANS circuit breaker in the ON position. **When the PU-126/G power unit is used as a power source, a load problem may arise when switching on the 28V CONV circuit breaker. To avoid this problem, slowly push the circuit breaker up halfway until contact is made. (You will hear a hum at 400 Hz power.) Then, switch the circuit breaker to full ON.**	Both shelter fans exhaust air from the shelter.
9	Place the 28V CONV circuit breaker in the ON position for 28 volts DC generated in the SB-3222/TSQ-71B. When a 28 VDC source external of the shelter is used, the 28V CONV circuit breaker should remain off.	When the 28 VDC EXTERNAL-INTERNAL SB switch is in the INTERNAL position, the DC VOLTAGE meter will indicate 29 VDC+4 volts.
10	Place the RING GEN circuit breaker in the ON position.	Telephone ring-voltage available.
11	Place the CONTROL UNITS circuit breaker in the ON position. **Ensure that the power switches on all radios are in the OFF position.** **NOTE:** Before placing any of the circuit breakers for the radio equipment in the ON position, make sure that all the controls on the C-7732/TSQ-71B radio-telephone control unit are in the MON position.	Operating voltage present at both C-7732/TSQ-71B.
12	Place the UHF, VHF, and FM circuit breakers in the ON position as required.	Operating voltages present at the VHF, UHF, and FM radio equipment.
13	When required, place the CRYPTO circuit breaker in the ON position.	Operating voltage present at the AM-6066/ TSQ-71B.
14	Place the OUTLETS circuit breaker in the ON position.	Power available at 120V 400 Hz 15 amp service outlets on the SB-3222/TSQ-71B.

2. Perform Turn-on Procedures.
   a. For preliminary switch and control settings, place the switches and controls in the positions shown in Table 5006-2. Figure 5006-1 shows the C-6988A/TPN-18 front panel controls.
   b. To apply power to the radar and IFF equipment, place the switches and controls in the positions shown in Table 5006-3.

Table 5006-2. Preliminary settings for radar and IFF equipment turn-on.

Switch	Control Position	Location
POWER*	OFF	Left Control-Indicator C-6998A/TPN-18
INTENSITY	CCW	
FOCUS	CCW	
POWER*	OFF	Right Control-Indicator C-6988A/TPN-18
INTENSITY	CCW	
FOCUS	CCW	
POWER	OFF	Video Decoder KY-593/TPX
POWER	OFF	Blanker, Interference MX-7280/TPX
POWER	OFF	Coder Control KY-592/TPX
POWER	OFF	Pulse Modulator MD-638/TPX
BIAS	OFF	
IFF RADAR	ON	Radar IFF Control Panel
IFF ANT SCAN	RADAR	Radar IFF Control Panel
IFF ANT	OPERATE	Radar IFF Control Panel
MAIN PWR	OFF	Receiver-Transmitter RT-1172/TPN-18
SCAN switch	OFF	Left and Right Control Indicators C-6988A/TPN-18
*When the AN/TPN-18A is turned off for transit or limited storage, operate the ANTENNA U-D, L-R switch so that the elevation antenna servo actuator and azimuth antenna tilt actuator are fully retracted before placing the POWER switch in the OFF position. Place the SCAN MODE switch to 35 degrees EL and allow time for the actuator to reach the retracted position before placing the power switch in the OFF position.		

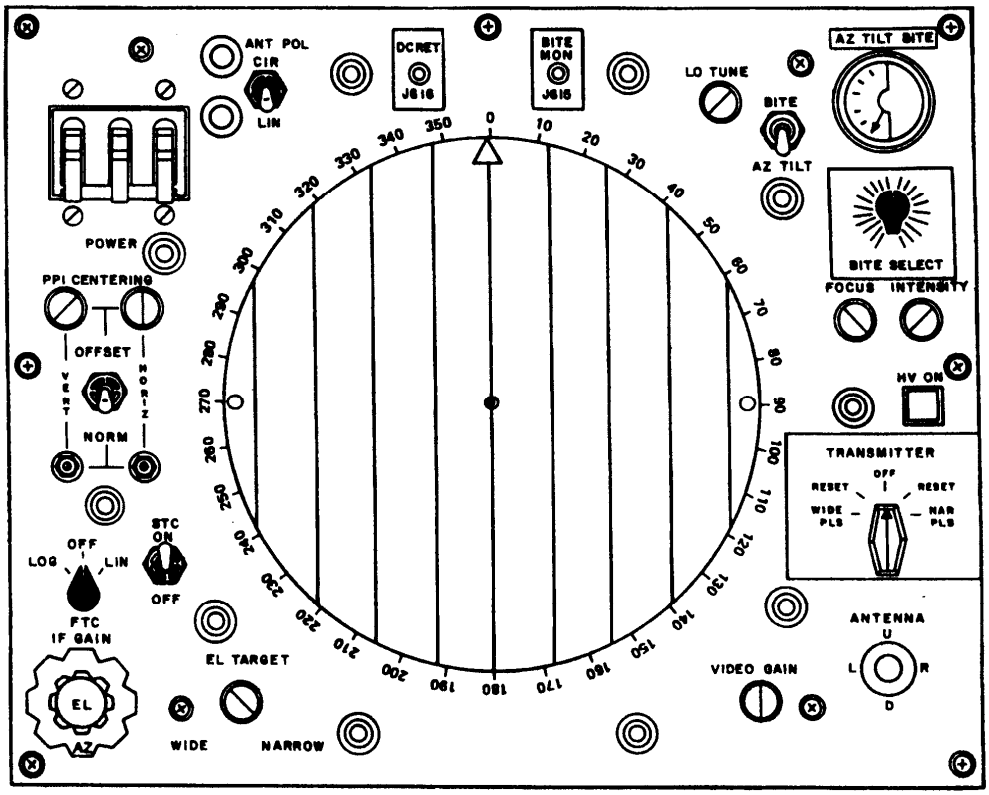


Figure 5006-1. C-6988A/TPN-18 control indicators (front panel controls).

NOTE 1: If the LOCAL/REMOTE switch on the TR-1172/TPN-18 receiver-transmitter is in the RT (local) position when applying the SCAN switch to the ON position, the azimuth search antenna will lag until the IFF antenna is running.
NOTE 2: Leave the RT LOCAL/REMOTE switch in the IND (remote) position.
NOTE 3: Control switches on the RT-1172/TPN-18 receiver-transmitter are located on the main power panel on the side of the receiver transmitter as shown in Figure 5006-2.
NOTE 4: Refer to TMs 11-5840-281-12-1 and 11-5895-468-12 for operating controls and adjustments.

Table 5006-3. Radar and IFF equipment turn-on power applications.

Switch	Control Position	Location	Indication
MAIN PWR	ON	RT-1172/TPN-18 radar receiver-transmitter control panel	Fan motors operate.
SCAN	ON		None.
HV	ON		None.
POWER	ON	C-6988A/TPN-18 left control-indicator	Panel illuminates.
POWER	ON	RT-820/TPX-44 receiver-transmitter	Indicator lamp glows after a 60-second delay.
POWER	ON	KY-593/TPX video decoder	Indicator lamp glows.
POWER	ON	MX-7280/TPX interference blanker	Indicator lamp glows.
POWER	ON	KY-592/TPX-44 coder control	Indicator lamp glows.
POWER	ON	Pulse monitor	Bias light illuminates.

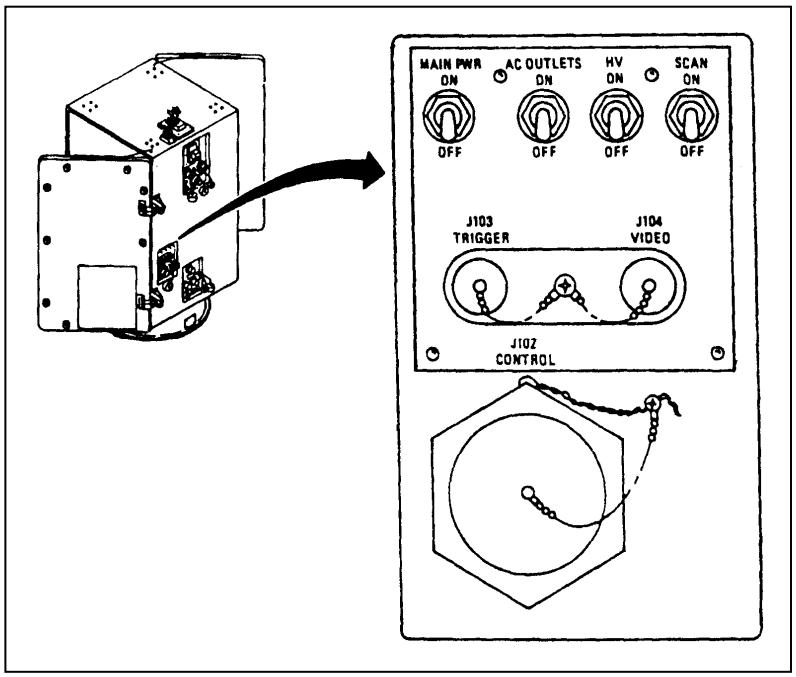


Figure 5006-2. RT-1172/TPN-18 receiver-transmitter main power panel controls

3. Operate the Radar. The GCA radar is a precision radar set providing course line and glide path tracking of aircraft to within 20 feet (altitude) and 1.3 degrees runway alignment of a predetermined landing point (touchdown). Using the radio communications facilities provided with the AN/TSQ-71B, aircraft position determined by the GCA radar is relayed to the pilot. An airport surveillance radar capability may be provided when the maximum radar range required is 40 nautical miles. Normally, the search mode is used to vector aircraft into the approach sector. The operating modes are discussed in the paragraphs that follow and as shown in Figure 5006-3.
   a. Search mode. The radar control-indicators present a 10-inch ppi display that provides a 360-degree azimuth with ranges of 5, 10, 20, and 40 nautical miles. The azimuth antenna can be adjusted in the vertical plane from -1 degree to +25 degrees for high altitude coverage.
   b. Precision approach (normal) mode. The indicators present two beta scan presentations on the CRT. These presentations appear on the upper and lower halves of the CRT for elevation and azimuth target determination. A calibrated electronic cursor is displayed on each azimuth and elevation beta presentation. This is the glide path and course line the operator instructs the pilot to maintain until the aircraft reaches the prescribed minimums.
   c. Height finder mode (if used). A variable electronic cursor on the elevation presentation, along with a calibrated ALTITUDE dial, enables the operator to determine the altitude of a target. By placing the variable cursor line over the target, the target height can be read directly from the calibrated ALTITUDE dial.
   d. Simultaneous mode. In the SIMULT mode, the precision approach mode will be on the indicator selected by the indicator control switch on the C-7012/TPX-44 control-indicator. When required, the search mode with IFF will be on the other indicator. This mode allows target tracking outside the approach sector and provides GCAs for landing aircraft.
   e. IFF (if used). The IFF interrogator provides target identification on the radar set control-indicator CRT out to a maximum range of 80 miles. The IFF interrogator equipment has interrogation path side lobe suppression and cancellation of nonsynchronous transponder signal (defruiter) circuits. The IFF interrogator and GCA radar manuals cover complete operations and maintenance instructions.

4. Operate The Radios.

NOTE: Before operating the radio sets, check the DC voltmeter on the power panel assembly. The DC voltmeter should indicate 29 +4 volts DC. Determine the frequency channel to use for each radio set. Mark this channel on the marking strip on the radio control panel. If there is interference between radios, change the frequencies. If interference continues, refer the problem to higher level maintenance.

   a. Radio set frequency settings. Energize and operate the radio sets as discussed below. Place all the radio TALK-MON-OFF switches on the C-7732/TSQ-71A radiotelephone control unit in the MON position.
      (1) RT-1167/ARC-164(V) UHF radio sets.

NOTE: The procedures for setting radio frequencies must be followed for each of the three UHF radio sets.

         (a) Place the RT-1167/ARC-164(V) radio set (Figure 5006-4) function selector switch. (1) in the MAIN position.

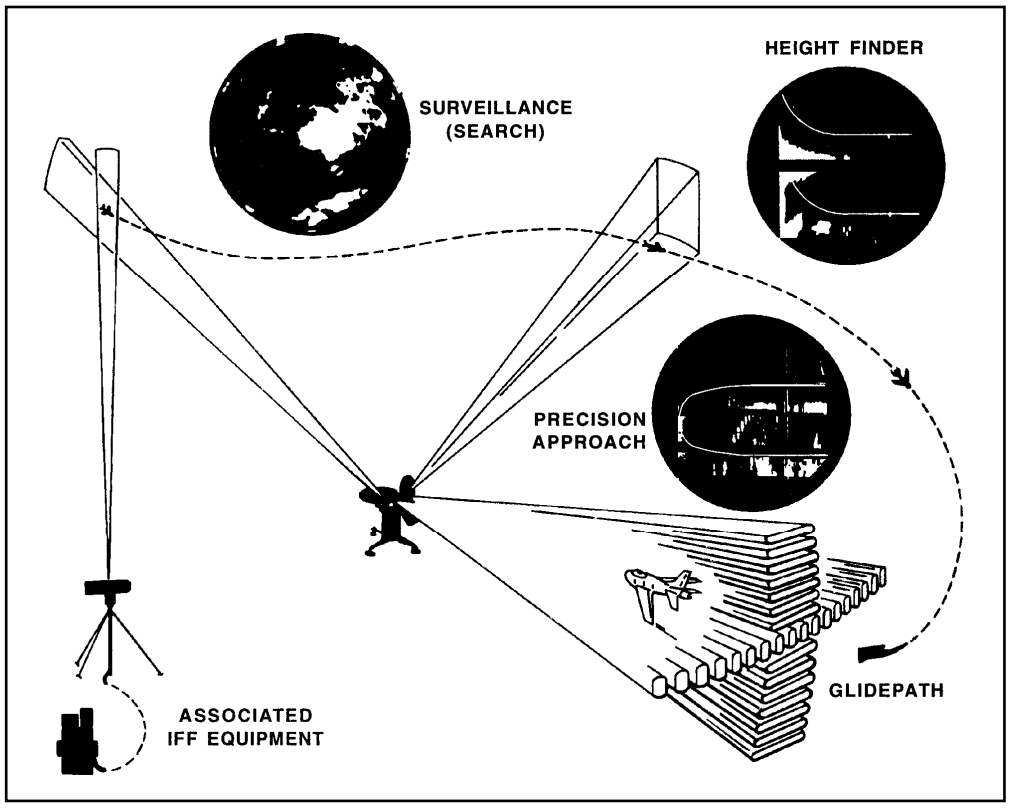


Figure 5006-3. Operating modes of radar and IFF.

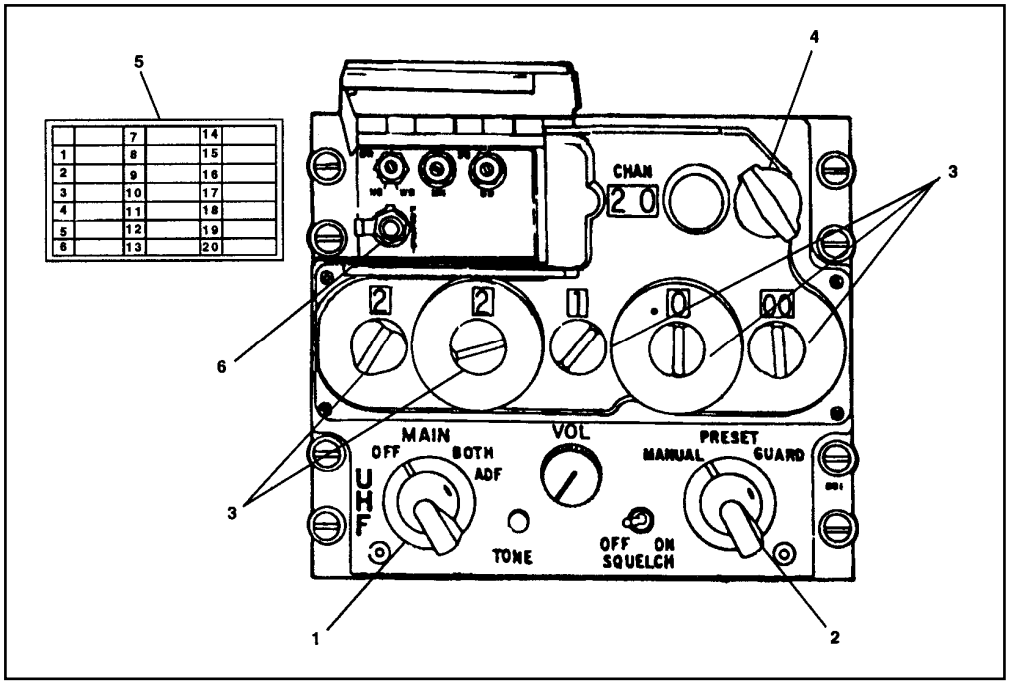


Figure 5006-4. Preset channels on the RT-1167/ARC-164.

NOTE: A completely separate guard channel receiver is provided in the equipment to continuously monitor the guard frequency while operating on the main channel frequency. To energize the guard receiver, place the function selector switch (1) in the BOTH position. Both guard and main receivers are off during any transmission period. For MANUAL-PRESET-GUARD, switch (2) to GUARD.

(b) Set the 20 preset channel numbers to the desired frequencies by setting the MANUAL-PRESET-GUARD switch (2) to PRESET. Using the manual frequency selector switches (3) to select the frequency to be placed in memory. Turning the preset channel selector switch (4) to the desired channel number. Removing the snap-on cover (5). Pressing and releasing the PRESET switch (6). Recording the frequency selected for the channel number using a soft lead pencil. (A card is provided on the front panel of the switching unit to record the channel number.)

(c) Use the VOLUME control on the C-7732/TSQ-71B radiotelephone control unit to adjust the audio volume level at each headset-microphone and loudspeaker.

(d) Turn the VOL control to midpoint.

(e) Set the MANUAL-PRESET-GUARD switch to MANUAL.

(f) Set the SQUELCH ON-OFF switch to ON.

(g) Turn the SQ-MN control counterclockwise until noise is heard. Turn the control clockwise until the receiver is quiet; continue turning the control clockwise an additional one-eighth turn.

(h) Depress and hold the RCVR TEST push button and listen for a tone in the headset to indicate proper main receiver operation.

(i) Set the function switch to BOTH and the MANUAL-PRESET-GUARD switch to MANUAL. (The main receiver squelch must be in the ON position.)

(j) Turn the SQ-GD control counterclockwise until noise is heard. Turn the control clockwise until the receiver is quiet; continue turning the control an additional one-eighth turn.

(k) Place the function selector switch to MAIN and the MANUAL-PRESET-GUARD to MANUAL.

(l) Rotate the frequency controls to the desired frequency setting.

(m) Establish communications with the station by keying the transmitter and speaking into the microphone. The presence of sidetone indicates proper operation of the transmitter. Adjust the VOL control for a suitable sidetone level in the headset.

(2) AN/ARC-115 or AN/ARC-115A (B model) VHF radio set.

NOTE: The procedures for setting radio frequencies must be followed for each of the radio sets.

(a) Place the AN/ARC-115 or AN/ARC-115A radio set function selector switch in the transmit/receive position.

NOTE: A completely separate guard channel receiver is provided in the equipment to continuously monitor the guard frequency while operating on the main channel frequency. To energize the guard receiver, place the function selector switch in the T/R GUARD position.

(b) Set the radio to the desired frequency.

(c) Turn the AN/ARC-115 SQUELCH adjustment counterclockwise until noise is heard or place the AN/ARC-115A SQUELCH switch in the OFF position.

(d) Turn the SQUELCH adjustment clockwise just until the receiver is quiet; continue turning the adjustment clockwise an additional one-eighth turn, or place the AN/ARC-115A SQUELCH switch in the ON position.

(e) Depress and hold the RCVR TEST push button and listen for a tone in the headset to indicate proper main receiver operation.

(f) Establish communication with another station by keying the transmitter and speaking into the microphone. Presence of sidetone indicates proper operation of the transmitter. Adjust the VOL control for a suitable sidetone level in the headset.

(3) AN/ARC-186 VHF radio set (B modified). With primary power applied, the radio set is operable with the mode select switch in any position other than OFF.

(a) Transmit/receive mode. Perform TR mode selection by setting the mode select switch to TR. Selecting the desired manual frequency or preset channel as described in paragraphs e through g below.

(b) Direction finding mode. Perform DF mode selection by setting the mode select switch to DF. Select the desired manual frequency or preset channel.

NOTE: Keying the transmitter when in the DF mode disables the homing function while the transmitter is keyed. The direction finding equipment may distort reception while the radio is in the DF mode.

(c) Frequency control/emergency select switch. Perform AM emergency mode selection by setting the mode select switch to the TR or DF position. Setting the frequency control/emergency select switch to the EMER AM position.

NOTE: Selecting EMER AM automatically disables the secure voice function and enables normal voice communications.

(d) FM emergency mode selection. Perform FM emergency mode selection by setting the mode select switch to TR or DF. Setting the frequency control/ emergency select switch to EMER FM.

NOTE: Selecting EMER FM automatically disables the secure voice function and enables normal voice communications.

(e) Manual selection. Perform manual frequency selection by setting the frequency control/emergency select switch to MAN. Rotating the four MHz selector switches until the desired frequency is displayed in the MHz indicators. Selector switches are the continuous rotation switches; rotating them clockwise increases frequency. The radio set will automatically tune to the selected frequency when the mode select switch is in the TR or DF position.

(f) Preset channel selection. Frequencies can be preset for 20 channels. Perform preset channel selection by setting the frequency control/emergency select switch to PRE. Rotating the preset channel selector until the desired channel number appears in the preset CHAN indicator. The radio set will automatically tune to the present frequency when the mode select switch is in the TR or DF position.

(g) Loading preset channels (Figure 5006-5). Load the preset channels by setting the mode select switch (1) to TR. Setting the frequency control/emergency select switch (2) to the MAN position. Rotating the four MHz selector switches (3) until the desired frequency is displayed in the MHz indicators. Rotating the preset channel selector (4) until the desired channel appears in the preset CHAN (channel) indicator (5). Remove the snap-on cover (6). Momentarily positioning the bandwidth/MEM load switch (7) to the MEM LOAD position. The preset information is now loaded into memory.

(h) Squelch disable. To disable the squelch, set the squelch disable/tone select switch to SQ DIS. Squelch will remain disabled until the switch is returned to the center position.

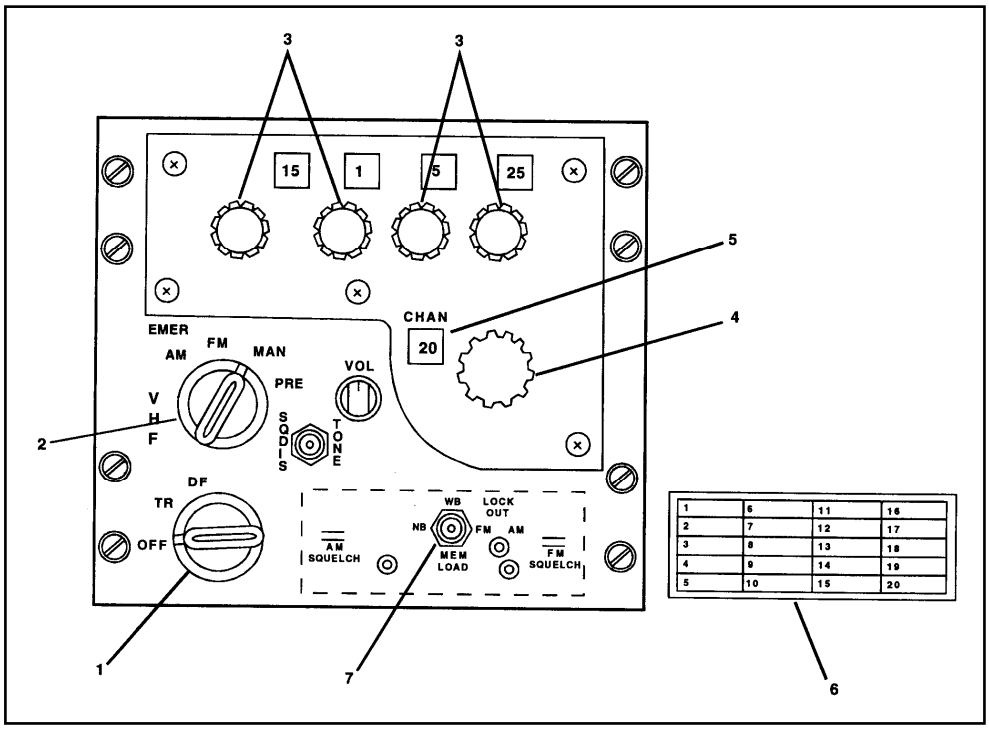


Figure 5006-5. Preset channels on the AN/ARC-186

CAUTION

Do not disable squelch when retransmit switches are in retransmit position. Squelch level is used to key the transmitter for retransmission.

(i) Tone transmission. Placing the squelch disable/tone select switch in the momentary TONE position may transmit a tone of approximately 1000 Hz. Releasing the switch disables the tone. The tone is transmitted in the AM or FM frequency selected.

(j) Wide-band/narrow-band selection. Set the bandwidth for the FM frequency band by setting the bandwidth/MEM load switch to the WB (wide-band) or the NB (narrow-band) position as desired.

NOTE: This switch will be operated in the WB position unless otherwise directed.

(k) Band lockout selection. A band lockout feature is provided for use only with VHF-AM or VHF-FM radios. Locking out a frequency band causes an audible warning if a frequency in that band is selected. To lock out a frequency band, set the dot on the band LOCKOUT switch to the AM or FM position as desired. In the center position, both bands operate. The AM position locks out AM; the FM position locks out FM. For example, set the dot toward FM to lock out FM.

(l) Transmission check. To conduct a transmission check, select TR and communicate with an established ground station on selected frequencies located in the low, middle, and high ranges of an applicable frequency band. Check the action of the volume control and ensure that the selected frequencies can be

heard loud and clear. Check to ensure that adequate sidetone is audible during all transmissions.

(m) Squelch disconnect check. To conduct a squelch disconnect check, select SQ DIS and check for noise.

(n) Tone check. To conduct a tone check, select TONE and check for tone transmission.

(4) AN/VRC-46 FM radio set.

NOTE: The procedures for setting radio frequencies must be followed for both FM radio sets (nonsecure operation only). Ensure that the X-mode receptacle cover is in place before operation.

(a) Turn the breaker-reset switch to HIGH POWER and wait for the call light to extinguish.

(b) Set squelch selection to NEW SQUELCH ON or OLD SQUELCH ON, as required.

(c) Turn the speaker switch to the OFF position.

(d) Turn the VOLUME control to the desired level.

(e) Turn the light switch to the ON position to illuminate the frequency dial.

(f) Set the BAND switch to the desired band (A or B). Set the desired frequency using the MC-KC tune selector switch.

(g) Establish communications.

(5) FM 1 radio. The FM 1 radio can be used with the crypto. The AM-6066/ TSQ-71B audio frequency amplifier is used to control the audio gain. A headset-microphone assembly is plugged into a cord assembly, which is plugged in the AM-6066/TSQ-71B. Operation of the crypto is not possible from the C-7732/TSQ-71B radiotelephone control unit. To operate the crypto, proceed as described below.

(a) Disconnect the X-MODE jumper connector on the AN/VRC-46 radio set and let it hang on its chain. Disconnect the SPKR 1 connector.

(b) Connect the X-MODE cable into the X-MODE connector on the AN/VRC-46 FM 1 radio set. At Crypto KY8, plug the P2 connector into J2. Plug the H-101A/U headset-microphone into the CX-2556/U cord assembly. The cord assembly is connected to the AM-6066/TSQ-71B audio frequency amplifier, which is mounted above the crypto unit.

b. Operating position controls for radio communications.

(1) All eight radio sets are operated from each of two C-7732/TSQ-71B radiotelephone control units. To select the radio set for transmission, place the radio control switch (UHF 1, UHF 2, VHF 1, VHF 2, VHF 3, FM 1, or FM 2) in the TALK (up) position. These switches are normally placed in the MON (monitor) position. When this is done, all incoming radio calls will be heard on the headset or the loudspeaker connected to the C-7732/TSQ-71B radiotelephone control units. The incoming call will also cause the appropriate radio blue call lamp to glow, which tells the operator on which radio set the incoming call is being received. To respond to the call, the operator places the switch beneath the glowing lamp in the TALK (up) position and presses either the footswitch or the push-to-talk button on the microphone and cord assembly or places the XMTR KEYING switch in the TALK (down) position.

(2) The XMTR KEYING switch is a spring-loaded, push-to-talk switch that returns to the OFF (up) position when the operator releases it. Normal two-way radio communication is accomplished with either the footswitches, headset microphone, or the XMTR KEYING switch. The headset and speaker volume can be adjusted with the VOLUME control. The radio sets need not be monitored by listening for an incoming call. When a radio control switch is in the OFF position, incoming calls will

cause the blue call lamp to glow, providing the operator with a visual indication of an incoming call.

(a) Transmit and receive. To transmit on a particular radio set, place the associated switch on the C-7732/TSQ-71B radio-telephone control unit in the TALK (up) position, press down on the footswitches, press the push-to-talk button on the headset-microphone cord assembly, or press the XMTR KEYING switch. To receive, release the keying switches.

(b) Receive only. Reception of all eight radio sets is automatic when the associated switches on the C-7732/TSQ-71B radiotelephone control unit are set to the MON (monitor) or OFF position. The VOLUME control on the radio and telephone control panel is used to adjust the audio level of the signals heard in the headset or loudspeaker.

c. Operating position controls for telephone communications. The four telephone lines are routed through the two C-7732/TSQ-71B radiotelephone control units. Four three-position TELEPHONE TALK-OFF-RING switches control access to the telephone lines and the telephone ring-out function. To use a telephone line, place the TELEPHONE ON-OFF switch in the ON position and select a telephone line. For example, if telephone 1 is selected, place the three-position switch in the TALK position to the operator's audio to that line. Incoming audio on telephone line 1 will be present. Either or both operators may access any or all of the four telephone lines at any one time. The blue indicator lamp above the switch will glow when that line is in use. When the three-position switch is placed in the OFF position, an incoming ring will cause the blue indicator lamp associated with that particular telephone line to flash. In the RING (down) position, a ringing signal is applied to the desired telephone line.

NOTE: The two TA-312/PT telephone sets that are supplied with the shelter can be used either by themselves or tied into a central telephone system.

d. Intercom operation.

(1) Operator's intercom. Headset and microphone amplifiers are provided in both of the C-7732/TSQ-71B radiotelephone control units. The operators speak to each other by placing the push-to-talk INTERCOM switch in the TALK position.

(2) LS-567/TSQ-71B or LS-147 F/FI intercommunication station. A remote intercom station is provided with the AN/TSQ-71B. The remote intercom may be connected between the tower and the shelter intercom system through the INTERCOM line on the telephone entrance panel. The remote intercom uses a 60-cycle, 120-volt AC source located in the tower. When the MONITOR-TALK switch is in the MONITOR position, the intercom speaker functions as a speaker. When the MONITOR-TALK switch is in the TALK position, the intercom speaker functions as a microphone.

5. Perform Stopping Procedures.

a. Normal Stopping Procedure. Place all radio control switches on the C-7732/TSQ-71B radiotelephone control unit in the MON position. Place all radio ON/OFF switches in the OFF position. Place the controls and switches of the AN/TPN-18A radar set and the AN/TPX-44 interrogator set to the positions shown in Figures 5006-6 and 5006-7.

(1) Place the TRANSMITTER switch in the OFF position on both control indicators.

(2) Place the SCAN MODE switch in the SEARCH position on both indicators.

(3) Turn the FOCUS and INTENSITY switches counterclockwise (both indicators).

(4) Place the SCAN switch in the OFF position (both indicators).

(5) Place the FTC and STC switches in the OFF positions (both indicators).

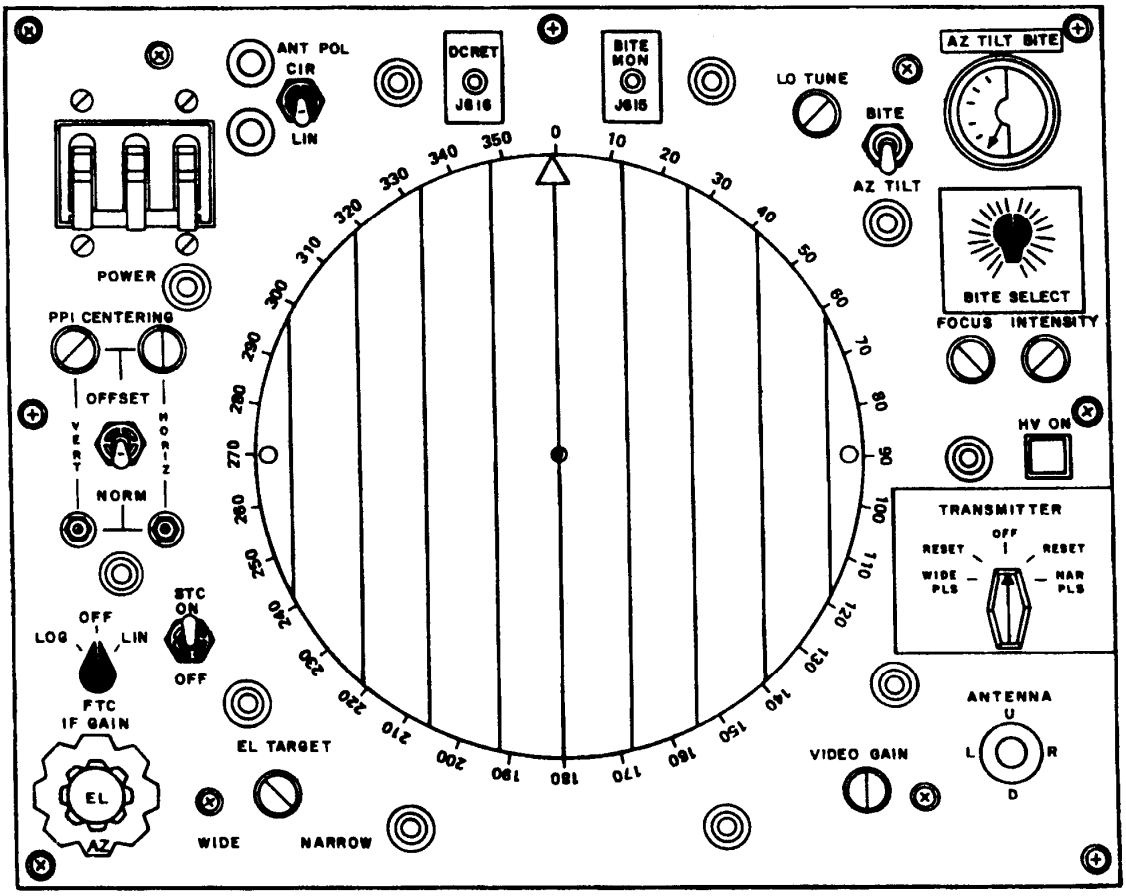


Figure 5006-6. C-6988A/TPN-18 control-indicators (front panel controls).

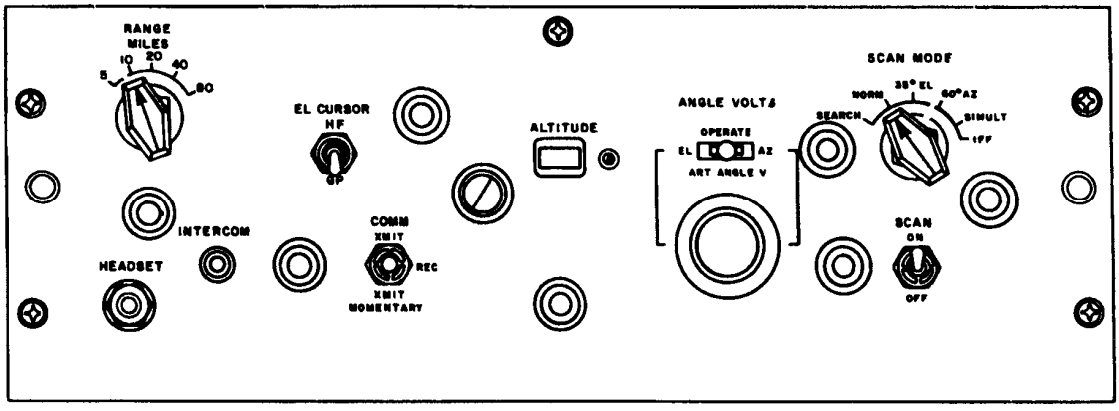


Figure 5006-7. O-1690/TPN-18 pulse generator panel controls and indicators.

(6) Place the following controls on the RT-1172/TPN-18 in the OFF position:
  (a) SCAN switch.
  (b) HV switch.
  (c) AC OUTLETS switch.
  (d) MAIN PWR switch.
(7) Place the MAIN POWER switch on the RT-820/TPX-44 receiver-transmitter in the OFF position.
(8) Place the KY-593/TPX video decoder MAIN POWER switch in the OFF position.
(9) Place the MX-7289/TPX interference blanker MAIN POWER switch in the OFF position.
(10) Place the KY-592/TPX-44 coder control MAIN POWER switch in the OFF position.
(11) Place the pulse modulator MAIN POWER switch in the OFF position.
(12) Place the IFF ANT OPERATE switch in the OFF position.
(13) Place the MAIN POWER switch on both indicators in the OFF position.
(14) Place all circuit breakers on the SB-3222/TSQ-71A power distribution panel in the OFF position. If shelter lighting is needed, the MAIN AC POWER and LIGHTS circuit breakers remain in the ON position.

NOTE: The FREQUENCY and AC VOLTAGE meters on the power panel assembly will still indicate the frequency and AC voltage because the power unit has not been shut down.

(15) After leaving the shelter, shut down the AN/MJQ-15 according to the turn-off procedures given in TM 5-6115-628-14&P.

b. Emergency Stopping Procedures. Placing the MAIN AC POWER circuit breaker on the SB-3222/TSQ-71A power distribution panel in the OFF position can shut down all equipment except the power unit. The power unit must be shut down separately.

6. Perform Operator Maintenance. Operator maintenance is performed on a monthly and quarterly basis. Keep in mind all warnings and cautions while performing PMCS for routine checks. Table 5006-4 provides a list of unit preventive maintenance checks and services. In the table, inspection intervals are checked either "M" for monthly or "Q" for quarterly.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment. Have the soldier perform the task in an actual setting or provide a training site.

Brief Soldier: Tell the soldier that he will be evaluated on operating the AN/TSQ-71B according to the appropriate TMs and unit SOP. Tell the soldier that he will not be informed of his progress during performance of the task except to prevent personnel injury or damage to the equipment.

Performance Measures	**GO**	**NO GO**
NOTE: Use TMs 5-6115-275-14; 11-5840-281-12-1; 11-5895-474-12, and the power source TM.		
1. Performs starting procedures.	____	____
2. Sets circuit breakers in priority order.	____	____
3. Turns on radar and IFF equipment.	____	____
4. Applies power to radar equipment.	____	____

Performance Measures	GO	NO GO
5. Turns on radios (UHF, VHF, FM).	___	___
6. Operates the radar set. a. Monthly. b. Quarterly.	___	___
7. Operates the radios.	___	___
8. Performs normal stopping procedures.	___	___
9. Performs emergency turnoff.	___	___
10. Performs preventive maintenance checks and services.	___	___
11. Cleans the equipment.	___	___
12. Performs operator troubleshooting.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
DA Form 2404	TM 11-5820-401-10-1
TM 11-5840-281-12	TM 11-5821-260-12
TM 11-5895-474-12	TM 11-5821-318-12
TM 5-6115-275-14	

Operate the Flight Coordination Central, AN/TSC-61B
011-143-5008

Conditions: You are a member of an ATC flight following team with an installed AN/TSC-61B and power source, cleaning equipment, and TM 11-5895-469-12.

Standards: Perform preliminary starting procedures, operate AN/TSC-61B, perform stopping procedures, and perform operator maintenance according to TM 11-5895-469-12.

Performance Steps

1. Perform Prestart Procedures. Preoperation of the FCC may be divided into three phases. These phases are preparation for daily operation, verification that the starting procedures have been accomplished, and verification that the console operating accessories are properly connected. Normal daily operation includes nonsecure radio preoperation and operation. Also during normal daily operations, the operator assuming his duties will perform the tasks described in the paragraphs that follow.
   a. Verify that the main power source is delivering the correct output to the system by ensuring that the PHASE SEQUENCE INDICATOR on the AC power distribution panel is lit and the AC VOLTS meter and frequency meter indicate 120 volts and 60 Hz respectively.

NOTE: If the system is in an operational status and the operator is merely assuming duties from another operator, omit the tasks in paragraphs b through e. If the system is in a nonoperational status, perform the tasks in paragraphs b through e.

   b. Verify that all operating accessories are properly connected for use at the operator consoles.
   c. Ensure that the clock indicates the correct time.
   d. Prepare the flight strip holders for the day's operation.
   e. Verify that the starting procedures have been performed and all radio channels are set at the frequency specified in the station frequency plan.
   f. Perform preliminary control adjustments (primary AC power application).
      (1) Set all circuit breakers in the AC power distribution panel and DC power distribution panel to OFF.
      (2) At the AC power distribution panel, use the VOLT/FREQ PHASE MONITOR to check the voltage and frequency of each phase of AC input power. The AC VOLT meter should indicate 120+ volts and the FREQUENCY meter should indicate 60 Hz + 2.
      (3) Set the MAIN circuit breaker to ON if the voltages and frequency are correct and the lamp is lit that indicates the phase sequence.
      (4) Set the remaining circuit breakers to ON, as required.
   g. Perform turn-on procedures (primary DC power application).
      (1) Check to ensure that the PS 1 and PS 2 circuit breakers in the AC power distribution panel are in the ON position.
      (2) At the power supply control, set the PSI-AUTO-PS2 switch to the position that corresponds to the power supply to be used. Either DC power supply can supply enough power to meet all the requirements of the FCC. However, both supplies normally are used and the switch should be set to AUTO.
      (3) Turn the DC power supply DC VOLTAGE ADJUST control to the extreme left (low output).

NOTE: The fan in the DC power supply must be at operating speed for the equipment to operate. Failure of the fan to obtain operating speed prevents the input voltage circuits from being completed.

(4) Press and hold the START button until the fan inside the equipment reaches operating speed. Note that the INPUTS green light (PS 1 and PS 2) glows. The green lights on both OUTPUTS should glow (DC distribution panel).
(5) Slowly turn the DC VOLTAGE ADJUST to the right (increased output) until the DC voltmeter on the front panel indicates 28.0 volts.
(6) To make the DC available to the radio sets and telephone junction box, set the appropriate circuit breaker of the DC distribution panel to ON.

h. Preoperational procedures.
(1) Before operating the radio equipment, check to ensure that all radio equipment power cables and signal cables are properly connected.
(2) Determine the frequency channels to be used for each radio set (UHF-1, UHF-2, UHF-3, VHF-1, and so on). Make a note of the frequency channel to be used with each radio control switch.
(3) Determine the area or zone of responsibility.
(4) Coordinate all HF radio and ground-to-ground communication facilities.
(5) Ensure that the map board is clean and ready to use.
(6) Ensure that the flight progress strip rack is ready to use.
(7) Press each call lamp on the control panels to ensure that it is operative. The lamp should light when the button is pressed.

2. Operate the AN/TSC-61B.

NOTE: Be sure that DC power is available to operate the radio sets.

a. Radio set operation. Energize the radio sets as described below. Check to ensure that all radio-audio panel switches are in the MON position (center) and the DC circuit breaker for the radio set to be used is in the ON position.
(1) UHF radio sets.

NOTE: The procedures in paragraphs (a) and (b) below must be done in the order listed if the squelch has not been adjusted.

(a) Preliminary adjustment of main receiver squelch. Set the function switch to MAIN and the MANUAL-PRESET-GUARD switch to MANUAL. Set the SQUELCH switch to ON. Turn the SQ-MN control counterclockwise until noise is heard. Turn the control clockwise just until the receiver is quiet; continue turning the control clockwise an additional one-eighth turn.
(b) Preliminary adjustment of guard receiver squelch. Set the function switch to BOTH and the MANUAL-PRESET-GUARD switch to MANUAL. (Main receiver SQUELCH must be in the ON position). Turn the SQ-GD control counterclockwise until noise is heard. Turn the control clockwise just until the receiver is quiet; continue turning the control clockwise an additional one-eighth turn.

NOTE: While operating on the main channel frequency, a separate guard channel receiver in the radio set continuously monitors the guard frequency. To energize the guard receiver, place the function switch to BOTH and the MANUAL-PRESET-GUARD switch to GUARD.

(c) Two-way voice communications (normal). For normal two-way voice communications, make the preliminary adjustments, as needed, and set the function selector switch to MAIN. Set the MANUAL-PRESET-GUARD switch for the desired method of frequency selection and adjust the selected frequency adjustment controls for the required operating frequency. Key the transmitter and tune the UHF bandpass filter to the operating frequency. Perform a talk test,

monitor the sidetone in the headset, and adjust the VOL control to a comfortable level.

NOTE: Use the VOL control on the radio-audio control panel to adjust the audio volume level on the headset-microphone.

(2) VHF radio sets.
   (a) Place the function selector switch in the T/R position.
   (b) Set the megacycle and kilocycle frequency selector switches to the assigned transmit/receive channel.
   (c) Key the transmitter and tune the VHF bandpass filter to the operating frequency.
   (d) Perform a talk test and adjust the audio control for a suitable sidetone level in the headset.

(3) FM radio sets.
   (a) Set the BAND switch to either the 30-52 or the 53-75 position depending on the frequency band to be used.
   (b) Set the MC-TUNE and KC-TUNE knobs to the desired frequency.
   (c) Set the SQUELCH control to the HOLD-ON position.
   (d) Set the SPEAKER switch to OFF.
   (e) Set the POWER switch to LOW or HIGH depending on whether the tactical situation calls for a 1- to 3-watt or a 35-watt transmitter output power.
   (f) If the voice security system is used, disconnect the P2 connector on the W309 cable from the J2 secure junction box connector. Connect the P3 cable connector of the W367 cable to the connector on the 1A73 secure junction box. The FM 3 switches on the radio control panels have no control functions. The KY-8 DC circuit breaker must be set to ON. Set the RECEIVERS 1 switch to ON and the transmit-interphone selector switch to position 1 on the secure control located in the control unit grouping on the radio equipment rack.
   (g) Set the VOLUME control as required, along with the VOL control on the radio control panel for FM 1 and FM 2. The FM 3 radio set can be monitored only at the special headset at the supervisor's console. The VOLUME control at the FM radio set and the VOL control at the secure control controls the volume at that headset.

(4) HF radio set.

NOTE: Three indicator lamps between the operator console positions indicate the operating status for the HF antenna coupler. The lamps (green, red, and yellow) are connected in parallel with the antenna coupler indicator lamps. The yellow lamp lights to show that the coupler is tuning. When the green lamp is lit, the radio set is ready to operate. When the red lamp is lit, the tuning system has not operated and transmission is not possible.

   (a) Depending on the desired mode of transmission, set the HF control unit mode selector switch to USB, LSB, or AM. Operating the mode selector switch in any position but OFF applies power to the radio set.
   (b) Set the frequency selector switches to the assigned HF transmit/receive channel.
   (c) Adjust the HF SENS knob until the background noise in the headset is barely audible.

b. Control position operation. After the modes of operation and communications channels are selected, all radio communication sets (except FM 3) may be operated from each of the three radio control panels when voice security connections are made.

(1) Monitoring. When there are no radio communications, the radio control switches may be set in the MON (center) or OFF (down) position. In the MON position, all incoming radio calls are heard in the headset-microphone and on the speaker/amplifiers. In addition, the incoming call causes the appropriate radio call lamp to flash, which shows the flight controller on which radio set the call is being received.

The MON position is used primarily during periods of light traffic when the flight operator is not necessarily seated at his position or is engaged in other duties. In the OFF position, an incoming call causes the call lamp to flash, which alerts the controller.

(2) Transmitting/receiving. To respond to an incoming call or to initiate a transmission, the operator sets the radio control panel switch beneath the flashing call lamp to the TALK (up) position. The operator then presses the footswitch, the push-to-talk button on the headset-microphone cord, or sets the KEY SW on the radio control panel in the up or down position. Placing the switch in the up position holds the transmitter energized. The KEY SW is spring-loaded in the down position and can be used as a conventional push-to-talk switch. Normal two-way push-to-talk radio communication is accomplished by releasing the key switch. The VOL control on the radio control panel is used to adjust the headset volume. The speaker volume control on the left side of the speaker/amplifier is used to adjust the volume.

c. Secure radio preoperating and operating procedures.

(1) Preoperating procedures. Before operating the KY-8 control, secure control, and FM 3, maintenance personnel must adjust the KY-8. A specially printed circuit card, PL-1208/VRC (APC), must be requisitioned and installed by maintenance personnel. This will ensure that unciphered (plain language) communications can be received on the FM 3 radio set even though the PLAIN-CIPHER switch on the KY-8 console is in the CIPHER position. For the best results in the cipher mode, the NORMAL/X-MODE switch on the inside of the FM 3 radio set should be in the X-MODE position.

NOTE: The FM 3 radio can be used to receive ciphered or unciphered messages in either the SQUELCH NEW (150H3) mode or the SQUELCH OLD (noise) mode.

(2) Unciphered operation.

(a) Set the PLAIN-CIPHER switch on the KY-8 control to PLAIN and observe that the PLAIN indicator illuminates.

(b) Set the secure control transmit-interphone selector switch to 1. When a call is received on the FM 3 radio set, the SECURE CALL indicator on the operator's console will light to alert the operator of an incoming call.

NOTE: Incoming signals can only be heard in the supervisor's headset that connects to the secure voice system junction box. Two other headsets are available at the position for operation with the other nine radio sets. These are connected to the supervisor's audio control panel located on the curbside wall. To call attention to an incoming call when the FM 3 radio headset is not worn, a SECURITY CALL INDICATOR lamp (amber) is provided.

(c) To transmit, depress the push button on the secure headset-microphone and speak into the microphone.

NOTE: If a ciphered message is received when the radio is set up for unciphered communication, a 1,200-Hz beep will be heard for approximately two seconds followed by a rushing noise that will last for the length of the message.

(3) Ciphered operation.

(a) Set the PLAIN-CIPHER switch on the KY-8 control to CIPHER and observe that the CIPHER indicator lights.

(b) Press the push-to-talk button on the headset-microphone cord and observe that a 1,200-Hz beep is heard for approximately two seconds. After the two-second period, normal sidetone should be heard. This indicates that the equipment is ready to operate.

NOTE: If fading occurs during ciphered transmission and the receiving station loses synchronization, the remainder of the message will not be received even though the signal comes in loud and clear for the rest of the message. To receive a complete message, the receiving station must remain synchronized during the entire transmission.

d. Telephone operation. Telephone circuits can be controlled with telephone control panels at any of the three operating positions. (Two are at the flight status console and one is at the supervisor's position.) The telephone circuits are controlled by 15 switches numbered 1 through 15. Note the organization to which each circuit is connected.
   (1) Preoperation control settings. When DC power is applied, 28 volts DC is available at the audio coupler, which enables various control circuits to operate. The following switches must be set before operation.
      (a) NIGHT ALARM switch. This switch is located on the right side of the audio coupler. When the NIGHT ALARM switch is in the ON (up) position, an incoming signal causes a buzzer to activate and the respective call lamp flashes. When the NIGHT ALARM switch is in the OFF (down) position, an incoming call causes only the call lamp to flash. The NIGHT ALARM switch is primarily used when the operators are away from their positions or engaged in other duties.
      (b) OPR AUDIO switch. This switch is located on the telephone key panel. When the OPR AUDIO switch is in the ON position, audio circuits are completed to the headset or headsets. When the OPR AUDIO switch is in the OFF position, no audio circuit can be completed through that key panel. The OFF position prevents ringing in the headset while other communications are underway, or it is used to hold a telephone line or conversation while a reply is made to a radio call.
      (c) A or A + B switch. This switch is located on the radio-audio control panel. When the switch is in the A position, one operator at the position has full control of the radio and telephone. In the A + B position, the A operator controls radio communications only, and the B operator controls telephone communications.

NOTE: During extremely heavy traffic, the latter situation can exist at each of the three radio-telephone operating conditions.

      (d) Telephone key switches. These switches should be set to the OFF position and can be checked by pressing each lamp. Each lamp should light when pressed.
   (2) Receiving and transmitting operations.
      (a) When an incoming call is indicated either by the buzzer or by a flashing call lamp, set the corresponding telephone key switch to TALK. (The OPR AUDIO switch must be in the ON position.) A two-way conversation can be held with no further switch operation. When the call is over, set the key switch to OFF.
      (b) To place a call, place the TALK-OFF-RING telephone key switch in the RING position. When released, the switch will spring back to the center position. When the party called answers the telephone call, place the switch in the TALK position. When the call is over, place the switch in the OFF position.

3. Perform Stopping Procedures.
   a. Telephone equipment. To shut down the telephone system, set all telephone key switches to the center (OFF) position. If monitoring identification is desired while personnel are away from their positions, set the NIGHT ALARM switch on the audio coupler box to the ON (up) position.
   b. Radio equipment. One way to stop the radio equipment is to set the radio circuit breakers to OFF. The radios also can be turned off using the front panel controls (FM), or they may be turned off from their control units (UHF, VHF, and HF radios) as described below.
      (1) UHF radio sets—set the function select switch to OFF.
      (2) VHF radio sets—set the POWER switch to OFF.
      (3) FM radio sets—set the POWER switch to OFF.

(4) HF radio sets—set the mode selector switch to OFF.
(5) Secure control unit and TSEC/KY-8 equipment—set the KY-8 circuit breaker to OFF.

c. DC Power Source. Press the STOP (red) button on the front panel of the DC power supply. All indicator lights on the front panel of the DC power supply control box should extinguish.
d. Shelter. To shut off shelter power, place all circuit breakers in the AC power distribution panel in the OFF position. Shut down the gasoline-engine-driven power supply and disconnect the power plug from the shelter.

4. Perform Preventive Maintenance Checks and Services. To ensure that the equipment is available and ready for operation, preventive maintenance checks and services must be performed (Table 5008-1). The equipment should be checked and serviced before operation. If a defect is noted, refer the deficiency to higher maintenance. Records and reports of these checks must be made according to DA Pamphlet 738-750.

Table 5008-1. Preventive maintenance checks and services.

Item	Interval	Item Inspected/Procedure	Equipment is not ready/available if:
1	a	Grounding system. Check grounding system to see that it is properly installed.	Grounding system improperly installed.
2	*	AN/ARC-115A Radio Set. Perform PMCS checks as described in TM 11-5821-260-12.	Failure of final system performance check.
3	*	AN/ARC-102 Radio Set. Perform PMCS checks as described in TM 11-5821-248-12.	Failure of final system performance check.
4	*	AN/VRC-46 Radio Set. Perform PMCS checks as described in TM 11-5821-311-12.	Failure of final system performance check.
5	*	RT-1167/ARC-164 Radio Receiver-Transmitter. Perform PMCS checks as described in TM 11-5821-311-12.	Failure of final system performance check.
6	a	Radio set antenna system. Check after lightning storm.	Damaged due to lightning.
7	*	C-8156/ARC (TSEC/KY-8) Control. Perform PMCS checks.	Failure of final system performance check.
8	*	C-1611D/AIC Control Intercommunications Set. Perform PMCS checks.	Failure of final system performance check.
9	a	Final systems performance check. Perform operational checks.	Failure of final systems performance checks.

Legend:

a = Perform PMCS after deployment, before operation, and as required.
* = Perform PMCS before deployment to detect and correct problems before the mission begins.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment. Have the soldier perform the task in an actual setting or provide a training site.

Brief Soldier: Tell the soldier that he will be evaluated on operating the AN/TSC-61B according to the appropriate TMs and unit SOP. Tell the soldier that he will not be informed of his progress during performance of the task except to prevent personnel injury or damage to the equipment.

Performance Measures	**GO**	**NO GO**
NOTE: Applicable performance measures are determined by local conditions, mission requirements, and assigned equipment. Use TM 11-5895-469-12 and the power source TM.		
1. Sets preliminary controls.	____	____
2. Performs preoperational checks.	____	____
3. Performs turn-on procedures.	____	____
4. Operates the equipment.	____	____
5. Performs stopping procedures.	____	____
6. Performs operator preventive maintenance checks and services.	____	____
7. Cleans the equipment.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
DA Form 2404	TM 11-5821-248-12
TM 11-5895-469-12	TM 11-5821-260-12
	TM 11-5821-311-12

Operate Radar Set, AN/FPN-40
011-143-5014

Conditions: You are assigned as a radar controller with an AN/FPN-40 radar set, which has been installed and aligned, a soft bristle brush, cleaning compound, lint free cloth, and TM 11-5840-293-12.

Standards: Set controls, perform adjustments, operate equipment, and perform preventive maintenance on the AN/FPN-40 according to TM 11-5840-293-12.

Performance Steps

1. Perform Startup Procedures.

NOTE: Do not perform the startup procedure until organizational maintenance prepares the radar set for operation.

a. Place the SCAN ON/OFF switch in the ON position.
b. Rotate the INTENSITY adjustment control clockwise until the rotating sweep is barely visible.
c. Push the HV RESET switch to reset.
d. Rotate the RANGE MARK GAIN control to the desired level.
e. Rotate the IF GAIN EL control and the IF GAIN AZ control clockwise until video appears on the CRT.
f. Rotate the FOCUS adjustment control to obtain clearly defined range marks on the CRT.

NOTE: Figure 5014-1 shows the control-indicator power distribution panel; Figure 5014-2 shows the azimuth-elevation range indicator; Figure 5014-3 shows the synchronizer-generator electronic marker; Figure 5014-4 shows the radar control set; Figure 5014-5 shows the navigational computer.

2. Operate the AN/FPN-40 Radar Set. Under normal conditions, the operator establishes radio communications with the pilot. The operator uses the surveillance (search) mode to obtain IFF information and directs the pilot into position for a proper GCA landing. When the aircraft is approximately 6 to 8 miles (11.1 to 15 kilometers) from touchdown, the operator switches from the surveillance (search) mode to the final approach (precision) mode. During the final approach (precision) mode, the operator uses radio communications to guide the aircraft along the correct courseline and glide path to the touchdown.
   a. Surveillance (search) mode. Azimuth bearing generally designates runway numbers. Position the mount so that the azimuth strobe bearing on the compass rose ring corresponds to the reciprocal of the runway number. For example, runway 18 would have an azimuth bearing of 180 degrees. Therefore, the mount strobe intersects the compass rose at 360 degrees. When the radar set is situated left of the runway, as viewed by the pilot of an approaching aircraft, the azimuth cursor will curve upward. When the radar set is situated right of the runway, the azimuth cursor will curve downward on the azimuth portion of the beta display (Figure 5014-6).
      (1) Place the SURVEILLANCE-FINAL APPROACH-HEIGHT FINDER switch in the SURVEILLANCE position (Figure 5014-4).
      (2) Use the CURSOR SELECT switch to select the runway (and corresponding cursor) to be used for final approach (precision) landings (Figure 5014-5).

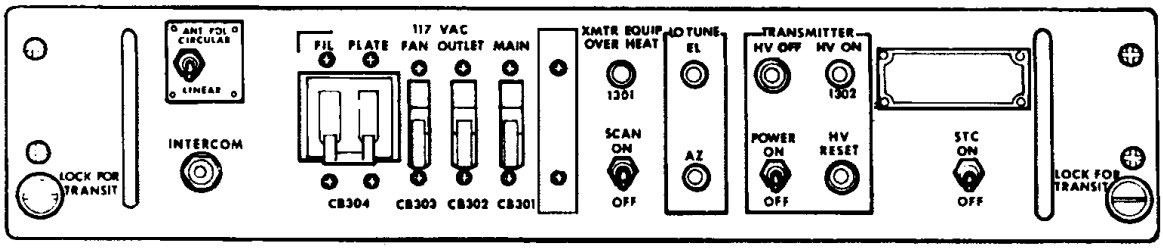


Figure 5014-1. Control-indicator power distribution panel.

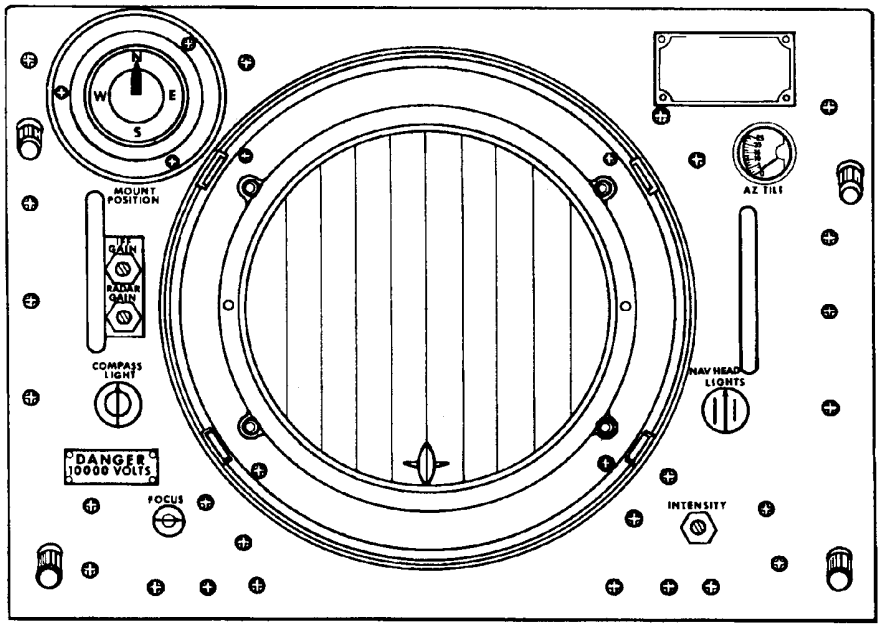


Figure 5014-2. Azimuth-elevation range indicator.

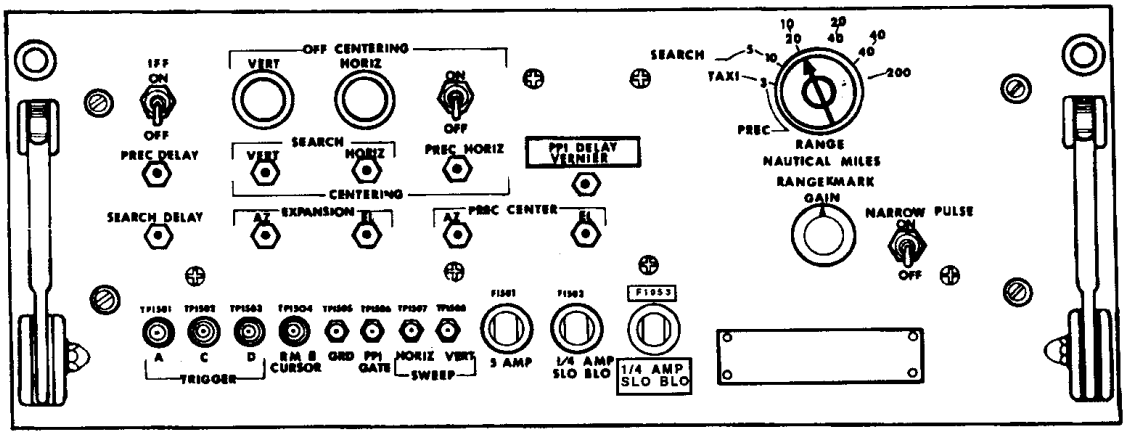


Figure 5014-3. Synchronizer-generator electronic marker.

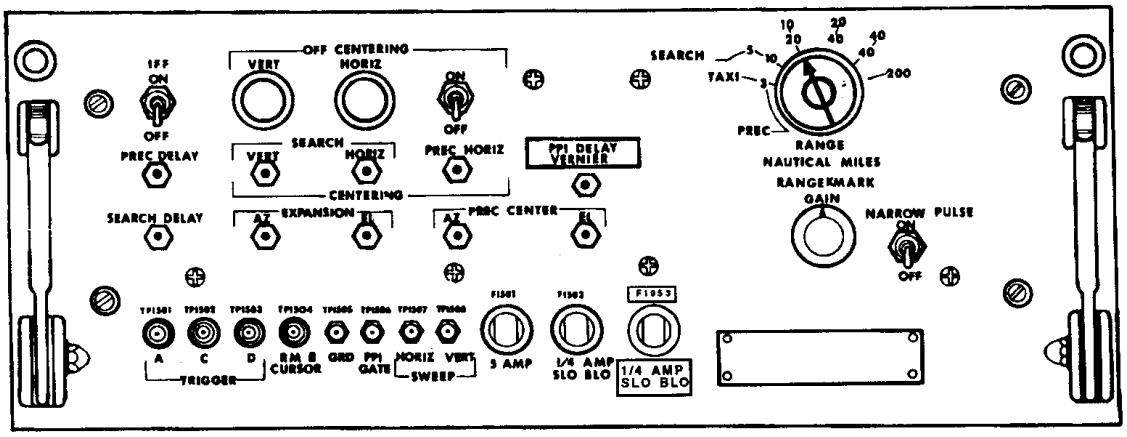


Figure 5014-4. Radar control set.

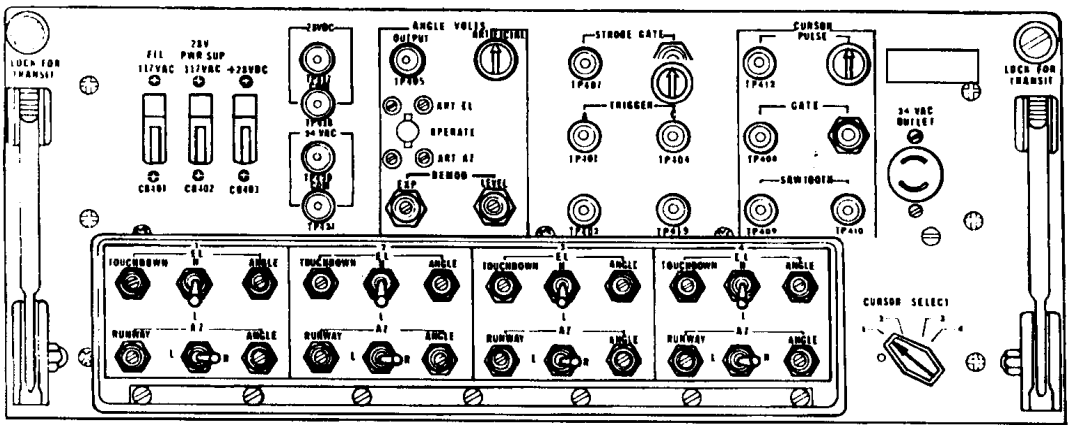


Figure 5014-5. Navigational computer.

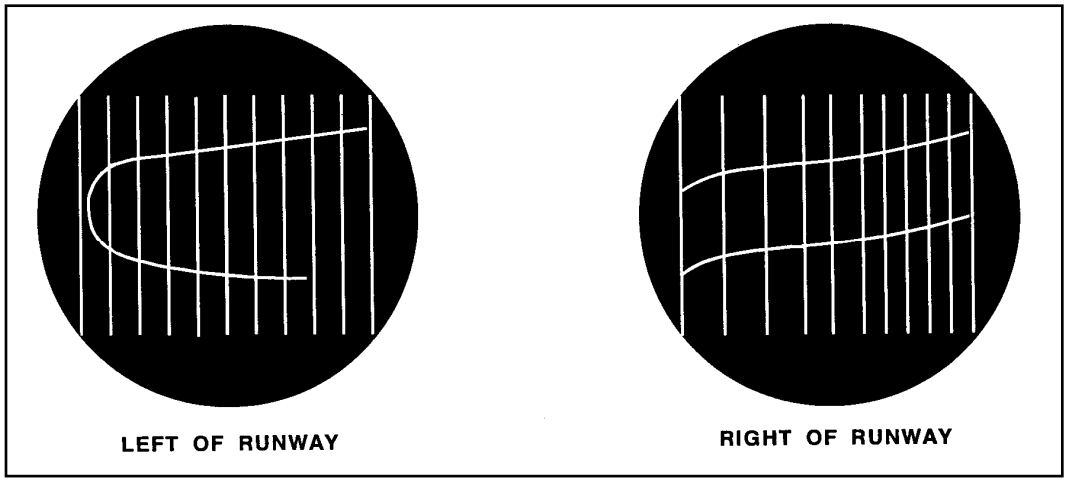


Figure 5014-6. Radar set left and right of runway.

(3) Use the MOUNT POS CCW/CW switch to align the mount strobe with the runway selected in step (2) (Figure 5014-4).
(4) Use the AZANT UP/DOWN control, as necessary, to tilt the azimuth antenna for optimum returns from the radar target (Figure 5014-4).
(5) Place the FTC ON/OFF switch in the ON position to reduce heavy video clutter (Figure 5014-4).
(6) Position the RANGE NAUTICAL MILES switch to the desired range (Figure 5014-3).
(7) Adjust the RANGE MARK GAIN control until the range marks are clearly defined on the CRT (Figure 5014-3).

NOTE: The geographic location of the airfield may make offsetting the ppi display during the surveillance (search) mode of operation desirable. If so, perform steps (8), (9), and (10). If not, go to step (11).

(8) Place the OFF-CENTERING ON/OFF switch in the ON position to off-center the search display (Figure 5014-3).
(9) Adjust the OFF-CENTERING HORIZ control to position the display horizontally (Figure 5014-3).
(10) Adjust the OFF-CENTERING VERT control to position the display vertically (Figure 5014-3).
(11) When the aircraft is at a shorter range or low altitude, target definition can be improved by placing the NARROW PULSE ON/OFF switch in the ON position. Some loss of return signal strength, especially at long ranges, will occur (Figure 5014-3).
(12) Place the STC ON/OFF switch in the ON position to decrease the gain automatically as radar range decreases (Figure 5014-1).
(13) When rain, sleet, or snow clutter the CRT display, the resolution may be improved by placing the ANT POL CIRCULAR/LINEAR switch in the CIRCULAR position. Some loss of return signal strength, especially at long ranges, will occur (Figure 5014-1).
(14) Adjust the INTENSITY control and FOCUS switches to ensure optimum definition on the CRT (Figure 5014-2).

b. Final approach (precision) mode. Azimuth bearing generally designates runway numbers. Position the strobe so that the azimuth bearing on the compass rose ring corresponds to the reciprocal of the runway number. For example, runway 18 would have an azimuth bearing of 180 degrees. Therefore, the mount strobe would intersect the compass rose at 360 degrees.
(1) Place the SURVEILLANCE-FINAL APPROACH-HEIGHT FINDER switch in the FINAL APPROACH position (Figure 5014-4).
(2) Place the HEIGHT FINDER-GLIDE PATH switch in the GLIDE PATH position (Figure 5014-4).
(3) Use the CURSOR SELECT switch to choose the runway (and corresponding cursor) to be used for the final (precision) approach mode (Figure 5014-5).
(4) Use the MOUNT POS CCW/CW switch to align the mount strobe to the runway selected in step (3) (Figure 5014-4).
(5) Use the AZANT UP/DOWN switch and the EL ANT LEFT/RIGHT switch to tilt the azimuth and elevation antennas for optimum returns from the radar target (Figure 5014-4). Observe the azimuth strobe on the elevation display and the elevation strobe on the azimuth display to determine the relative positions of antennas.
(6) Place the FTC ON/OFF switch in the ON position to reduce heavy video clutter (Figure 5014-4).
(7) Adjust the IF GAIN AZ and EL controls until the desired aircraft can be seen (Figure 5014-4).

(8) Place the STC ON/OFF switch in the ON position to decrease gain automatically as the radar range decreases (Figure 5014-1).
(9) Adjust the LO TUNE AZ and EL controls to obtain the maximum return signal on the CRT (Figure 5014-1).
(10) When rain, sleet, or snow clutter the CRT display, the resolution may be improved by placing the ANT POL CIRCULAR/LINEAR switch in the CIRCULAR position. Some loss of return strength, especially at long ranges, will occur (Figure 5014-1).
(11) Position the RANGE NAUTICAL MILES switch to the desired range (Figure 5014-3).
(12) When the aircraft is at a shorter range or low altitude, target definition can be improved by placing the NARROW PULSE ON/OFF switch in the ON position. Some loss of return signal strength, especially at long ranges, will occur (Figure 5014-3).
(13) Adjust the INTENSITY control and the FOCUS control to ensure optimum definition on the CRT (Figure 5014-3).

c. Taxi mode. Operating the radar set in the taxi mode is similar to operating it in the surveillance (search) mode.
(1) Place the SURVEILLANCE-FINAL APPROACH-HEIGHT FINDER switch in the SURVEILLANCE position (Figure 5014-4).
(2) Place the RANGE NAUTICAL MILES switch in the TAXI position. This produces a 360-degree ppi display which shows runways, taxiways, base legs, buildings, and so on in the landing field (Figure 5014-3).

NOTE: Operations in the taxi mode automatically place the radar set in short pulse operation. Placing the NARROW PULSE switch in the OFF position has no effect.

(3) Adjust the INTENSITY control and the FOCUS control to ensure optimum definition on the CRT (Figure 5014-2).

d. Height finder mode. The height finder mode allows the operator to determine the height of the aircraft within a 20-mile (37-kilometer) range. If the radar set is operated in the surveillance (search) mode before it is operated in the height finder mode, perform steps (1) through (10). If operating in the final approach (precision) mode and the target is identified on the elevation display, proceed to step (3). When the radar set is situated left of the runway, as viewed by the pilot of an approaching aircraft, the azimuth cursor will curve upward. When the radar set is situated right of the runway, the azimuth cursor will curve downward on the azimuth portion of the beta display (Figure 5014-6).
(1) Determine if the radar target is within 30 degrees of the mount strobe on the CRT. If it is not within 30 degrees, place the MOUNT POS CCW/CW switch in the CW or CCW position, as required, to bring the radar target within the sector (Figure 5014-4).
(2) Depress the EL STROBE push button switch (Figure 5014-4).
(3) Adjust the EL ANT UP/DOWN control, as necessary, to position the elevation strobe so that it intersects the radar target (Figure 5014-4).
(4) Note the range of the target on the ppi display and place the SURVEILLANCE-FINAL APPROACH-HEIGHT FINDER switch in the HEIGHT FINDER position (Figure 5014-4).
(5) Place the HEIGHT FINDER-GLIDE PATH switch in the HEIGHT FINDER position (Figure 5014-4).

NOTE: If the SURVEILLANCE-FINDER APPROACH-HEIGHT FINDER switch is in the HEIGHT FINDER position, the right-hand height finder indicator will light and the cursor can be adjusted to determine the altitude of a target up to 50,000 feet (15,250 meters). If the SURVEILLANCE-FINAL APPROACH-HEIGHT FINDER switch is in the FINAL APPROACH position, the left-hand height finder indicator will light up and the cursor can be adjusted to determine the altitude of a target up to 5,000 feet (1,525 meters).

(6) Adjust the HEIGHT FINDER control until the cursor on the elevation display on the CRT intersects the radar target (Figure 5014-4).
(7) Read the height of the aircraft on the appropriate height-finder indicator (Figure 5014-4).
(8) Place the STC ON/OFF switch in the ON position to decrease gain automatically as the radar range decreases (Figure 5014-4).
(9) When rain, sleet, or snow clutter the CRT display, the resolution in the height finder mode may be improved by placing the ANT POL CIRCULAR/LINEAR switch in the CIRCULAR position. Some loss of return signal strength, especially at long ranges, will occur (Figure 5014-1).
(10) When the aircraft is at a shorter range or low altitude, target definition can be improved by placing the NARROW PULSE ON/OFF switch in the ON position (Figure 5014-3). Some loss of return signal strength, especially at long ranges, will occur.
(11) Adjust the INTENSITY control and FOCUS control to ensure optimum definition on the CRT (Figure 5014-2).

e. IFF mode.
(1) Place the IFF ON/OFF switch in the ON position (Figure 5014-3).
(2) Adjust the IFF GAIN control to control the gain of incoming IFF signals (Figure 5014-2).
(3) Adjust the INTENSITY control and FOCUS control to ensure optimum definition on the CRT (Figure 5014-2).

3. Place the AN/FPN-40 in the Standby Mode. The operator places the AN/FPN-40 in the standby mode when the radar set must be out of operation for a short period.
a. Push the TRANSMITTER HV OFF switch (Figure 5014-1).
b. Rotate the IF GAIN AZ control and IF GAIN EL control counterclockwise to stop (Figure 5014-4).
c. Rotate the RANGE MARK GAIN control counterclockwise to stop (Figure 5014-3).
d. Rotate the INTENSITY adjustment control counterclockwise to stop (Figure 5014-2).
e. Place the SCAN ON-OFF switch in the OFF position (Figure 5014-1).

4. Perform Operator Preventive Maintenance (Table 5014-1).
a. The radar set must be inspected at definite intervals to ensure that it is always ready to use. Defects must be found and corrected before they result in serious damage or failure.
b. PMCS are required to keep the equipment in good operating condition. They include before operation (B), during operation (D), and weekly (W) checks.
c. Always perform the before operation, during operation, and weekly checks if you are the assigned operator and have not operated the equipment since the last weekly check or you are operating the equipment for the first time. Do not assume that the checks and services have been done.
d. If the equipment fails to operate, refer to the operator's troubleshooting procedures. Use DA Pamphlet 738-750 as a guide for reporting problems and using the required forms.
e. Routine checks, such as inventorying the equipment; cleaning the components; checking for frayed and damaged cables; storing items not in use; checking for loose hardware, nuts, bolts, and screws; and checking for corrosion on receptacles and connectors, are not listed in the PMCS. As a matter of good preventive maintenance, these checks should be completed anytime they are needed. If you find a routine check in the PMCS, other operators have reported problems with the item.

f. Use the number in the item number column in the PMCS for the TM number column on DA Form 2404.
g. The item to be inspected/procedure column lists portions of the equipment to be inspected and contains a brief description of the procedures to be followed to check the equipment.
h. The equipment is not ready/available if the column contains criteria that will cause the inspected portion of the equipment to be classified not ready or available for use.

NOTE: Keep in mind all *WARNINGS* and *CAUTIONS* while performing PMCS or any routine checks.

Table 5014-1. Preventive maintenance checks and services.

Item	Interval B D W	Item Inspected/Procedure	Equipment is not ready/available if:
		RADAR SET GROUP	
1	X	Earth Anchors Check to ensure that the radar set group is firmly secured with earth anchors and a hold-down assembly.	The earth anchors and hold-down assembly are not secured. Refer to higher maintenance.
2	X	Spirit Levels Check to ensure that the two spirit levels on top of the central antenna pedestal subassembly indicate a level position.	The radar set group is not level. Refer to higher maintenance.
3	X	Waveguides Ensure that the waveguides are not dented or damaged. Manually rotate the azimuth and elevation antennas through their respective scans. Ensure that the waveguides clear the antenna pedestal subassemblies.	The waveguides are dented, damaged, or do not clear the antenna pedestal subassemblies when manually rotated. Refer to higher maintenance.
4	X	Waveguide Connections Check to ensure that all of the quick disconnects that join the waveguides are properly seated.	The waveguide connections are not properly seated and/or secure.
		ANTENNA GROUP	
5	X	Self-Locking Pins Check the self-locking pins that secure the antenna pedestal subassemblies to the antennas; check the tilt actuators for proper installation and security.	The self-locking pins are not properly secured and/or installed.
		RECEIVER-TRANSMITTER GROUP	
6	X	Output Voltages Place the METER switch to -800V, -210V, +105V, and +300V (in turn) on the receiver-transmitter power supply.	The meter needle is not in the green zone for each position of the METER switch. Refer to higher maintenance.

Table 5014-1. Preventive maintenance checks and services (concluded).

Item	Interval B	D	W	Item Inspected/Procedure	Equipment is not ready/available if:
7	X			High-Voltage Interlocks Ensure that the components in the receiver-transmitter group are properly secured in the receiver-transmitter group electrical equipment cabinet so that the high-voltage interlocks are enabled.	Components are not properly secured in the receiver-transmitter group electrical equipment cabinet.
				CONTROL-INDICATOR GROUP	
8	X			High-Voltage Interlocks Ensure that the components in the control-indicator group are properly secured in the control-indicator group electrical equipment cabinet so that the high-voltage interlocks are enabled.	Components are not properly secured.
9		X		CRT Display Using the radar return with a known azimuth bearing, check the ppi orientation of the video display to the compass rose ring.	The radar return is not properly oriented on the ppi display. Refer to higher maintenance.
10		X		Fuses Check to ensure that the fuses are not blown. (The cap does not glow during operation.)	Fuses are blown.
				CONTROL-INDICATOR POWER SUPPLY GROUP	
11		X		Output Voltages Place the METER SELECT switch to -210V, +300V COMPUTER, and +300V (in turn) on the control-indicator power supply.	The meter needle is not in the green zone for each position of the METER SELECT switch. Refer to higher maintenance.
12		X		Fuses Check to ensure that the fuses are not blown. (The cap does not glow during operation.)	Fuses are blown.
				RADAR SET	
13		X		Operational Checks Perform daily operational checks.	The correct results are not obtained. Refer to higher maintenance.

Evaluation Preparation: Setup: This task may be evaluated using an operational AN/FPN-40.

Brief Soldier: Tell the soldier he will be evaluated on his ability to operate the AN/FPN-40 Radar Set.

Performance Measures **NOTE:** Applicable performance measures are determined by local conditions, mission requirements, and assigned equipment. Use TM 11-5840-293-12.	**GO**	**NO GO**
1. Sets preliminary controls.	____	____
2. Performs turn-on procedures.	____	____
3. Performs the operator tune-up.	____	____

Performance Measures	GO	NO GO
4. Operates the AN/FPN-40 radar set.	___	___
5. Performs stopping procedures.	___	___
6. Performs operator preventive maintenance checks and services.	___	___
7. Cleans the equipment.	___	___
8. Conducts visual inspections.	___	___
9. Performs operator troubleshooting.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
DA Form 2404	None
TM 11-5840-293-12	

Operate Beacon Set, AN/TRN-30 (V) 1 or AN/TRN-30 (V) 2
011-143-5051

Conditions: You are a member of an ATC team with an operational AN/TRN-30 (V)1 or AN/TRN-30 (V) 2 beacon, TM 11-5825-255-12, power source and TM for power source.

Standards: Perform preliminary start-up, starting, and operator maintenance procedures on the AN/TRN-30 (V)1 or AN/TRN-30 (V)2 beacon according to TM 11-5825-255-12 and power source TM.

Performance Steps

1. Performs Preliminary Starting Procedures.

   CONDITION: Beacon set is installed.

2. *****Performs Starting Procedures.

   CONDITION: Preliminary starting procedures are complete.

***NOTE:** CURRENT GENERATOR OPERATORS LICENSE IS REQUIRED TO OPERATE GENERATOR.

WARNING
Do not touch the antenna when power is applied.
Death or serious injury can result.

3. Performs Operator Maintenance.

   CONDITION: Operational AN/TRN-30 (V)1 or (V)2 beacon set.

Evaluation Preparation: Setup: This task may be evaluated using an operational Beacon Set, AN/TRN-30 (V) 1 or (V) 2.

Brief Soldier: Tell the soldier he will be evaluated on his ability to operate the AN/TRN-30 (V) 1 or (V) 2 Beacon Set.

Performance Measures	**GO**	**NO GO**
Controls are set prior to performing starting procedures. Starting procedures are performed, operator maintenance performed, all according to TM 11-5825-255-12 and TM for power source.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
DA Form 2404	None
TM 11-5825-255-12	

Operate the AN/TSQ-198 (Tactical Terminal Control System)
011-143-7004

Conditions: As an ATC tower operator in a field environment, you are given a AN/TSQ -198 TTCS and TM 11-5895-1568-14. You are a member of a tactical air traffic control team and a request for ATC support.

Standards: Operate the AN/TSQ-198 TTCS according to TM 11-5895-1568-14.

Performance Steps

1. Use the Meteorological Measuring System.
2. Perform Continuous Operations.
   a. Establish operations net.
   b. Initiate secure TOD procedures.
   c. Test reliability of frequency skip systems.
   d. Establish landing areas.
   e. Initiate recovery procedures.

   CONDITION: Complete starting and checkout procedures, operate AN/TSQ-198 and provide air traffic services.
3. Operate Under Unusual Conditions.
   a. Antijamming.
   b. High humidity.

   CONDITION: The AN/TSQ-198 is fully operational and affected by unusual circumstances.
4. Perform Operator Maintenance.

   CONDITION: Before, during, and after operating the AN/TSQ-198.

Evaluation Preparation: Setup: This task may be evaluated using an operational AN/TSQ-198 TTCS.

Brief Soldier: Tell the soldier he will be evaluated on his ability to operate the AN/TSQ-198 TTCS.

Performance Measures	GO	NO GO
Properly set switches and dials prior to operating the AN/TSQ-198. When AN/TSQ-198 is subject to jamming use antijamming procedures. When high humidity is encountered and the AN/TSQ-198 is operated according to TM 11-5825-1568-14.	___	___
a. Use the meteorological measuring system.		
b. Perform continuous operations.		

Performance Measures **GO** **NO GO**

c. Operate under unusual conditions.
d. Perform operator maintenance.

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
TM 11-5895-1568-14	None
DA Form 2404	

SUBJECT AREA 4: PREPARATION OF ATC EQUIPMENT FOR MOVEMENT

Prepare the Landing Control Central, AN/TSQ-71B, for Movement
011-143-0002

Conditions: While working in a tactical environment as a member of a GCA team you are given movement orders, an assembled AN/TSQ-71B, and a generator set.

Standards: Disassemble the landing control central and generator set and prepare them for movement according to TMs 11-5840-281-12-1 and 11-5895-474-12.

Performance Steps

1. Disconnect and Store the Equipment. The headset-microphone assemblies and the footswitches are disconnected for limited storage or transit. All other interconnected equipment in the shelter remains connected. The radar and IFF equipment outside the shelter must be disassembled and stored on the radar trailer or on the transit skid. The transit skid is secured on rails inside the shelter during storage or transit. The radio antennas and lead-ins must be disassembled and stored on the transit skid. Under ideal conditions, disassembling and storing the equipment should take 10 man-hours (using no less than four men). Figure 0002-1 shows the suggested sequence for disassembling and storing the equipment.

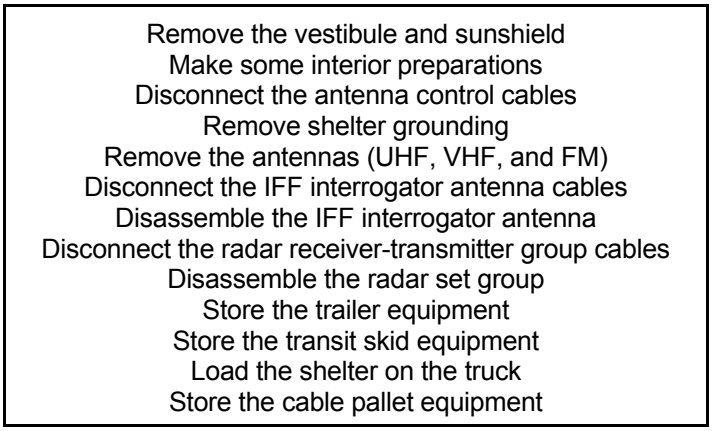


Figure 0002-1. Disassembly sequence.

NOTE: In preparation for packing, place the transit skid (with the upper pallet separated from the transit skid) in a convenient place near the shelter door.

a. Perform normal stopping procedures. Return each C-7732/TSQ-71A to its stored position by releasing the locking detents on both sides and sliding the unit forward until it locks into the stored position.

NOTE: Notify the appropriate security personnel when movement or preparation for movement of secure voice crypto equipment is planned.

b. Remove the vestibule from the rear of the shelter. Fold the vestibule canvas and place it near the transit skid. Put the two vestibule poles and the two 6-foot lengths of rope in bag 6 and place the bag near the transit skid.

c. Remove the sunshield from the shelter roof. Fold the sunshield and place it and the 30-foot rope near the transit skid.
d. Remove the folding chairs from the shelter and place them near the transit skid.
e. Place the front covers on each of the C-6988A/TPN-18 control-indicators. Close all shelter ports (fan, air conditioners, and C-6988A/TPN-18).
f. Attach the transit skid rails to the floor of the shelter. Do not install the two transit skid retaining blocks until the transit skid is stored in the shelter. Ensure that the fire extinguisher, sledgehammer, and pickax are secured properly in their retaining brackets on the shelter curbside wall.
g. Disconnect the FM antenna control cables and the FM coaxial (RF) cables from the MX-6707/VRC antenna matching bases and the J9007 through J9010 connectors at the radar, FM, and UVU entrance panel. Coil the cables and store them in bag 13.
h. Disconnect the VHF coaxial (RF) cables from the VUV and UVU antenna bases. Disconnect the W40003 and W40004 VHF coaxial cables from the J9014 and J9015 connectors on the IFF and VUV entrance panel. Disconnect the W40005 VHF coaxial cable from the J9013 connector on the radar, FM, and UVU entrance panel. Coil the three coaxial cables and store them in bag 13.
i. Disconnect the UHF coaxial (RF) cables from the VUV and UVU antenna bases. Disconnect the 3010 and 3011 UHF coaxial cables from the J9011 and J9012 connectors on the radar, FM, and UVU entrance panel. Disconnect the W3012 UHF coaxial cable from the J9016 connector on the IFF and VUV entrance panel. Coil the three coaxial cables and store them in bag 13.
j. Disconnect the W7006 grounding cable from the E9023 ground at the power entrance panel and grounding rod. Coil the cable and store it in bag 13. Remove the grounding rod and place it near the radar trailer.
k. From the shelter roof, remove the AS-1730/VRC FM antenna element from the MX-6707/VRC antenna matching base. Separate both the AT-1095/VRC and the AS-1730/VRC antenna elements. Store them in bag 7. Remove the FM antenna mounting brackets, and place them beside the transit skid. Remove the FM antenna lower mast (curbside), and place it beside the transit skid.
l. From the shelter roof, loosen the antenna mounting clamp on the VUV antenna, and remove the VUV antenna from the antenna mounting bracket. Unscrew the threaded collar, and separate the upper and lower elements. Remove the threaded collar from the upper element, and screw it onto the lower element. Place the upper element beside the transit skid. Place the lower element beside the radar trailer. Remove the VUV antenna mounting bracket and place it beside the transit skid.
m. From the shelter roof, loosen the antenna mounting clamp on the UVU antenna and remove the UVU antenna from the lower mast. Loosen the wing nut and remove the lower mast. Place the UVU antenna beside the radar trailer. The UVU antenna lower mast with the adapter attached is stored in bag 6.
n. Disconnect the IFF, RF, and control cables at the drive assembly and disassemble the IFF interrogator antenna as described below.

CAUTION

During disassembly, hold the antenna in an upright position until it can be lowered to the ground.

(1) Place the IFF antenna storage cover over the front of the antenna and strap the cover in place.
(2) Remove the two staking pins at the base and the three guy cables which hold the antenna upright. Place the guy cables in the canvas storage bag for storage on the rear of the radar trailer bed.
(3) Lower the antenna to the ground. Rest the antenna on the storage cover.
(4) Remove the backfill antenna and place it near the radar trailer.
(5) Unbolt the antenna from the antenna drive assembly and place the antenna near the transit skid. Place the antenna mast and drive near the radar trailer.

o. Disassemble the radar receiver-transmitter group as described below.
(1) Disconnect cables W3001 through W3005 from the receiver-transmitter connectors J101 through J104, the junction box connectors P9601 and P9602, and the shelter connectors P601 through P604. Place the cables at the cable pallet and the junction box at the transit skid.
(2) At the TG-230()/TPN-18, disconnect the W9101-1 cable from the azimuth antenna tilt actuator and the W9301 cable from the azimuth polarizer horn assembly. At the TB-231()/TPN-18, disconnect the W9101-2 cable from the elevation servo actuator and the W9201 cable from the elevation polarizer and horn assembly.

NOTE: The elevation servo actuator remains installed on the elevation reflector and yoke assembly. Both actuators must be fully retracted for proper storage. When removing the waveguide for storage, ensure that an O-ring remains in the choke joint of the waveguide. Also ensure that the covers are installed at the choke joint, the flange ends of each section of the waveguide, and the waveguide openings on the receiver-transmitter. The pads for the waveguide storage are constructed to fit the waveguide to be stored. The pads are in the waveguide storage box located on the radar trailer (roadside rear).

(3) Remove and store the waveguide as described below.
(a) Store the two flexible waveguides from the elevation antenna sum and difference channels and the flexible waveguide from the azimuth feedhorn polarizer assembly in the three storage pads.
(b) Remove the azimuth waveguide assembly from the rotary joint to the receiver-transmitter. The azimuth waveguide assembly includes the directional coupler, the rigid waveguide, and the waveguide dehydrator.
(c) Store the elevation antenna sum and difference channel rigid and flexible waveguide assemblies in the storage pad provided.
(4) Remove the elevation feedhorn polarizer waveguide assembly by supporting the assembly and removing the three support arms at the reflector and at the assembly. Place the support arms and the assembly with the transit skid.
(5) Remove the elevation antenna and elevation antenna yoke by supporting the antenna and the yoke and removing the four bolts, lock washers, and flat washers that attach the yoke to the TG-231()/TPN-18. Retain the mounting hardware so it can be used to store the antenna and the yoke on the trailer bed. Place the antenna and the yoke near the radar trailer.

NOTE: Ensure that the servo actuator is fully retracted.

(6) Remove the azimuth antenna reflector from the azimuth antenna yoke assembly by loosening the two clamps that hold the reflector in the support arms of the yoke assembly. Place the azimuth antenna reflector near the radar trailer. Store the azimuth tilt actuator in the storage box pad provided.
(7) Place the red cover at the bottom of the azimuth drive reducer.
(8) Remove the elevation safety shield and place it near the radar trailer. Retain the hardware.

(9) Remove and invert the vent plugs in the azimuth and elevation drive assembly. Remove the six bolts on the azimuth and elevation drive assembly. Remove the azimuth and elevation drive with the azimuth yoke and place them near the radar trailer.
(10) Recover and disassemble the three radar target simulators. Place the simulators with the radar trailer.
(11) Remove the ratchet strap between the grounding anchor and the eyebolt at the bottom of the pedestal. Place the ratchet strap near the transit skid.

CAUTION

When the radar trailer is in place, engage the hand brakes. Release the hand brakes when transporting the radar trailer.

2. Store the Equipment on the Radar Trailer.
   a. Install two shipping braces on the receiver-transmitter frame and secure them with four screws. Loosen the three clamps on the receiver-transmitter rotary mount base and rotate the receiver-transmitter to align the index lines on top of the forward leg of the pedestal and the base of the receiver-transmitter.
   b. Remove the screws from the rotary mount base and install three shipping clamps (one clamp at a time) using two screws and two retaining screws per clamp.
   c. Ensure that the IFF antenna mast clamp R at the rear of the radar trailer is closed. Position the azimuth antenna reflector and horn support brackets L, O, and P at the rear of the radar trailer. Ensure that the guide pins are seated and secured with three screw clamps.
   d. Using three bolts, install the triangular support bracket on the rear roadside of the receiver-transmitter frame.
   e. Using the captive hardware, install the azimuth reflector top support bracket assembly on the curbside of the receiver-transmitter frame. Secure the triangular support bracket using three bolts.
   f. Using the captive hardware, secure the top of the azimuth antenna reflector with three padded clamps. Adjust the clamps to equalize the stress.
   g. Position the elevation antenna reflector, yoke, and servo actuator assembly on clamps A, K, and G. Adjust the position until the locating pins engage. On the underside of the bracket toward the front of the radar trailer, secure the equipment using two captive screws and four screws and four lock washers.

CAUTION

Do over tighten the screw clamps or antenna reflector. Excess tightening may damage the reflective surface.

h. Loop the longer web strap over the elevation antenna on the roadside and install the anchors of the strap in the rings on the clamps (K). Loop the smaller strap over the curb side of the antenna and install the anchors in the rings on the clamps and the bracket (A). Tighten the straps.
i. Install the azimuth and elevation drive assembly on the brackets (A and C) on the front of the radar trailer. Secure with six screws, six lock washers, six flat washers, and two captive screws.
j. Secure the metal strap (B) around the azimuth drive motor.
k. Install the elevation drive safety shield using the retained screws. Secure the bottom of the safety shield to the frame with a bolt, two flat washers, and a nut. Secure the elevation rotary coupler with a strap.
l. Install the A-frame support bracket on the azimuth and the elevation drive to the mounting bracket (C) using two captive screws. Secure the azimuth yoke to the A-frame with two captive screws.
m. Install nine target reflector legs in the rack forward of the receiver-transmitter. Secure by releasing the spring-loaded cover.
n. Install the three target reflectors in the brackets (D, E, F, I, and J). Secure the screw clamps.
o. Install three target reflector polarizer grids in the triangular rack below the receiver-transmitter and secure with a brace and two screws.
p. Install three grounding rods in the brackets under the trailer bed near the roadside.
q. Install two driving rods in spring clips on the inside of the curbside fender well; secure with a clamp and a screw.
r. Install the IFF backfill reflector on the forward roadside of the receiver-transmitter frame. Secure with three bolts.
s. Place the IFF antenna mast in the saddle clamps (Q and R) on the curbside with the base on the mast toward the rear.
t. Place the lifting sling, guy cables, and crossover spreader in the storage bag. Secure with two straps (W).
u. Install the waveguides and storage pads in the storage box at the rear curbside of the radar trailer. Secure the lid.
v. Using four bolts, install the leg support bracket on rear roadside of the receiver-transmitter frame.
w. Using four bolts, install two leg support brackets on the forward curbside of the receiver-transmitter frame.

CAUTION

Loosen the bolts on the yoke assembly. Mount the assembly on the trailer before removing the Saginaw jacks and leveling legs. Removing the leveling legs causes the trailer to bow in the middle and the yoke assembly mounting bolts to bind.

x. Retract the three Saginaw jacks and remove them from the radar/trailer leg assemblies. With the disk facing outward, install one jack at the rivnut (S) on the roadside fender. Install two more jacks (disks facing outward) at the rivnuts (T and U) on the storage box cover. Secure the handles of the two jacks storage box with the strap (V).

WARNING

To keep the trailer from tilting backward, use care when removing the radar/trailer legs from their operating positions. Do not stand on the rear of the trailer or place anything that weighs more than 230 pounds on the rear of the trailer.

y. Remove three radar/trailer leg assemblies from the mounting plates on the radar trailer. Position one leg upright with the disk facing forward on the brackets (M and N). Secure with two bolts. Secure the top of the leg to the bracket on the receiver-transmitter frame with one bolt, one lock washer, and two flat washers.

z. Position two legs upright on four rivnuts (H) on the curbside of the trailer bed. Place the inboard leg disk so that it faces to the rear. Place the outboard disk leg so that it faces forward. Using a spacer, a threaded rod, two flat washers, and two nuts, secure the tops of both legs between two mounting brackets installed on the frame. Tighten the bolts on the yoke assembly mount.

aa. Remove the grounding anchor, which is installed directly below the pedestal. To reach the grounding anchor, move the trailer forward or backward. Keep the trailer as level as possible.

ab. Install the lower element VUV antenna beneath the trailer bed in the curbside antenna transport tube.

ac. Install the UVU antenna beneath the trailer bed in the roadside antenna transport tube.

NOTE: Remove the upper pallet from the transit skid. Locate storage bags 1 through 9, 11, and 13 through 15. Load the equipment on the lower pallet, along with the front vestibule. Ensure that all bags are firmly strapped in place.

ad. Store the equipment in the bags.

ae. Store the roadside FM antenna mounting bracket and the VUV antenna mounting bracket on the lower pallet.

af. Store the two folding chairs and bags 4, 8, 9, 11, and 13 on the lower pallet, along with the front vestibule. Ensure that all of the bags are firmly strapped in place.

ag. Slide the upper pallet into position on the transit skid. Ensure that the retaining pins are inserted securely.

ah. Position the elevation antenna feedhorn on the brackets on the upper pallet and secure with the captive screws and a strap.

ai. Secure the support legs (radar elevation antenna feedhorn polarizer waveguide assembly) to the transit skid using the straps provided. Strap bag 5 containing the upper element for the VUV antenna to the transit skid.

aj. Store the covers of the C-6988A/TPN-18 control-indicators and bags 1, 2, 3, 6, 7, 14, and 15 on the upper pallet. Strap all of the bags and covers securely on the upper pallets.

ak. Place the IFF antenna storage bracket on the transit skid. Insert the four retaining pins and tighten the two swing bolts.

al. Place the IFF antenna on the storage bracket and clamp it in place. Insert the four mounting bolts that secure the antenna to the storage bracket.

am. Align the transit skid with the transit skid rails in the shelter. Slide the transit skid forward until the tapered pins on each side of the transit skid engage the plates on the ends of the rails. Ensure that the top of the transit skid is aligned with the indentations on the bracket located on the forward wall.

an. Install the two captive blocks on the rear end of the transit skid rails.

ao. Attach the snap hooks of the tie-down straps to the transit skid tie-down rings on the curbside and roadside walls of the shelter.
ap. Route the tie-down strap secured to the roadside tie-down around the rear end of the transit skid. Attach the ratchet buckle to the curbside tie-down on the transit skid with the ratchet handle facing forward. Route the tie-down strap secured to the curbside tie-down ring around the rear of the transit skid. Attach the ratchet buckle to the roadside tie-down on the transit skid with ratchet handle facing forward. Secure the transit skid in the shelter by tightening the tie-down straps.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment.

Brief Soldier: Tell the soldier that he will be evaluated on preparing the AN/TSQ-71B for movement.

Performance Measures	**GO**	**NO GO**
NOTE: Applicable performance measures are determined by local conditions, mission requirements, and assigned equipment. Use TM 11-5840-281-12-1; TM 11-5895-474-12, and the power source TM.		
1. Disconnects the external connections.	____	____
2. Dismantles the UVU, VUV, and FM antennas.	____	____
3. Removes the sunshield and vestibule.	____	____
4. Dismantles the radar.	____	____
5. Dismantles the IFF.	____	____
6. Loads the equipment.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
TM 11-5840-281-12-1	None
TM 11-5895-474-12	

Prepare the Aircraft Control Central, AN/TSQ-70A, for Movement
011-143-0003

Conditions: You are operating as a member of an ATC tower team and are given an operational AN/TSQ-70A and generator set.

Standards: Disassemble the aircraft control central and the generator set from an operational mode and prepare them for the transit mode according to TM 11-5895-579-12 and the TM for the generator set.

Performance Steps

1. Perform Stopping Procedures. The aircraft control central may be disabled by setting the AC power distribution panel MAIN circuit breaker to OFF or by setting the power trailer transfer switch to OFF. Individual components must be set to their respective OFF positions before restarting them. Therefore, use this disabling procedure only as an emergency measure. To perform the normal stopping procedure for the individual components, set the controls to the positions shown in Table 0003-1.

Table 0003-1. Stopping procedures control positions.

Component	Control	Position
Radio operator's console VHF and UHF radios	POWER ON/OFF switch Function select switch	OFF OFF
Secure and HF radios	POWER ON switch Mode selector switch	OFF OFF
LF radio	SENS	Maximum counterclockwise
FM radio	POWER switch	OFF BREAKER-RESET
Telephone control box	CB25 circuit breaker	OFF (release)
Blowers	BLOWER 1 switch BLOWER 2 switch	OFF OFF
DC selector switch	DC POWER SUPPLY switch	OFF
DC power distribution panel	CONSOLES circuit breaker R-511 circuit breaker HF RADIO circuit breaker HF ANT TUNER circuit breaker SECURE EQUIP circuit breaker FM 3 circuit breaker FM 2 circuit breaker FM 1 circuit breaker VHF 3 circuit breaker VHF 2 circuit breaker VHF 1 circuit breaker UHF 3 circuit breaker UHF 2 circuit breaker UHF 1 circuit breaker	OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF OFF

Table 0003-1. Stopping procedures control positions (continued).

Component	Control	Position
AC power distribution panel	RINGER circuit breaker	OFF
	AN/GMQ-11 circuit breaker	OFF
	LIGHTS circuit breaker	OFF
	CONV circuit breaker	OFF
	DC POWER circuit breaker	OFF
	BLOWERS circuit breaker	OFF
	AIR COND circuit breaker	OFF
	MAIN circuit breaker	OFF
	Transfer switch	OFF

2. Disconnect the Cables.
   a. Disconnect the AC power cable assembly from the power trailer and the power entrance panel. Store the cable on the cable reel on the power trailer.
   b. Disconnect the air conditioner cable assembly and store it in the designated storage case.
   c. Disconnect the grounding straps at the power trailer and shelter. Store the grounding straps in the designated storage case.
   d. Remove the grounding rods and store them in the designated storage case.
   e. Disconnect the cabling to the remote consoles (if used) and store it in the designated storage case.

3. Disassemble the Antennas.
   a. HF antenna.
      (1) Disconnect the coaxial cable from the antenna mast to the HF antenna base and store it in its designated storage case.
      (2) Unscrew the antenna mast section from the HF antenna base.
      (3) Unscrew the antenna mast sections from each other.
      (4) Store the antenna components in their designated storage case.
   b. LF antenna.
      (1) Disconnect the 50-foot length of wire from the LF antenna connector on the antenna entrance panel and the structure that was selected as the terminating point for the opposite end.
      (2) Store the LF antenna wire in its designated storage case.
   c. VHF antenna.
      (1) Disconnect the three VHF cable assemblies from the antenna entrance panel and from each VHF antenna.
      (2) Remove the pip pin in a VHF support arm and remove the VHF support arm from the VHF antenna mast.
      (3) Remove the VHF antenna from the VHF support arm.
      (4) Unscrew the elements from the VHF antenna.
      (5) Repeat steps (2) through (4) for the remaining two VHF support arms.
      (6) With all VHF support arms and elements removed, pull out the pip pin that holds the VHF antenna mast to the VHF antenna support bracket. Remove the VHF antenna mast.
      (7) Remove the mast adapter from the VHF antenna mast.
      (8) Remove the VHF antenna support bracket from the shelter.

(9) Store the antenna components in their designated storage cases.

d. FM antenna.
   (1) Disconnect the FM antenna cable assemblies and FM antenna control cable assemblies from the FM antenna connectors on the antenna entrance panel and at the MX-6707/VRC.
   (2) Remove the safety wire.
   (3) Unscrew the FM antenna from the MX-6707/VRC.
   (4) Unscrew the AS-1730/VRC and the AT-1095/VRC antenna elements from each other.
   (5) Remove the MX-6707/VRC from its FM antenna mounting bracket.
   (6) Remove the FM mounting bracket from the shelter.
   (7) Store the antenna components in their designated storage case.

e. UHF antenna.
   (1) Disconnect the three UHF cable assemblies from the antenna entrance panel and from each of the three UHF antennas.
   (2) Remove the pip pins from the mast adapter and the UHF antenna support arms from the UHF antenna mast.
   (3) Remove the UHF antennas from the UHF support arms.
   (4) Remove the antenna elements from the UHF antennas.
   (5) Remove the UHF antenna mast from the shelter.

4. Remove the Wind Transmitter.
   a. Disconnect the two cable assemblies from the wind transmitter and the signal entrance panel.
   b. Remove the wind transmitter from the mast assembly.
   c. Disconnect the mast assembly from the shelter.
   d. Store the components in their designated storage cases.

5. Remove the Vestibule.
   a. Remove the tarpaulin from the frame and fold it.
   b. Remove the anchors from the ground.
   c. Remove the support bracket from both the side and the top of the shelter.
   d. Lift the assembled components away from the mating flange on the shelter.
   e. Remove the top rib support from each flange on the front gable assembly.
   f. Remove the top rib support from each flange on the rear gable assembly.
   g. Remove the side support rib from the bottom portions of the legs.
   h. Remove the pip pins to remove the adjustable legs.
   i. Store the vestibule components in their designated cases.

6. Disassemble the Tower.
   a. Disconnect the blower power cable assembly.
   b. Remove the S-hook and signal light gun.
   c. Remove the tower.
   d. Remove the Plexiglas sides one at a time.
   e. Replace the tower cover over the opening and secure the cover.
   f. Store the components of the tower in the tower storage case.

7. Store the Master Remote Console.
   a. Disconnect the footswitch, microphone, headset-microphone, and handset from their respective connectors.
   b. Disconnect the 5-foot remote signal cable assembly.

c. Loosen the screws that hold the hinged portions of the top on the master remote console and secure the top in the down position.
d. Replace the cover on the master remote console.
e. Lay the master remote console on its back and remove the legs and extension legs.
f. Store the legs and extension legs in the support remote console. Store the cables in their designated storage cases.
g. Store the mast remote console in its storage case.

8. Store the Support Remote.
   a. Remove the telephone and radio key panels and place them in the radio operator's console.
   b. Remove the legs and extension legs and store them inside the console.
   c. Replace the cover on the support remote console. Store the support remote in its respective storage case.
9. Disconnect the Telephone Lines. Disconnect any subscriber telephone lines from the binding posts on the signal entrance panel.
10. Prepare the Shelter for Transit.
    a. Remove all loose items (head-set microphone, handset, and so forth) and store them in their respective storage cases.
    b. Secure the components mounted in the shelter racks with fastening devices. Block, brace, tie, and strap the components with nylon filament tape, as necessary, to protect them against movement, vibration, stress, and transportation hazards. Secure the tower storage case, the two wooden cases, and all loose items to be transported inside the shelter. Close and lock the shelter door and secure the door with aluminum foil tape.
11. Prepare the Power Trailer for Transit.
    a. Position the remote console storage cases, the wooden storage crate, and all other items stored on the power trailer in place.
    b. Strap all items securely in place.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment.

Brief Soldier: Tell the soldier that he will be evaluated on preparing the AN/TSQ-70A for movement.

Performance Measures	**GO**	**NO GO**
NOTE: Use TM 11-5895-579-12 and the power source TM.		
1. Performs stopping procedures.	____	____
2. Disconnects and stores cables.	____	____
3. Disassembles the antenna.	____	____
4. Removes and stores the wind transmitter.	____	____
5. Removes and stores the vestibule.	____	____

Performance Measures	GO	NO GO
6. Removes and stores the tower.	___	___
7. Prepares and stores the master remote console.	___	___
8. Prepares and stores the support remote console.	___	___
9. Disconnects the telephone lines.	___	___
10. Prepares the shelter for transit.	___	___
11. Prepares the power trailer for transit.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
TM 11-5895-579-12	None

Prepare the Air Traffic Control Facility, AN/TSQ-97, for Movement
011-143-0004

Conditions: You are a member of an ATC team with a fully operational AN/TSQ-97, TM 11-5895-800-12, and power source TM. You receive an order to relocate.

Standards: Perform stopping procedures, disassemble and store the AN/TSQ-97 (with power source) according to TM 11-5895-800-12 and the power source TM.

Performance Steps

1. Perform Stopping Procedures. Set the function selector switches on the radio sets to OFF. On the control monitor, place three XMT-OFF-MON switches to OFF. Position the POWER ON/OFF switch to OFF. Set the radio circuit breakers on the rear of the control console to OFF.

2. Disassemble the AN/TSQ-97.
   a. Disconnect the power cable from the battery or vehicle and the POWER-IN connector. Store the cable in the left side storage compartment.
   b. Disconnect the W201, W202, and W203 coaxial cables from the RF choke. Wrap the cables for storage. Strap the cables in position using a flexible snap strap at the rear of the control monitor.
   c. Disconnect the headset/microphone or microphone and store it in the right side storage compartment.
   d. Use caution when lowering the antenna boom. Have someone help lower the antenna boom because when the antenna boom is lowered, the guy lines no longer support the assembly. Hold onto the fiberglass extension and remove the quick-release pin near the top of the metal mast. Lower the mast extension into the mast.
   e. Disconnect the W401 and W402 wind sensor cables. Store them in the left side storage compartment.
   f. Disconnect the W301, W302, and W303 antenna cables from the RF choke and antennas. Store the cables in the left side storage compartment.
   g. Remove and store the RF choke.
   h. Remove and store the thermometer and the bracket.
   i. At the antenna coupler mounting plates, unscrew and remove the AS-4034/TSQ-97 horizontal antenna elements. Store these items in the front cover.
   j. Unscrew the whip antenna elements from the coupler. This antenna element will be stored in the hollow metal mast.
   k. Remove and store the antennas and the couplers.
   l. Remove and store the ML-653/TSQ-97 wind detector, the vane, and the standoff.
   m. Remove the anchor pins at the guy line terminations. Store the anchor pins in the front cover of the equipment case.
   n. Shorten the guy lines and wrap them between the storage hooks on the boom.
   o. Disconnect the antenna boom from the mast.

3. Store the Components of the AN/TSQ-97 in the Transit Mode.
   a. Install the rear cover.

CAUTION

Before installing the case covers, make sure that the interior of the equipment is completely dry and the BB-451/U storage battery is removed.

b. Using two people, place the facility back onto the rear cover.
c. Remove the twist-lock cap from the bottom of the mast. Store the whip-type antenna elements in the mast. Replace the twist-lock cap.
d. Attach the mast and boom to the equipment case for use as carrying handles.
e. Install the front cover.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment.

Brief Soldier: Tell the soldier that he will be evaluated on preparing the AN/TSQ-97 for movement.

Performance Measures	**GO**	**NO GO**
NOTE: Use TM 11-5895-800-12 and the power source TM.		
1. Sets all switches to the correct position.	____	____
2. Disconnects and stores the power cable.	____	____
3. Disconnects and stores the choke cables to the radios.	____	____
4. Disconnects the security equipment.	____	____
5. Disconnects and stores the headset and microphone.	____	____
6. Lowers the antenna boom.	____	____
7. Disconnects the wind sensor cables.	____	____
8. Disconnects and stores the antenna cables.	____	____
9. Removes and stores the RF choke.	____	____
10. Removes and stores the thermometer and bracket.	____	____
11. Removes and stores the antenna element.	____	____
12. Removes the whip antenna.	____	____
13. Removes and stores the antennas and couplers.	____	____
14. Removes and stores the wind detector, vane, and stand-off post.	____	____

Performance Measures	GO	NO GO
15. Removes the anchor pins and stores them in the equipment case front cover.	____	____
16. Shortens the guy lines and wraps the line between the storage hooks on the boom.	____	____
17. Disconnects the antenna boom from the mast.	____	____
18. Installs the rear cover. Lays the facility down on the rear cover.	____	____
19. Stores the whip antenna element in the mast.	____	____
20. Installs the mast and boom in the equipment case.	____	____
21. Installs the front cover.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
TM 11-5895-800-12	None

Prepare the Air Traffic Control Central, AN/TSW-7A, for Movement

011-143-0006

Conditions: While operating as a member of an ATC tower team and given AN/TSW-7A in operational mode with TM 11-5895-801-12 and applicable TM for power source, you received orders to transport the AN/TSW-7A to a new location.

Standards: Perform stopping procedures, disassemble and store the AN/TSW-7A and associated items furnished with the facility, in preparation for movement according to TM 11-5895-801-12 and applicable power source TM.

Performance Steps

1. Perform Stopping Procedures. To shut down the AN/TSW-7A to a standby status, proceed as described below.
   a. At the power distribution panel assembly, set the following switches and circuit breakers to OFF in any order; however, leave the MAIN POWER circuit breakers set to ON.
      (1) The TRANSCEIVER CONTROL bank of 13 circuit breakers.
      (2) The AUDIO bank of three circuit breakers.
      (3) The WD SET circuit breaker.
      (4) The LIGHT GUNS bank of two circuit breakers.
      (5) The CONVENIENCE OUTLETS bank of two circuit breakers.
      (6) The LIGHTING DC and AC bank of four circuit breakers and the DOOR, OVHD DC, OVHD AC, and THEATER switches.
      (7) The EMERGENCY DC bank of three circuit breakers. All the circuit breakers on the front panel of the power distribution panel should now be set to OFF.
   b. At each of the two ECU control units, set the select knob to OFF.
   c. At the power distribution panel side panel, set the ECU POWER two banks of circuit breakers to OFF. Also, set the WINDOW HEAT circuit breaker and one switch to OFF.

2. Perform a Power Shutdown. For a normal shut down, perform the steps in paragraph 1a through 1a(3), then proceed as described below.
   a. At the power distribution side panel, set the MAIN POWER 28 VDC circuit breaker and the MAIN POWER 3 50/60 Hz bank of three circuit breakers to OFF. The only sign of power inside the shelter should be the MAIN POWER 3 50/60 HZ AVAIL light and the MAIN POWER 28 VDC AVAIL light (if the 28 VDC generator is running). These lights will extinguish when the main power is removed or shut down.
   b. Shut down the power unit as described below.
      (1) Set the CKT BRK switch to the OPEN position.
      (2) Let the generator run with no load from three to five minutes.
      (3) Set the START-RUN-STOP switch to the STOP position, then release it.
      (4) Turn the FUEL SUPPLY valve to OFF.

3. Disassemble the AN/TSW-7A.

WARNING

Before disconnecting any cables, remove the primary power source and any other substitute emergency power sources from the shelter. Check to ensure that the MAIN POWER circuit breakers and the EMERGENCY DC BATTERY ON-LINE circuit breaker on the power distribution panel are in the OFF position.

a. Disconnect the power.
   (1) Disconnect the power, external signal, and ground cables that are shown in Table 0006-1. Rewind them on the cable reels in the sequence shown below. Make sure that the P1 end of all the cable is placed on the reel first.
      (a) W16 and W106 on reel 5.
      (b) W6, W7, and W14 on reel 7.
      (c) W28 and W29 on reel 2.
      (d) W26 and W27 on reel 3.
      (e) W1 on reel 4.

NOTE: Figure 0006-1 shows cable reel identity. Always reload the lower reels first.

   (2) Before winding the power cables up, double the cables in the middle and insert the connector ends into the center of the reel.
   (3) Pack the W2 and W3 cables in the power transfer box bracket on the skid platform.

Table 0006-1. Shelter power and control cables to be disconnected.

Equipment	Cable Designator	Termination
Wind set	W16	SEPJ14
Wind set	W106	SEPJ14 or W16P2
ECU power	W6	PEPJ3
ECU power	W7	PEPJ4
ECU control	W14	PEPJ7
FM 3 control	W28	SEPJ11
FM 3 RF	W29	SEPJ12
FM 2 control	W26	SEPJ9
FM 2 RF	W27	SEPJ10
Primary power	W1	PEPJ1
Primary power	W2	W1P2*
Primary power	W3	W1P2*
*This termination will be made to the power transfer box if the power transfer box is used.		

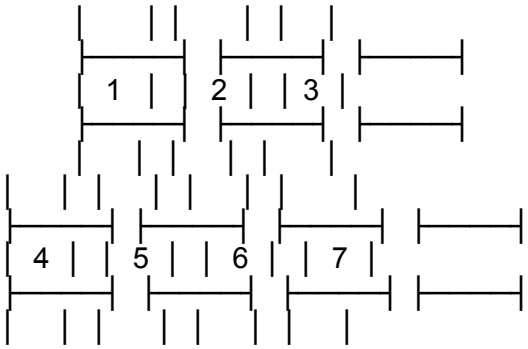


Figure 0006-1. Cable reel identity.

b. Restow the shelter platform, stairway, and handrails.

NOTE: Two people are required for this task (one inside the shelter and one outside on the ground).

(1) Remove the tie-down straps and D-rings from storage and install them in their sockets in the shelter floor.
(2) Unsnap the upper handrail ropes from the eyebolts in the outside wall of the shelter.
(3) Remove the ball-lock pins that secure the handrails to the sides of the stairway. Remove and stow the handrails.
(4) Disconnect the stairway security lanyard cable from the turnbuckle underneath the platform.
(5) Remove the safety lanyard from the right side of the platform and doorway.
(6) Remove the ball-lock pins that secure the lower hinge points of the stairway.
(7) Fold the stairway into place on the top of the platform.
(8) Place the shipping strap around the stairway/platform assembly and pull the strap tight.
(9) Release the barrel bolts that secure the platform to the doorsill.
(10) While the person outside the shelter lifts the platform free of the shoulder screws, the person inside sets the ladder pivots into the pivot brackets on the threshold of the shelter door.
(11) The person outside lifts the outer edge of the assembly over the doorway to the person inside the shelter. The person inside the shelter lays it flat on the floor.
(12) Place the strap from the floor-mounted D-rings over the platform and stairway assembly and pull the strap tight. This secures the assembly in its transit configuration.
(13) The person in the shelter uses the roof ladder to get out of the shelter after the assembly is secured.

c. Lower the shelter.

CAUTION

Be sure that there are no obstructions under the shelter, and keep the shelter level during the lowering process. Make sure that all ECUs are disconnected and the cables are clear of the shelter.

NOTE: If guy lines were not used to install the shelter, disregard any reference to them in the paragraphs that follow.

(1) Connect one jack-connecting shaft between the two front jacks; connect the two rear jacks with the second jack-connecting shaft.
(2) Lower the jacks until there is about a foot of slack in the guy lines.
(3) Take the slack out of the guy lines so that they are taut.
(4) Repeat steps (2) and (3) above until the shelter is on the ground.

d. Stow the UHF/VHF antennas. To stow the antennas, pull out the lock pins, fold the antennas down into their roof-mounted cradles, and clamp them in place. Remember to remove the extension from the VUV antenna before securing the roof clamps.

e. Remove the shelter leveling jacks.

NOTE: If the connecting shafts are still connected between the jacks, make sure that the shelter is level and remove the connecting shafts.

(1) Make sure to lower each jack so that the shelter does not put pressure on any one jack.

(2) Using the wrenches supplied with the jacks, loosen the two gate-locking nuts.
(3) Open the jack gates and remove the jack stanchions.
(4) Take the jack stanchions and the jack stands to the skid platform.
(5) Replace the wrenches on the sides of the jacks.
(6) Remove the four jack-mounting screws with the hexagonal wrench.
(7) Take the gearboxes and jack handles to the skid platform.

f. Remove the guy lines from the shelter.
(1) Remove the strap hooks from the shelter anchor guy line couplings and the lifting rings on the corners of the shelter.
(2) Gather the eight straps and place them beside the skid platform.
(3) Remove all guy line stakes according to the procedures outlined in TM 11-5895-801-12.

g. Disconnect the telephone line.
(1) If the landlines are connected to the telephone entry panel by a single cable, disconnect the cable from the entry panel. Install the connector cap over the connector.
(2) If the landlines are connected to the binding posts in pairs, proceed as described below.
(a) Release the captive fasteners and the hinged outer door. At the same time, work the grouped wires free of the wire retainer and open the door fully.
(b) Disconnect each wire pair by pressing the binding posts that secure the wires. Slip the bared ends of the wires out of the slots in the posts.
(c) After all the wires are disconnected, close the door and secure it with the captive fasteners.

h. Disassemble the HF antenna and coupler.

WARNING

High voltage (1,000 VRF) may be present at the HF antenna. Do not attempt to disassemble the antenna until you are certain the AN/TSW-7A has been shut down. Do not approach or touch the antenna until all power to the antenna has been turned off. Contact with the antenna terminals may cause serious injury or death.

i. Disassemble the wind set mast.
(1) Disconnect the W106 cable from W30 cable on the mast.
(2) Release the guy lines and lower the wind mast to the ground gently. Remove the guy lines and stow them in the HF storage cabinet.
(3) Release the clamps that secure the W30 cable to the wind mast.
(4) Pull the ball-lock pin that secures the wind transmitter to the top of the mast and remove the wind transmitter.
(5) Stow the wind transmitter assembly in the shelter.
(6) Remove the mast assembly from the base plate and stow the mast assembly in its cradle on the front sill of the shelter. Using the pins provided, pin the mast into its mount.
(7) Remove the ground stakes from the mast base plate.
(8) Pull out the mast guy stakes. Stow the guy line stakes and the mast base plate in the transit bag in the shelter.

(9) Stow the W16 and W106 cables on cable reel 5 according to the procedures outlined in TM 11-5895-801-12.

j. Disassemble the VHF/FM 2 and VHF/FM 3 antenna assemblies.
(1) Disconnect the RF and the control cables that connect the antenna couplers to the signal entry panel (W26, W27, W28, and W29).
(2) Stow the W26 and W27 cables on cable reel 3 and the W28 and W29 cables on cable reel 2.
(3) Untie the antenna hold-down line from the ground stakes and remove the clip from the tripod apex.
(4) Remove the hold-down stake from the ground by turning it counterclockwise.
(5) Assemble and pack the installation kit in its transmit bag.
(6) While temporarily supporting the antenna assembly on two of the tripod legs, raise the third leg off the ground and remove it from the socket in the tripod head.
(7) Gently lower the antenna assembly to the ground.
(8) Unscrew the antenna whip from the antenna coupler.
(9) Pack the antenna couplers into their transit bags and stow the bags on the skid platform.
(10) Pack the tripod legs into their transit bags and stow the bags on top of the HF cabinet on the skid platform.

k. Remove the grounding stakes.

NOTE: The grounding stakes at the shelter, the skid platform, and the generator truck must be removed.

(1) If the grounding cable is still connected, disconnect it from the grounding stake.
(2) Grasp the grounding stake and work it in all directions to loosen it.
(3) If necessary, use a shovel to remove the soil from around the stake.
(4) After the grounding stake is removed, replace the soil that was removed.

NOTE: The grounding stakes for the generators are stowed on the generator trailers.

(5) Take the grounding stakes, the grounding cable, and the shovel to the skid platform.

l. Remove the ECU or heater air ducts.
(1) Release the clamps that secure the air ducts to the plenum (ECU or heater).
(2) Release the clamps that secure both air ducts to the openings in the front of the shelter.
(3) Collapse the air ducts and place them near the skid platform.

m. Remove the plenum from the ECUs and prepare the ECUs for transit.

NOTE: Two people are needed to remove the plenum from the ECUs.

(1) With one person supporting the plenum, another person releases the three straps that secure the plenum to the ECUs.
(2) With one person on each side of the plenum, lift the plenum free of the two locating pins. Place the plenum on the ground beside the skid platform.
(3) Prepare each ECU for transit as described below.
(a) Fully close the discharge grill by manually pushing each vane to a closed position.
(b) Fully close the intake grill with the control lever.
(c) Undo the rain cover securing the straps, unroll the cover over the ECU face, and close the zipper completely.

n. Remove the guy line stakes.

NOTE: A truck or similar vehicle may be used to pull the guy line stakes out of the ground.

(1) Get the D-handle shovel and the mattock from the skid platform.
(2) Loosen the ground around the stake with the shovel. If the ground is frozen or the stake has been driven into hardpan, remove it with the mattock.
(3) Pull the stake out in the direction that it was driven in.

(4) Clean the stakes and store them in the grounding stake transit bag.

o. Place the protective screens over the shelter windows.

NOTE: Each protective screen is identified with a number. Matching numbers are printed on the shelter to show the proper location of each screen.

(1) Find the proper location for each screen by matching the numbers.

(2) Small hangers located above each window mate with the hooks in the top of each screen. Hook the top of the screens into the appropriate hangers.

(3) At the bottom of the screens, engage the hook of each draw latch into the keeper on the shelter and snap the draw latch closed.

4. Store all Equipment.

NOTE: Teardown and disassembly is complete. Start the packing and tie-down procedures. Items are stowed on the skid platform or in the shelter. Each item is bolted down, held by brackets, or secured with straps. The order of stowage is important because some items may block access to mounting holes or brackets. Each item should be double-checked to make sure that it is secured (Figure 0006-2).

a. Tie down the shelter jacks. Separate the jacks into five basic parts for storage. These parts are the gearbox, stanchion, jack footplate, jack handle, and connecting shaft. The parts are stowed in separate locations on the skid platform.

(1) Using four captive bolts, bolt the gearbox of each jack to the mounting brackets on the skid platform.

(2) Stow the four jack footplates in the bottom of the storage case assembly (located near the center of the skid platform).

(3) Using the brackets, secure the four jack stanchions (Figure 0006-2) along the rear edge of the skid platform.

(4) Stow the connecting shafts on the rear compression bar. Tighten the holding straps.

b. Repack the wind measuring set transmitter. The wind speed and direction transmitter is stowed with the shelter. Using the straps provided in the floor attachment rings, strap the wind speed and direction transmitter and the propeller to the top of the air ducts.

c. Repack the transit bags and tool storage bag.

(1) Place the large tools used in the disassembly into the tool bag. These tools include the mattock, shovel, and ripping bar.

NOTE: The tool bag should be packed after all of the brackets and clamps have been tightened.

(2) Place all of the remaining tools in the tool bag and close the bag.

(3) Pack all transit bags according to Table 0006-2.

(4) Stow the tool bag and transit bags.

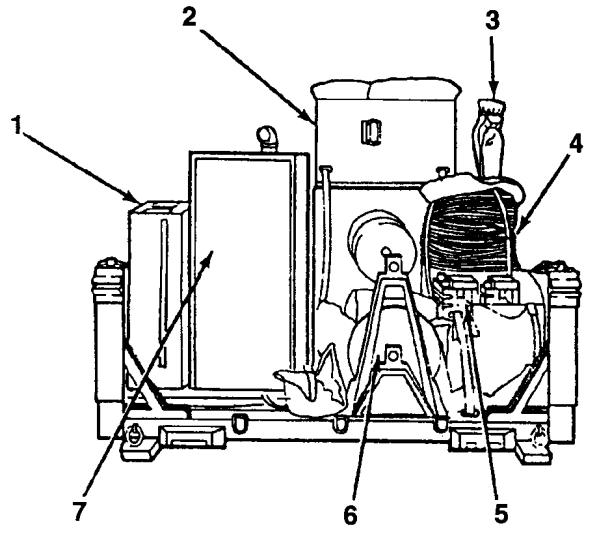
d. Stow the HF antenna. Place the antenna whip sections in the antenna transit bag (Figure 0006-2). Stow the bag on the side of skid and secure it with the straps.

e. Repack the cable reels. Repack the cables according to the procedures outlined in TM 11-5895-801-12. Fill the lower reels first, then fill the top reels.

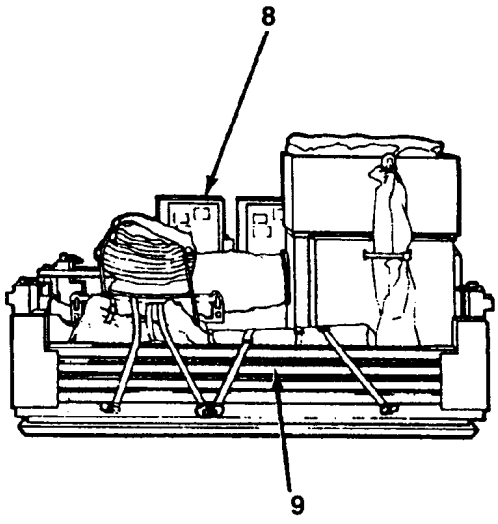
f. Repack the air ducts. Using the straps supplied, secure the 7-foot air duct on the skid platform on top of the jack gearboxes.

g. Tie down the ECU plenum.

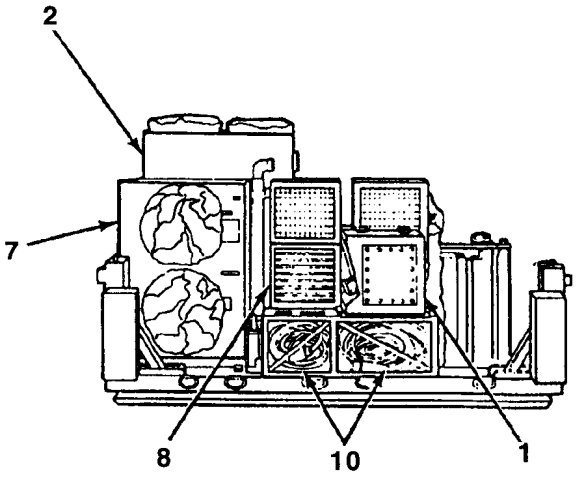
(1) Place the air plenum on top of the HF cabinet assembly as shown in Figure 0006-2.



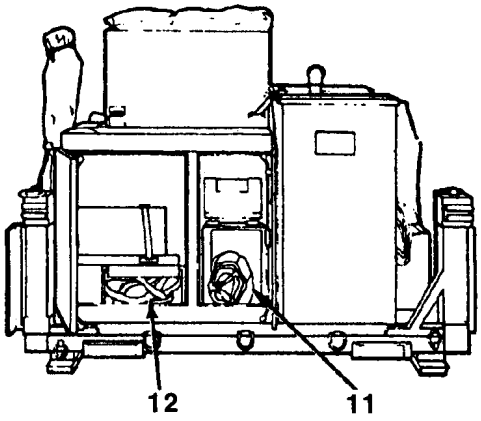
A. FRONT VIEW



B. REAR VIEW



C. LEFT SIDE VIEW



D. RIGHT SIDE VIEW

LEGEND:

1. Power Transfer Box
2. ECU Plenum
3. Antenna Transit Bag
4. Air Duct (10 ft)
5. Jack Gearbox (A)
6. Cable Reel Assembly
7. Heater and Plenum
8. ECU (2)
9. Jack Stanchion (4)
10. W2 and W3 Cables
11. Toolbag
12. Lifting Sling

Figure 0006-2. Skid platform packing.

(2) Using the attached straps, secure the air plenum to the skid platform at the base of the storage case assembly.
(3) Tighten the strap assemblies.

h. Pack the roof ladder and FM antenna tripod legs.
(1) Place the roof ladder on its mounting brackets on the left-hand end of the shelter. Secure the ladder with the latch that is provided.
(2) Pack the FM antenna tripod legs into their transit bags and stow them on the skid platform (Table 0006-2).

Table 0006-2. Contents of transit bags.

Transit Bag	Quantity	Contents
Shelter bags		
SM-D-884782-9	1	Windset mast base
	3	Windset guy stake
SM-D-886365	1	Vacuum cleaner with accessories
Skid platform bags		
SM-D-886809-1	4	Jack footplates (SM-D-885076)
	2	Jack ratchet wrenches
SM-D-886809-2	2	MX--6707/VRC base/antenna coupling units
SM-D-886838	2	FM antenna tripod mount
	1	Sledge
	3	Grounding rod assembles
	6	GP-112/G guy line sties w/shackles
	4	Ground clamp assembles
	5	Shackles (for 4-foot stakes)
SM-D-885867	1	Chain wrench
	1	Ripping bar
	1	Measuring tape
	1	Mattock with handle
	1	Axe
	1	Hammer
	1	Machetes
	1	Shovel (modified)
	1	Extension lamp
	1	Pliers arc joint
Mast section bag MS-44	2 sets	FM antenna installation kit
	1	FM antenna

i. Stow small items. A storage drawer for each controller position is located at the bottom of the console. A secure cabinet is located at the bottom of the console between the local and data controller positions. This cabinet is secured with a padlock and is used for storing the crypto headsets. Table 0006-3 shows the contents of each storage drawer.

Table 0006-3. Contents of storage drawers

Left-Hand Drawer (1)	Center Drawer (2)	Right-Hand Drawer (3)
4 headset-microphones	2 light guns with cables W102 and W103	1 compass
3 desk microphones		2 binoculars
2 telephone handsets		1 barometer
		50 flight strip holders
		3 shelter grounding straps

j. Tie down and store the equipment inside the shelter.
   (1) Chairs.
      (a) Remove the tie-down straps and rings from the shelter storage drawer.
      (b) Using a screwdriver or coin, open the tie-down ring receptacles in the floor.
      (c) Insert the swivel shank of the tie-down rings into the floor receptacle and lock it in place with a screwdriver or coin.
   (2) Binoculars. Remove the binocular cases from the storage drawer. Place the binoculars in their cases and return the cases to the storage drawer.
   (3) Light guns.
      (a) Disconnect the air traffic light gun power cables (W102 and W103) from the connectors on the shelter ceiling.
      (b) Unhook each light gun from its suspension cable.
      (c) Wrap the attached power cable around each light gun and place the light guns in the center storage drawer.
   (4) Headsets, microphones, and flight data strip holders.
      (a) Disconnect the headset-microphone and desk microphone cables connected to each MIKE and HDST connector on the three operator position control plates.

NOTE: The two telephone handsets remain in their respective holders during transit.

      (b) Remove the flight data strip holders from the data operator console.
      (c) Stow the headset-microphone, desk microphones, and flight data strip holders in the storage drawers.
      (d) Fasten all of the drawers securely in the racks.
   (5) Drain plug. Check to ensure that the floor drain plug is in place and screwed hand-tight.

NOTE: Check to ensure that all rack-mounted equipment is fastened securely and all personal gear is removed from the shelter.

k. Install the shelter compression bar.

NOTE 1: Do not rotate the compression bar after it is installed.

NOTE 2: During transit, the compression bar strengthens the rear wall of the shelter, which prevents flexing and possible deformations.

   (1) Place the compression bar in position with an eyebolt in a bracket at each side to the door.
   (2) Engage the locking pin at one end of the bar.
   (3) Turn the bar clockwise or counterclockwise, as required, and insert the other pin.
   (4) Tie down the chairs using the 12 tie-down straps. Tighten the straps.

l. Close the shelter door and attach the padlock. The interior door of the shelter is now secured.

m. Check the shelter exterior. Perform the following checks to determine if the shelter is ready for transit.

(1) Check to ensure that the three latches on the shelter door are secure and the door is padlocked.
(2) Check to ensure that the shelter door tieback and the power entry panel cover are secure.
(3) Check to ensure that the five protective screens on the rear of the shelter are secure.
(4) Check to ensure that the air filter on the right side of the shelter is secure and the three protective screens are secure.
(5) Check to ensure that the landline entry panel cover on the left side of the shelter and the two air duct covers are secure. Also check to ensure that the five protective screens are attached and secure.
(6) Check to ensure that the air filter cover and the signal entry panel cover on the left side of the shelter are secure. Check to ensure that the three protective screens are secured.
(7) Check to ensure that the roof ladder is properly mounted and secured.

n. Check the skid platform.
(1) Check the straps and the bracket on the ECUs to ensure that they are tight.
(2) Check all of the cable reels to ensure that they are locked in position.
(3) Check the cable ends to ensure that they are tucked away.
(4) Check the air ducts and the straps to ensure that the straps are tight and the air ducts are secure.
(5) Check the grounding stakes to ensure that they cannot shake loose.
(6) Check the straps on the ECU plenum to ensure that they are tight and secure.
(7) Check the jack stanchions and the FM antenna transit bags to ensure that the mounting hardware is tight and the straps are secure.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment.

Brief Soldier: Tell the soldier that he will be evaluated on preparing the AN/TSW-7A for movement.

Performance Measures	**GO**	**NO GO**
NOTE: Use TM 11-5895-801-12 and the power source TM.		
1. Prepares the AN/TSW-7A for movement from a fully operational mode.	___	___
2. Prepares the generator set for movement.	___	___

NOTE: Do not rotate the compression bar after it is installed. The shelter compression bar strengthens the rear wall during transit to prevent flexing and possible deformations of the shelter.

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
TM 11-5895-801-12	None

Prepare the Flight Coordination Central, AN/TSC-61B, for Movement
011-143-0009

Conditions: As an air traffic controller in a field environment, given an AN/TSC-61B flight coordination central and STP 1-93C1-SM-TG, TMs 11-5820-538-12 and 11-5895-469-12, power source, the power source TM, and pioneer tools. You are assigned as a member of an ATC flight following team, with a requirement to move the flight coordination central.

Standards: Stop power, disconnect, disassemble and load the flight coordination central according to TM 11-5820-538-12, TM 11-5895-469-12, and power source TM.

Performance Steps

1. Stop the Power Source. Press the STOP (red) button on the front panel of the DC power supply. All indicator lights on the front panel of the DC power supply control box should extinguish.
2. Disconnect the External Cables.
   a. Power unit to shelter.
      (1) Perform stopping procedures.

> **WARNING**
>
> **Do not disconnect any cables until the power source for the equipment is shut down.**

      (2) Disconnect one of the 100-foot power cables between the output connector of the power unit and POWER IN receptacle on the power entrance panel.
      (3) Disconnect the grounding stud of the power unit with a grounding strap.
      (4) Disconnect the GROUND TERMINAL with a grounding strap.
   b. Telephone line/equipment. To shut down the telephone system, place all telephone key switches in the center (OFF) position. To monitor the telephone system while personnel are away from their positions, place the NIGHT ALARM switch on the audio coupler box in the UP position.
   c. Antenna cables. Disconnect the antenna cables from the antenna entrance panels. Be sure to unscrew all of the antenna cables so that they will not break from strain.
3. Dismantle the Antennas.
   a. Antenna number 1.
      (1) Unscrew all bolts and screws.
      (2) Remove the remaining HF antenna by unscrewing it from the base of the antenna coupler case.
      (3) Remove the UVU antenna from the front mounting bracket.
      (4) Loosen the bolts in the VUV antenna from the front antenna mounting bracket and unlatch the split ring portion of the clamp around the antenna.
      (5) Disconnect the SC-D-889535 antenna mounts (one on the curbside rear top corner and one on the roadside front top corner) and loosen the three bolts.
      (6) Remove the two remaining FM antennas from the tripods.

(7) Disassemble the two FM antenna tripods.
(8) Remove one FM antenna from the mount with the four bolts.
(9) Disconnect the SC-D-889536 FM antenna mount from the shelter and loosen the six bolts.

b. Antenna number 2.
(1) Unscrew all bolts and screws.
(2) Remove the remaining HF antenna by unscrewing it from the base of the HF coupler case.
(3) Remove the VUV antenna from the front mounting bracket.
(4) Loosen the three bolts from the roadside front top corner of the shelter and disconnect the SC-D-889535 antenna mount.
(5) Disassemble one FM antenna tripod and remove one FM antenna from the tripod.
(6) Remove one FM antenna from the mount with the four bolts.
(7) Loosen the six bolts from the shelter to disconnect the FM antenna.
(8) Remove one FM antenna in the SC-D-881815 adapter, which is part of the array mounted on the 50-foot mast.
(9) Disassemble the three FM antennas by loosening an AT-1095/VRC element from each AT-1096/VRC element. Screw the assembled elements into the antenna bases.
(10) Loosen the bolt in one end of the antenna support assembly and remove the SC-D-881835 adapter.
(11) Remove the UVU antenna by loosening the bolt and slipping the split ring portion of the clamp around the SC-D-881835 adapter.
(12) Loosen the bolt in the 50-foot antenna mast and disconnect the AB-720/G.

4. Load the Equipment.
a. Remove the blower.
b. Mount the storage box under the operator's console and tighten the four mounting lugs on the side of the box.
c. Tighten the rotary chairs and put them in the equipment room.
d. Mount the cable reels and tighten the cable reel brackets.
e. Secure the antenna mast to the floor bracket.
f. Mount the hold-down bracket by the door to secure the antenna mast.
g. Mount the folding chair and the plate section and secure them to the antenna mast.
h. Insert the pin to secure the holding bracket to the ceiling.
i. Secure the antenna to the roof using the brackets.
j. Lock the plate to the antenna base.
k. Screw the wing nut on the front wall of the shelter to the base of the antenna.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment.

Brief Soldier: Tell the soldier that he will be evaluated on preparing the AN/TSC-61B for movement

Performance Measures	GO	NO GO

NOTE: Applicable performance measures are determined by local conditions, mission requirements, and assigned equipment. Use TM 11-5820-538-12, TM 11-5895-469-12, and the power source TM.

1. Disconnects the external cables. ____ ____
2. Dismantles the antennas (installation number 1). ____ ____
3. Dismantles the antennas (installation number 2). ____ ____
4. Loads the equipment. ____ ____

NOTE: Some shelters have two eyes--one a lifting eye and the other a tie-down eye. Other shelters have a single eye, which serves as a lifting and a tie-down eye. If the shelter to be moved has two eyes, be sure the sling assembly hooks are connected to the lifting eye.

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
STP 1-93C1-SM-TG	None
TM 11-5820-538-12	
TM 11-5895-469-12	

Prepare the Beacon Set, AN/TRN-30 (V)1 or AN/TRN-30 (V)2, for Movement

011-143-5054

Conditions: You are assigned as a member of an ATC tower team given an operational AN/TRN-30 (V)1 or AN/TRN-30 (V)2 beacon, TM 11-5825-255-12, power source, power source TM, and pioneer tools.

Standards: Disconnect, disassemble and pack components of the AN/TRN-30 (V)1 or AN/TRN-30 (V)2 according to TM 11-5825-255-12.

Performance Steps

1. Perform Stopping Procedures.
   a. Pathfinder mode. Turn the transmitter PWR switch to OFF.
   b. Tactical and semifixed modes. Turn the transmitter PWR switch to OFF and the amplifier POWER switch to OFF.
   c. External power source. Turn the external power source off according to the applicable technical manual.

2. Disassemble the Antenna.

CAUTION: During removal, disassembly, erection, assembly, or repair of the antenna, conform to all safety requirements of TB 43-0129. Death or serious injury could result from failure to comply with safe practices.

   a. Fifteen-foot antenna. Disassemble the 15-foot antenna as described below.
      (1) Be sure that transmitter PWR switch is in the OFF position.
      (2) Remove the hold-down stakes and ground radials. Rewind the ground radials on the reels.
      (3) Loosen the guy lines from the snubbers and remove the antenna from the transmitter.
      (4) Disassemble the antenna by detaching each mast section and center loading coil.
      (5) Coil the guy lines to keep them from tangling.
      (6) Pull the guy line stakes out of the ground.
      (7) Place all of the items on the ground next to the rucksack.
   b. Thirty-foot antenna. Disassemble the 30-foot antenna as described below.
      (1) Be sure that the PWR switch on the transmitter is in the OFF position.
      (2) Remove the hold-down stakes and ground radials. Rewind the ground radials on the reels.
      (3) Slacken the windward guy lines and detach three leeward guy lines from the snubbers.
      (4) Lift the antenna out of the antenna receptacle and remove two 1 1/4-inch mast sections.
      (5) Slowly lower the antenna to the ground.
      (6) Detach the remaining guy lines from the snubbers and remove all of the guy line stakes from the ground.
      (7) Detach the top-loading web from the bottom mast section.
      (8) Disassemble the mast sections.
      (9) Carefully coil each guy line assembly.
      (10) Carefully coil the top-loading assembly and the top-loading guy lines.
      (11) Place all of the items next to the rucksack.
   c. Sixty-foot antenna. Disassemble the 60-foot antenna as described below.

(1) Be sure that the amplifier POWER switch and transmitter PWR switches are in the OFF position.
(2) Remove the hold-down stakes and ground radials. Rewind the ground radials on the reels.
(3) Slacken all guy lines.
(4) Raise the antenna mast from the antenna base on the amplifier.

CAUTION: To prevent damage to the antenna mast or injury to personnel, do not allow the mast to lean windward.

(5) Remove the mast sections one at a time from the bottom of the mast.
(6) Disconnect the top-loading assembly from the mast section.
(7) Lay the guy line plates on the ground as they are removed from the mast sections.
(8) Store the mast sections in the top cover of the amplifier transit case.
(9) Remove the guy lines from all snubbers.
(10) Coil the guy lines and the top-loading assembly carefully and place all of the items next to the transit case.
(11) Remove the stakes from the ground and coil the retainer cables around the stakes. Place all of the items next to the transit case. Disconnect the power source.

3. Disconnect the Power Source.
   a. AN/TRN-30(V)1.
      (1) Disconnect the battery cable from the 1J3 power connector.
      (2) Remove the antenna base support from the antenna receptacle.
      (3) Place the antenna cover plug into the 1J4 antenna receptacle.
      (4) Place all of the items next to the rucksack.
   b. AN/TRN-30(V)2.
      (1) Disconnect the audio and RF cables.
      (2) Install the connector dust caps.
      (3) Pack the transmitter in the transit case.

4. Disconnect the Amplifier (AN/TRN-30(V)2 only). Disconnect the amplifier as described below.
   a. Disconnect the audio and RF cables.
   b. Coil the cables and place them next to the transit case.
   c. Loosen the screws on all four amplifier legs and collapse the legs. Retighten the screws.
   d. Install the connector dust caps.

5. Pack the Components for Travel.
   a. Pathfinder mode. In the pathfinder mode, the 15-foot or 30-foot antenna, transmitter, battery, and associated hardware must be disassembled or disconnected and packed in the rucksack and the CY-7505/TRN-30(V) transmitter case before they are transported and reassembled at another site.
      (1) Prepare the battery for movement according to the applicable TM.

CAUTION

To prevent damage, transport the transmitter in the transit case. The transmitter should be transported in the rucksack only when it is being backpacked.

(2) Place all of the components in the appropriate compartment of the rucksack.

b. Tactical and semifixed mode. In the tactical and semifixed modes, the antenna, amplifier, transmitter, and cables must be disassembled or disconnected and packed in the CY-7143/TRN-30(V) before they are transported and reassembled at another site.
   (1) Pack all of the items in transit case.
   (2) Close and secure the transit case cover.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment.

Brief Soldier: Tell the soldier that he will be evaluated on preparing the AN/TRN-30 (V) 1 or AN/TRN-30 (V) 2 Beacon Set for movement

Performance Measures	**GO**	**NO GO**
NOTE: Use TM 11-5825-255-12 and the power source technical manual.		
1. Disassembles the 15-foot antenna.	____	____
2. Disassembles the 30-foot antenna.	____	____
3. Disconnects the transmitter.	____	____
4. Prepares the battery for travel.	____	____
5. Installs the components in the rucksack.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
TM 11-5825-255-12	None

Prepare the AN/TSQ-198 (Tactical Terminal Control System) for Movement
011-143-7002

Conditions: As an ATC tower operator, tactical team leader in a field environment, you are given AN/TSQ-198 TTCS and TMs 11-5895-1568-14 and 11-5985-357-13. (You are assigned as a member of an ATC team with an operational AN/TSQ-198 TTCS, and you are ordered to prepare your equipment for movement.)

Standards: Shutdown and disconnect all power and cables, disassemble and pack components of the AN/TSQ-198 TTCS according to TM 11-5895-1568-14.

Performance Steps

1. Shutdown Procedures.
2. Radio System Shutdown.
3. TTCS Cables Removal.
4. MMS Removal.
5. HF Whip Antenna Removal.
6. HF NVIS Antenna Removal.
7. VHF-FM Antenna Removal.
8. VHF/UHF-AM Antennas Removal.

Evaluation Preparation: Setup: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment.

Brief Soldier: Tell the soldier that he will be evaluated on preparing the AN/TSQ-198 TTCS for movement according to the appropriate TMs.

Performance Measures	GO	NO GO
1. Shutdown Procedures.	____	____
2. Radio System Shutdown.	____	____
3. TTCS Cables Removal.	____	____
4. MMS Removal.	____	____
5. HF Whip Antenna Removal.	____	____
6. HF NVIS Antenna Removal.	____	____
7. VHF-FM Antenna Removal.	____	____
8. VHF/UHF-AM Antennas Removal.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required

FAA Order 7110.65
TM 11-5895-1568-14
TM 11-5985-357-13

Related

AR 95-2
DA FORM 2404 (Equipment Inspection and Maintenance Worksheet)
DA FORM 3479-1-R (Trainee/Controller Evaluation)
DA FORM 3503-R (Air Traffic Control Position Log)
FM 3-52(FM 100-103)
FM 3-04.303(FM 1-303)

SUBJECT AREA 5: WEATHER/ADVISORIES

Process Pilot Reports (PIREPS)
011-143-0012

Conditions: You are assigned to a control position in an ATC facility and you receive a report with a significant change in weather. [Solicit PIREPS when a significant change in the weather is observed or reported to your facility.]

Standards: Request, record, and disseminate PIREP information according to FAA Order 7110.65 and FM 3-04.230(FM 1-230).

Performance Steps

1. Request PIREP Information. Significant PIREP information includes reports of strong frontal activity, squall lines, thunderstorms, light to severe icing, wind shear and turbulence (including clear air turbulence) of moderate or greater intensity, or other conditions pertinent to flight safety. Solicit a PIREP when one is requested or when one of the conditions listed below exists or is forecasted for your area.
   a. Ceilings at or below 5,000 feet. (These PIREPs shall include cloud base/top reports when feasible.) Ensure that at least one descent/climb-out PIREP, including cloud bases, tops, and other related phenomena, is obtained each hour when the ceiling is at or below 5,000 feet.
   b. Visibility (surface or aloft) is at or less than 5 miles.
   c. Thunderstorms and related phenomena.
   d. Turbulence of moderate degree or greater.
   e. Icing of light degree or greater.
   f. Wind shear.
   g. Braking action advisories are in effect.

2. Record Pertinent Information with the PIREP.
   a. Record with the PIREP—
      (1) the time.
      (2) the position of the aircraft.
      (3) the type of aircraft.
      (4) the altitude of the aircraft.
   b. Obtain the PIREP directly from the pilot or, if the PIREP has been requested by another facility, you may instruct the pilot to deliver it directly to that facility. The correct terminology to use when requesting a PIREP is: "Request flight conditions," or, if appropriate, "Request (specific conditions, such as ceiling, visibility, and so forth) conditions." "Over (fix)" or "Along present route" or "Between (fix) and (fix)."

3. Disseminate PIREP Information.
   a. Relay pertinent PIREP information to concerned aircraft in a timely manner.
   b. Relay all operationally significant PIREPs to the appropriate intrafacility positions, the FSS serving the area in which the report was obtained, and other concerned terminal or en route ATC facilities, including non-FAA facilities.

NOTE: The FSS is responsible for Service A dissemination.

   c. Use the words gain and/or loss when describing to pilots the effects of wind shear on airspeed. Some examples of the terminology to use when describing wind shear are:

"Delta Seven Twenty-One, a Boeing Seven Twenty-Seven, previously reported winds hear, loss of two five knots at four hundred feet." Another example is: "US Air Seventy-Six, a D-C Niner, previously reported wind shear, gain of twenty-five knots between niner hundred and six hundred feet, followed by a loss of five zero knots between five hundred feet and the surface."

Evaluation Preparation: SETUP: Require the soldier to process pilot reports. He must be able to request, record, and disseminate the PIREP. The supervisor may simulate this task by acting as the calling or receiving party.

Brief Soldier: Tell the soldier that he will be evaluated on his abilities to request, record, and disseminate PIREPS according to FAA Order 7110.65.

Performance Measures	GO	NO GO
1. Solicits PIREP information. a. Ceiling at or below 5,000 feet. b. Visibility at or less than 5 miles. c. Thunderstorms and related phenomena. d. Turbulence of moderate degree or greater. e. Icing of light degree or greater. f. Wind shear.	___	___
2. Records pertinent information. a. Time of observation. b. Location of aircraft. c. Extent of reported phenomena. d. Type of reporting aircraft and altitude of aircraft. e. Other pertinent data.	___	___
3. Disseminates PIREP information.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
FAA Order 7110.65 FM 3-04.230(FM 1-230)	None

Decode METAR Weather Reports
011-143-5063

Conditions: While performing duties as an ATC operator or aviation operations specialist, you are given an encoded aviation routine weather report (METAR).

Standards: According to DOD Flip General Planning, FAA Orders 7340.1 and 7350.7, FM 3-04.230(FM 1-230), and ICAO Document 7910.

Performance Steps

Decode METAR Weather Report.

Evaluation Preparation: Setup: In an actual setting, require the soldier to interpret and post a METAR weather report. However, providing the soldier with a sample weather report and asking him to decode it may simulate the requirement.

Brief Soldier: Tell the soldier he will be evaluated on his ability to decode the METAR codes. The soldier will not be informed of his progress during the performance of the task.

Performance Measures	GO	NO GO
Decodes METAR weather report.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
FAA Order 7340.1	None
FM 3-04.230(FM 1-230)	
DOD FLIP General Planning	
FAA Order 7350.7	
ICAO Document 7910	

SUBJECT AREA 6: AIR TRAFFIC CONTROL FORMS

Process Flight Progress Strips
011-143-0014

Conditions: As an ATC operator, manning a flight data position, you are given strip holders and FAA Form 7230-8 (Flight Progress Strip). (Process flight [aircraft] information received over the telephone and/or radio.)

Standards: Initiate, maintain, and sequence flight progress strips upon receipt of flight information according to FAA Order 7110.65.

Performance Steps

1. Initiate Flight Progress Strips.
   a. Arrivals. Complete the flight strip blocks according to the instructions provided below.
      (1) Block 1. Enter the aircraft identification.
      (2) Block 2. Enter the strip request originator.
      (3) Block 3. Enter the number of aircraft if there is more than one; the TCAS/heavy aircraft indicator, if appropriate; the type of aircraft; and the aircraft equipment suffix. The TCAS indicator is "T/," and the heavy aircraft indicator is "H/." For aircraft that are both TCAS and heavy, the indicator is "B/."
      (4) Block 4. Enter the computer identification number, if required.
      (5) Block 5. Enter the assigned secondary radar (beacon) code.
      (6) Block 6. Enter the previous fix or inbound airway.

NOTE: Use of the inbound airway is restricted to facilities where flight data is received via interphone when agreed upon by the center and terminal facilities.

      (7) Block 7. Enter the coordination fix.
      (8) Block 8. Enter the estimated time of arrival at the coordination fix or destination airport.
      (9) Block 9. Enter the altitude (in hundreds of feet) and any remarks.
      (10) Block 9a. Enter the destination airport, point-out, radar vector, and speed adjustment information. Air traffic managers may authorize the omission of any of these items if no misunderstanding will result. They also may authorize the optional use of spaces 2A and 10 through 18 for point-out/radar vector or speed adjustment information.
      (11) Blocks 10 through 18. Enter data as specified by a facility directive. Radar facility personnel need not enter data in these spaces except when nonradar procedures are used or when radio recording equipment is inoperative.
   b. Departures. Complete the flight strip blocks according to the instructions provided below.
      (1) Block 1. Enter the aircraft identification.
      (2) Block 2. Enter the strip request originator.
      (3) Block 3. Enter the number of the aircraft if there is more that one; the TCAS/heavy aircraft indicator, if appropriate; the type of aircraft; and the aircraft equipment suffix. The TCAS indicator is "T/," and the heavy aircraft indicator is "H/." For aircraft that are both TCAS and heavy, the indicator is "B/."
      (4) Block 4. Enter the computer identification number, if required.
      (5) Block 5. Enter the assigned secondary radar (beacon) code.

(6) Block 6. Enter the proposed departure time.
(7) Block 7. Enter the requested altitude.
(8) Block 8. Enter the departure airport.
(9) Block 9. For machine-generated flight strips, enter the route, destination, and any remarks. Manually enter the altitude and altitude restrictions in the order flown, if appropriate. For manually prepared flight strips, enter the clearance limit, route, and altitude and/or altitude restrictions in the order flown, if appropriate, and any remarks.
(10) Block 9a. Enter point-out, radar vector, and speed adjustment information. Air traffic managers may authorize the optional use of spaces 2A and 10 through 18 for this information.
(11) Blocks 10 through 18. Enter data as specified by a facility directive. Items, such as the departure time, the runway used for takeoff, and check marks to indicate information forwarded or relayed, may be entered in these spaces.

2. Maintain Flight Progress Strips.
   a. As outlined in FAA Order 7110.65, FAA Forms 7230-7 (Flight Progress Strip), 7230-7.2 (Flight Progress Strip), or 7230-8 shall be used to record all instrument approaches.
   b. If there is an advantage in doing so, tower facilities may use VFR logs or note pads instead of flight strips to record all VFR operations except flight-following movements. With the exception of GCA facilities, all others shall record IFR and VFR operations on flight strips. Strips shall be filed daily and retained for minimum of 15 days.

3. Sequence Flight Progress Strips.
   a. Sequence flight progress strips in chronological order of arrival.
   b. Sequence departure aircraft by time of departure.

Evaluation Preparation: Setup: This task may be simulated by the supervisor. Give the soldier the situation and equipment. The supervisor can act as the transmitting or receiving station.

Brief Soldier: Tell the soldier he will be evaluated on their ability to properly process flight progress strips according to FAA Order 7110.65 and FM 3-04(FM 1-303).

Performance Measures	**GO**	**NO GO**
1. Initiates flight progress strips.	____	____
2. Maintains flight progress strips.	____	____
3. Uses control symbology.	____	____
4. Uses standard hand-printed characters.	____	____
5. Corrects entries.	____	____
6. Arranges flight progress strips.	____	____
7. Retains flight progress strips.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
FAA Form 7230-8	FAA Order 7110.65

Record ATC Facility Daily Activities

011-143-5055

Conditions: You are assigned to a shift in an ATC facility and given DA Forms 3502-R (Daily Report of Air Traffic Control Facility) and 3503-R (Air Traffic Control Position Log). If assigned to a GCA facility, you are also given DA form 3501-R (GCA Operations Log).

Standards: Record, without error, all daily ATC activities using the forms required for the facility.

Performance Steps

1. Records Facility Information and Date on DA Form 3502-R.
   a. Records the facility or log opening and closing.
   b. Records entries on DA Form 3502-R describing all abnormal conditions, unusual occurrences, or items of interest.
   c. The individual making each entry in the remarks section records operating initials.

   CONDITION: You are assigned to a shift in an ATC facility and given DA Form 3502-R.

2. Records Facility Information and Date on DA Form 3503-R.
   a. Records operator's initials in the appropriate control-position block.
   b. Records initials of controllers requiring direct supervision.

   CONDITION: You are assigned to a shift in an ATC facility and given DA Form 3503-R.

3. Records Facility Information on DA Form 3501-R.
   a. Records check mark in the appropriate column for VFR or IFR aircraft.
   b. Records aircraft information in the appropriate column.
      (1) IFR or VFR aircraft.
      (2) Aircraft identification.
      (3) Aircraft type.
      (4) Radar time.
      (5) Type approach.
   c. Records operating initials of the controller conducting the approach in the appropriate column.
      (1) PAR.
      (2) ASR.
   d. Records operating initials of the controller monitoring the approach.
   e. Records operating initials of the controller monitoring the departure.
   f. Records the operating initials of the controller conducting a simulated approach.

NOTE: Unless it satisfies a training requirement, data that is considered irrelevant may be eliminated when simulated approaches are being conducted.

   g. Records remarks such as missed approach or other control instructions.

   CONDITION: You are assigned to a shift in an ATC facility and given DA Forms 3501-R, 3502-R, and 3503-R.

Evaluation Preparation: Setup: This task may be simulated by the supervisor. Tell the soldier the that he will be required to record, without error, all daily ATC activities using the forms required for the facility.

Brief Soldier: Tell the soldier he will be evaluated on his ability to record ATC facility's daily activities.

Performance Measures	**GO**	**NO GO**
Initiates forms at the beginning of each calendar day (0000 local time or whenever a facility begins operations for the day), making entries in coordinated universal time according to FM 3-04.303 (FM 1-303). Describes all abnormal conditions, unusual occurrences, or items of interest according to FM 3-04.303(FM 1-303), paragraph 4-10b. Initials all entries as required by FM 3-04.303(FM 1-303). Type or draw a line through incorrect entries. Only uses authorized Army, FAA, and ICAO abbreviations and phrase contractions according to FM 3-04.303(FM 1-303). Close the logs according to FM 3-04.303 (FM 1-303), paragraph 4-10e.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
DA Form 3479-1-R	None
DA Form 3479-R (Training and Proficiency Record - Air Traffic Controller)	
DA Form 3501-R	
DA Form 3502-R	
DA Form 3503-R	

SUBJECT AREA 7: NONRADAR CONTROL PROCEDURES

Control the Flight of VFR/SVFR Aircraft
011-143-0026

Conditions: While performing duties as an air traffic control operator on the local control position in an ATC tower, you receive landing and departure request from an aircraft.

Standards: Issues all require information and applies appropriate separation criteria to VFR aircraft within assigned airspace according to FAA Order 7110.65.

Performance Steps

1. Issue Arrival Information.
   a. Issue wind, runway, and altimeter setting information at the airport of intended landing. This information may be omitted if it is in the ATIS broadcast and the pilot states the appropriate ATIS code or uses the phrase, "Have numbers."

NOTE: The pilot's use of the phrase "have numbers" does not mean that he has received the ATIS broadcast.

   b. Issue traffic information as the work load permits.
   c. Issue the time or place where the aircraft is to contact the tower on the local control frequency for further landing information.

NOTE: When the pilot of an aircraft makes initial contact with the tower, you may suggest that he contact approach control for landing and traffic information.

2. Issue Holding Instructions.
   a. Clear the aircraft to hold at selected, prominent geographical fixes which can be easily recognized from the air (preferably those shown on sectional charts).

NOTE: At some locations, VFR checkpoints are shown on sectional aeronautical and terminal area charts. When selecting geographical fixes, the depicted VFR checkpoints are preferred unless the pilot exhibits a familiarity with the local area.

   b. Issue traffic information to aircraft cleared to hold at the same fix. The phraseology to use is shown below.

   Phraseology: "Hold at (location) until (time or other condition)."

   "Traffic (description) holding at (fix, altitude if known)."

   Or,

   "Proceeding to (fix) from (direction or fix)."

3. Provide Proper Spacing and Sequencing Instructions to Arriving or Departing Aircraft. Establish the sequence of arriving and departing aircraft by requiring them to adjust their flight or ground operation, as necessary, to achieve proper spacing. The phraseology to use is shown below.

   Phraseology: "Cleared for takeoff."

"Cleared for takeoff or hold short/hold in position/taxi off the runway (traffic)."

"Extend downwind."

"Make short approach."

"Number (landing sequence number)."

"Follow (description and location of traffic)."

Or, if traffic is using another runway,

"Traffic (description and location) landing runway (number of runway being used)."

"Circle the airport."

"Make left/right three-sixty/two-seventy."

"Go around."

"Cleared to land."

"Cleared for:"

"Touch-and-go."

Or,

"Stop-and-go."

Or,

"Low approach."

"Cleared for option."

Or,

"Option approved."

Or,

"Unable option, (alternate instructions)."

Or, "Unable (type of option), other options approved."

NOTE 1: The cleared-for-the-option procedure gives an instructor pilot/flight examiner/pilot the option to make a touch-and-go, low approach, missed approach, stop-and-go, or full-stop

landing. This procedure will be used only at those locations with an operational control tower and will be subject to ATC approval.
NOTE 2: For proper helicopter spacing, speed adjustments may be more practical than course changes.

4. Apply Arrival Separation Between Aircraft of the Same or Different Categories.
   a. The first aircraft has landed and taxied off the runway. If, between sunrise and sunset, you can determine distances by referring to suitable landmarks and the first aircraft has landed, it need not be clear of the runway if the following minimum distance from the landing threshold exists: Three thousand feet when a Category I aircraft lands behind a Category I or II aircraft.
   b. The first aircraft has departed and crossed the runway end. If you can determine distances by referring to suitable landmarks and the first aircraft is airborne, it need not have crossed the runway end if the following minimum distance from the landing threshold exists:
      (1) Three thousand feet when a Category I aircraft lands behind a Category I or II aircraft.
      (2) Four thousand five hundred feet when a Category II aircraft lands behind a Category I or II aircraft.
      (3) Six thousand feet when either aircraft is a Category III aircraft.

5. Apply Departure Separation Between Two or More Aircraft Operating on the Same Airfield. Separate a departing aircraft from a preceding departing or arriving aircraft using the same runway by ensuring that it does not begin a takeoff roll until the other aircraft has departed and crossed the runway end or turned to avert any conflict. If you can determine distances by referring to suitable landmarks, the first aircraft need only be airborne if the following minimum distance exists between aircraft:
   a. Three thousand feet when only Category I aircraft are involved.
   b. Three thousand feet when a Category I aircraft is preceded by a Category II aircraft.
   c. Four thousand five hundred feet when either the succeeding or both aircraft are Category II aircraft.
   d. Six thousand feet when either is a Category III aircraft.
   e. When the succeeding aircraft is a helicopter, visual separation may be applied instead of distance minimums.

6. Apply VFR Separation to Helicopters. Separate an arriving helicopter from other helicopters by ensuring that it does not land until one of the conditions given below exists.
   a. A preceding, arriving helicopter has come to a stop or taxied off the landing area.
   b. A preceding, departing helicopter has left the landing area.

7. Approve Operations for SVFR Aircraft. Special VFR operations in weather conditions that are less than basic VFR minimums are authorized as shown in the following paragraphs.
   a. For fixed-wing aircraft at any location not prohibited by FAR 93 or when an exemption to FAR 93 has been granted and an associated letter of agreement published.
   b. Only within the lateral boundaries of Class B, C, D, or E surface areas below 10,000 feet MSL.
   c. Only when requested by the pilot.
   d. On the basis of weather conditions reported at the airport of intended landing or departure.
   e. When weather conditions are not reported at the airport of intended landing or departure and the pilot advises that he cannot maintain VFR and requests special VFR. The phraseology to use is shown below.

Phraseology: "Cleared to enter/out of/through control zone"

And, if required,

"(Direction) of (name) airport (specified routing),"

And

"Maintain special V-F-R conditions while in control zone,"

"Or as applicable for operation under an exemption from FAR 93,

"Cleared for (coded arrival or departure procedure) arrival/departure, (additional instructions as required)."

f. When the primary airport is reporting VFR, special VFR operations may be authorized for aircraft transiting a Class B, C, D, or E surface area when the pilot advises that he cannot maintain basic VFR.

8. Approve a Request for Local SVFR Operations.
   a. Upon request, authorize local special VFR operations for a specified period (series of landings, takeoffs, and so on) if the aircraft can be recalled when traffic or weather conditions require. Where warranted, letters of agreement may be consummated. The phraseology to use is shown below.

   Phraseology: "Local special V-F-R operations in the immediate vicinity of (name) airport are authorized until (time). Maintain special V-F-R conditions."

   b. Control facilities may also authorize an FSS to transmit SVFR clearance so that only one aircraft at a time operates in a Class B, C, D, or E surface area unless pilots agree that they will maintain visual separation with other aircraft operating in a Class B, C, D, or E surface area. Such authorization concerning visual separation by pilots shall be contained in a letter of agreement between the control facility and the FSS.

Evaluation Preparation: Setup: This task may be simulated by providing the soldier with canned VFR and SVFR aircraft. The supervisor should act as the calling or receiving party.

Brief Soldier: Tell the soldier he will be evaluated on the decisions, procedures, and phraseology he uses to control VFR/SVFR aircraft.

Performance Measures	**GO**	**NO GO**
1. Issues departure information.	____	____
2. Provides spacing and sequencing.	____	____
3. Issues landing information.	____	____

Performance Measures	GO	NO GO
4. Provides helicopter departure separation (VFR).	___	___
5. Provides helicopter arrival separation (VFR).	___	___
6. Provides visual holding of VFR aircraft.	___	___
7. Provides VFR/SVFR departure separation.	___	___
8. Provides VFR/SVFR arrival separation.	___	___
9. Transfers control and radio communications.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
AR 95-2	None
DOD FLIPs	
FAA Form 7230-8	
FAA Order 7110.65	
FAA Order 7110.10	
FM 3-04.303(FM 1-303)	

Provide Nonradar IFR Service

011-143-1043

Conditions: As an ATC tower operator, given local flying area map (or, blank paper and/or template of local fling area with appropriate DOD FLIPS), ATC facility training manual, DA Form 3503-R, FAA Form 7230-8 with holders, and aircraft requiring IFR arrival and departure information. [You have a requirement to provide nonradar IFR services.]

Standards: Construct the local flying area according to local SOP, select the appropriate IFR separation, and formulate clearances according to FAA Order 7110.65.

Performance Steps

1. Constructs Local Flying Area.
   a. Airways.
   b. NAVAIDS.
   c. Intersections.
2. Initiate Flight Progress Strips.
3. Maintain Flight Progress Strips.
4. Separate IFR Aircraft.
   a. Arrival.
   b. Departure.
5. Formulate IFR Clearances.
   a. Arrival.
   b. Departure.

Evaluation Preparation: Setup: This task may be simulated by providing soldiers with canned IFR arrivals or departures. The supervisor should act as the calling or receiving party.

Brief Soldier: Tell the soldier that he will be evaluated on his decisions and the procedures and phraseology he uses to control aircraft making nonradar IFR departures.

Performance Measures	GO	NO GO
1. Selects vertical separation.	____	____
2. Selects longitudinal separation.	____	____
3. Selects lateral separation.	____	____
4. Conducts aircraft holding.	____	____
5. Issues approach information to aircraft.	____	____
6. Issues approach clearance to aircraft.	____	____
7. Receives/formulates IFR departure clearance.	____	____

Performance Measures	GO	NO GO
8. Issues departure clearance.	___	___
9. Issues abbreviated departure clearance.	___	___
10. Assigns departure restrictions.	___	___
11. Coordinates with the receiving facility.	___	___
12. Handles a VFR release of an IFR departure.	___	___
13. Forwards departure delay information on departure times.	___	___
14. Provides initial separation between successive departing aircraft.	___	___
15. Provides initial separation of departing and arriving aircraft.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
DA Form 3503-R	DA Form 3479-1-R
FAA Form 7230-8	DOD FLIPS
	FAA Order 7110.65

SUBJECT AREA 8: RADAR PROCEDURES

Control the Flight of IFR/SVFR Arrival/Departure Aircraft
011-143-0025

Conditions: As a controller in an ATC facility, during IFR weather, given DOD FLIPS and METAR weather report, and you must issue all required arrival and departure information and apply appropriate separation criteria. You receive a pilot's request for IFR/SVFR arrival/ departure service for his aircraft

Standards: Applies correct IFR/VFR tower and radar procedures, separations and phraseology in time for it to be useful to the pilot according to FAA Order 7110.65.

Performance Steps

1. Issue Arrival Information.
2. Issue VFR Holding Instructions.
3. Request, issues Approved Clearances for SVFR Operations.
4. Request, Issues Approved Clearances for Local SVFR Operations.
5. Applies arrival/Departure Separation Between IFR/SVFR Aircraft of the Same or Different Categories.
6. Provide Radar Vectors.
7. Departing Aircraft Requesting Radar Service.
8. Arriving Aircraft Using Radar Procedures.

Evaluation Preparation: Setup: This task may be simulated by providing the soldier with canned IFR and SVFR aircraft. The supervisor should act as the calling or receiving party.

Brief Soldier: Tell the soldier he will be evaluated on the decisions, procedures, and phraseology he uses to control IFR/SVFR aircraft.

Performance Measures	GO	NO GO
1. Identifies approach and departure categories for IFR aircraft.	____	____
2. Controls departing aircraft.	____	____
3. Controls arriving aircraft.	____	____
4. Provides vectors.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
DOD FLIPs	AV0905
DOD FLIP Low Altitude Instrument Approach Procedures	DA Form 3501-R
	FAA Order 7110.65

Transfer Radar Identification
011-143-0100

Conditions: As a GCA controller working in a radar ATC facility, you are given a radar identified aircraft.

Standards: Perform radar transfer identification procedures according to FAA Order 7110.65.

Performance Steps

1. Transfer Control of a Radar-identified Aircraft.
   a. Transfer control of a radar-identified aircraft using one of the methods described below.
      (1) Physically point to the target on the receiving controller's display.
      (2) Use landline voice communications.
   b. When making a handoff or point-out or when issuing traffic restrictions, relay information to the receiving controller in the order described below.
      (1) Relay the position of the target relative to a fix, map symbol, or radar target that is known and displayed by both the receiving and transferring controller.
      (2) Relay the aircraft identification (call sign) or, during interfacility point-outs only, the discrete beacon code of the aircraft if both the receiving and transferring controllers agree.

NOTE: Acceptance of a point-out using the discrete beacon code as the aircraft's identification constitutes agreement.

      (3) Relay the assigned altitude, appropriate restrictions, and information that the aircraft is climbing or descending, if applicable, except when inter/intrafacility directives ensure that the altitude information will be known by the receiving controller.

Phraseology: "(Aircraft ID) (restrictions, if applicable) RADAR CONTACT,"

Or

"(Aircraft ID or discrete beacon code) (restrictions, if applicable) POINT-OUT APPROVED,"

Or

"Traffic observed,"

Or

"Unable (appropriate information, as required)."

2. Receive Control of a Radar-identified Aircraft.
   a. The transferring controller shall accomplish the tasks described below.
      (1) Complete a radar handoff before the aircraft enters the airspace delegated to the receiving controller.
      (2) Verbally obtain the receiving controller's approval before making any changes to the flight path or altitude of the aircraft or data block information while the handoff is being initiated or after the handoff is accepted.

(3) Before transferring communications, ensure that potential violations of adjacent airspace and potential conflicts between aircraft in their own area of jurisdiction are resolved. Coordination must be made with all controllers through whose area of jurisdiction the aircraft will pass before they enter the receiving controller's area of jurisdiction. This coordination must be accomplished except when it is the receiving controller's responsibility or when a letter of agreement or a facility directive states otherwise.

NOTE: The transferring controller will also ensure that the receiving controller obtains all issued restrictions.

(4) Comply with restrictions issued by the receiving controller unless other coordination has been effected.

(5) Transfer communications when the transfer of radar identification has been accepted.

NOTE: Before the ARTS "Modify/Quick Look" function is used to transfer radar identification, a facility directive is required that specifies communication transfer points.

(6) Advise the receiving controller of pertinent information not contained in the data block, flight progress strip, or a letter of agreement or facility directive. Pertinent information includes—

(a) Assigned heading.
(b) Air speed restrictions.
(c) Issued altitude information.
(d) Observed track or deviation from the last route clearance.
(e) Beacon code, if different from that normally used or previously coordinated.
(f) Any other pertinent information.

b. The receiving controller shall accomplish the tasks described below.

(1) Ensure that the target position corresponds with the position given by the transferring controller or that there is an appropriate association between an automated data block and the target being transferred before accepting a handoff.

(2) Issue restrictions that are needed for the aircraft to enter your sector safely before accepting the handoff.

(3) Comply with restrictions issued by the initiating controller unless otherwise coordinated.

c. Ensure that coordination has been accomplished before issuing control instructions that will change the heading route, speed, altitude, or beacon code of an aircraft in another controller's area of jurisdiction. Coordinate with each of the controllers listed below whose area of jurisdiction is affected by those instructions unless otherwise specified by a letter of agreement or a facility directive.

(1) The controller within whose area of jurisdiction the control instructions will be issued.

(2) Any intervening controller through whose area of jurisdiction the aircraft will pass.

d. After accepting a handoff from another controller, confirm the identity of the primary target by advising the pilot of the aircraft of the position and beacon target. This is done by observing a code change, an identification reply, or a standby squawk, unless one of these was used during the handoff. When aircraft identification is assured by sequencing or positioning before the handoff and the parent approach control facility delegates responsibility to the tower and GCAs to provide radar separation, these provisions do not apply.

Evaluation Preparation: Setup: Evaluate the task during a period when the performance measures can be assessed thoroughly. If necessary, simulate the requirements by providing the soldier with simulated situations. The supervisor may act as the calling or receiving party.

Brief Soldier: Tell the soldier he will be evaluated on the procedures and phraseology for transferring and receiving transfers of an aircraft from one controller to another. The soldier will not be informed of his progress during the performance of the task.

Performance Measures	**GO**	**NO GO**
NOTE: Applicable performance measures are determined by local conditions, mission requirements, and assigned equipment.		
1. Transfers radar identification of an aircraft.	____	____
a. Transfers radar identification of an aircraft using one of the following approved methods:		
(1) Physically points to the target on the receiving controller display.		
(2) Uses landline communications.		
b. Relays information to the receiving controller in the following sequence:		
(1) Position of the target relative to a fix, map symbol, or radar target known and displayed by both the receiving and the transferring controller.		
(2) Aircraft identification.		
(3) Altitude.		
2. Hands off an aircraft.	____	____
a. Hands off an aircraft using physical point-out procedures.		
(1) Initiating controller points to the aircraft's location on the scope.		
(2) Receiving controller indicates when ready.		
(3) Initiating controller says, "Hand off," and states the aircraft identification and altitude information.		
(4) Receiving controller looks for the target to establish radar identification, states the aircraft identification, and says, "Radar contact."		
b. Hands off an aircraft using interphone procedures.		
(1) Initiating controller makes the interphone connection, listens to ensure the circuit is not in use, states the intended receiving controller's identification, and says, "Hand off."		
(2) Receiving controller states the receiving controller's identification.		
(3) Initiating controller states the aircraft's position and aircraft identification and altitude information.		
(4) Receiving controller looks for the target to establish radar identification, reads back the aircraft identification, says "Radar contact," and states the operating initials.		
3. Performs point-out procedures.	____	____
a. Points out the aircraft using physical procedures.		
(1) Initiating controller points to the aircraft's location on the scope.		
(2) Receiving controller indicates when ready.		

Performance Measures **GO** **NO GO**

(3) Initiating controller says, "Point out," and states the aircraft identification and altitude and route information.
(4) Receiving controller looks for the target to establish radar identification, states the aircraft identification, and says, "Point out approved."

b. Points out the aircraft using interphone procedures.
(1) Initiating controller makes the interphone connection, listens to ensure the circuit is not in use, states the intended receiving controller's identification, and says, "Point out."
(2) Receiving controller states the receiving controller's identification.
(3) Initiating controller states the aircraft's position, aircraft identification and altitude, and route information.
(4) Receiving controller looks for the target to establish radar identification, reads back the aircraft identification, says, "Point out approved," and states the operating initials.

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
FAA Order 7110.65	AV0905
FM 3-04.303(FM 1-303)	AV0992

Provide Radar Approach Information
011-143-1038

Conditions: While assigned to a control position in a GCA facility, you are given aircraft approach information and instructions for aircraft requesting radar approaches.

Standards: Provides initial approach information, all phraseology, and procedures, according to FAA Order 7110.65.

Performance Steps

1. Provide Initial Approach Information. Issue the following information to an aircraft conducting a radar approach: altimeter setting; ceiling and visibility information; special weather observations; airport conditions, and lost communications procedures when required. Current approach information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS broadcast code. All items discussed below may be omitted after the first approach if repeated approaches are made and no change has occurred. In this phase of the approach, transmissions with the aircraft should occur approximately every minute.
   a. Altimeter setting. Provide the altimeter setting to the aircraft.
   b. Ceiling and visibility information. If available, provide the ceiling and visibility if the ceiling at the airport of the intended landing is reported below 1,000 feet or below the highest circling minimum (whichever is greater) or if visibility is less than 3 miles. Advise pilots via the automated weather observation system/automated surface observation system when weather information is available and issue the appropriate frequency.
   c. Special weather observations. Issue any known changes classified as special weather observations as soon as possible. Special weather observations need not be issued after they are included in the ATIS broadcast and the pilot states the appropriate ATIS broadcast code.
   d. Airport conditions. Issue pertinent information on known airport conditions if it is considered necessary to the safe operation of the aircraft concerned.
   e. Lost communications procedures. Issue lost communications procedures when required. When weather reports indicate that an aircraft will likely encounter IFR weather conditions during the approach, take the actions described below as soon as possible after establishing radar identification and radio communications. (These actions may be omitted after the first approach when successive approaches are made and the instructions remain the same.)

NOTE: Air traffic control facilities at US Army installations are not required to transmit lost communications instructions to military aircraft. All military facilities will issue specific lost communications instructions to civil aircraft when required.

(1) If lost communication instructions will require the aircraft to fly on an unpublished route, issue the pilot an appropriate altitude. If the lost communications instructions are the same for both the pattern and final approaches, the pattern/vector controller shall issue both. If radio communications are lost for a specified time interval (but not more than 1 minute) on vector to final approach, 15 seconds on a surveillance final approach, or 5 seconds on a PAR final approach, advise the pilot to—
   (a) Attempt contact on a secondary frequency.
   (b) Proceed according to visual flight rules, if possible.
   (c) Proceed with an approved nonradar approach or execute the specific lost communications procedures for the radar approach being used.

NOTE: Facility SOP and training manuals will specify the exact lost communications procedures, when applicable, for that facility. The phraseology for lost communications procedures is given below.

Phraseology: "If no transmissions are received for (time interval) in the pattern or five/fifteen seconds on final approach, attempt contact on (frequency)," and if the possibility exists, "proceed VFR."

"If unable, proceed with (nonradar approach), maintain (altitude) until (established on/over/fix/NAVAID/approach procedure)."

Or

(Alternative instructions).

(2) If final approach lost communications instructions are changed, differ from those for the pattern, or are not issued by the pattern controller, the final controller shall issue them.
(3) If the pilot states that he cannot accept a lost communications procedure because of weather conditions or other reasons, request his intentions.

NOTE: The pilot is responsible for determining the adequacy of lost communications procedures with respect to aircraft performance, equipment capability, or reported weather.

2. Issue Additional Approach Information Before Beginning the Final Approach.

NOTE 1: ASR approach procedures may be prescribed for specific runways, an airport or heliport, and helicopters to a point-in-space only; that is, a MAP from which a helicopter must be able to proceed to the landing area by visual reference to a prescribed surface route.

NOTE 2: Occasionally, helicopter PAR approaches are available to runways where conventional PAR approaches have been established. When two PAR approaches serve the same runway, the helicopter approach has a steeper glide slope and a lower decision height. When the controller designates the approach to be flown, the helicopter pilot understands which of the two approaches he has been vectored for and which set of minimums apply.

a. Inform the pilot of the type of approach and runway. Also inform him of the airport, heliport, or other point, as appropriate, to which the approach will be made. Specify the airport name when the approach is to a secondary airport. The phraseology to use is shown below.

Phraseology: "This will be a P-A-R/surveillance approach,"

Or

"Runway (runway number)," or "(airport name) airport/heliport."

b. For surveillance approaches, specify the location of the MAP in relation to the runway, airport, or heliport. The phraseology to use is shown below.

Phraseology: "Missed approach point is (distance) mile(s) (direction from landing area) of (airport name) airport/heliport."

An example of a helicopter point-in-space approach is shown below.

Example: "Army copter Zulu Two, this will be a surveillance approach to a missed approach point, three point five miles south of Creedon Heliport."

c. Inform the pilot of an aircraft making an approach to an airport not served by a tower that no traffic or landing runway information is available for that airport. The phraseology to use is shown below.

Phraseology: "No traffic or landing runway information available for the airport."

3. Issue no-gyro approach information when required. Issue no-gyro approach information when an aircraft is to make a no-gyro surveillance or a PAR approach.
   a. Before issuing a vector, inform the pilot of the type of approach. The phraseology to use is shown below.

   Phraseology: "This will be a no-gyro surveillance/PAR approach."

   b. Instruct the pilot when to start and stop the turn. The phraseology to use is shown below.

   Phraseology: "Turn left/right." "Stop turn."

   c. After the turn on the final approach has been made and before the aircraft reaches the approach gate, instruct the pilot to make a half-standard rate turn. The phraseology to use is shown below.

   Phraseology: "Make half-standard rate turns."

4. Issue radar contact lost instruction. Issue radar contact lost instruction if radar contact is lost during an approach and the aircraft has not started final approach. Clear the aircraft to an appropriate NAVAID or fix for an instrument approach, as applicable.

5. Issue landing check instructions for the type of pattern being used. Advise the pilot to perform a landing check while the aircraft is on the downwind leg. Ensure that the pilot has time to complete the landing check before he turns base leg. If an incomplete pattern is used, issue these instructions before the aircraft is handed off to the final controller for a PAR approach or before the aircraft starts to descend on the final approach for a surveillance approach. The phraseology to use is shown below.

   Phraseology: "Perform landing check."

6. Issue position information. Inform the pilot of the position of the aircraft at least once before beginning the final approach. The phraseology to use is shown below.

   Phraseology: "(Number) miles (direction) of (airport name) airport"

   Or

   "(Number) miles (direction) or (airport name) airport on downwind/base leg."

7. Issue final controller changeover instructions. Include the name of the facility when instructing the pilot to change frequencies for final approach guidance. The phraseology to use is shown below.

   Phraseology: "Contact (name of facility) final controller on (frequency)."

8. Request communications check. On initial contact with the final controller, ask the pilot of the aircraft for a communication check. The phraseology to use is shown below.

   Phraseology: "Aircraft call sign, (name of facility) final controller. How do you hear me?"

9. Issue transmission acknowledgement. While on the final approach course and after contact has been established with the final controller, instruct the pilot of the aircraft not to acknowledge further transmissions. The phraseology to use is shown below.

   Phraseology: "Do not acknowledge further transmissions."

10. Issue missed approach instructions. Before the aircraft begins the final descent or a full-stop landing and if weather reports indicate that any portion of the final approach will be conducted under IFR conditions, issue a specific missed approach procedure approved for the radar approach being conducted. The phraseology to use is shown below.

    Phraseology: "Your missed approach procedures are (missed approach procedures)."

11. Issue low approach and touch-and-go instructions. Before a pilot who plans to execute a low approach or touch-and-go begins final descent, issue the appropriate departure instructions to be followed upon completion of the approach. Climb-out instructions must include a specific heading and altitude except when the pilot will maintain VFR and contact the tower. The phraseology to use is shown below.

    Phraseology: "After completing low approach/touch and go Climb and maintain (altitude) Turn (right or left) heading (degrees)/fly runway heading."

    Or

    "Maintain VFR, contact tower."

    Or

    (Other instructions as appropriate).

NOTE: This portion may be omitted after the first approach if the instructions remain the same.

12. Issue a tower clearance. An aircraft is on final approach to an airport served by a tower and obtains a clearance to land, touch-ignite-go, or make a low approach. Issue the clearance and the surface wind to the pilot. If the clearance is not obtained or is cancelled, inform the pilot and issue alternative instructions. The phraseology to use is shown below.

    Phraseology: "Tower clearance cancelled/not received (alternative instructions)."

13. Issue final approach abnormalities instructions. If the runway environment is not in sight, instruct the pilot to execute a missed approach, if previously given, or climb to or maintain a specified altitude and fly a specified course whenever the completion of a safe approach is questionable because one or more of the conditions given below exists. The conditions in paragraphs a, b, and c do not apply after the aircraft passes decision height on a PAR

approach. Examples of phraseology to use when issuing missed approach instructions are shown below.

Phraseology: "Radar contact lost." "Too high/low for safe approach." "Too far right/left for safe approach."

a. Safety limits are exceeded or radical target deviations are observed.
b. The position or identification of the aircraft is in doubt.
c. Radar contact is lost or a malfunctioning radar is suspected. The phraseology to use is shown below.

Phraseology: "(Reason) if runway/approach lights/runway lights not in sight, execute missed approach/(alternative instructions)."

NOTE: If the pilot requests it, approval may be granted to proceed with the approach via ILS or another navigation aid/approach aid.

d. Airport conditions or traffic preclude the completion of the approach. The phraseology to use is shown below.

Phraseology: "Execute missed approach/(alternative instructions)."

Evaluation Preparation: Setup: This task may be evaluated using a radar target simulator device. The supervisor will act as the pilot. The controller will work the approach (pattern) and final controller positions.

Brief Soldier: Tell the soldier he will be evaluated on providing approach information. The soldier will be working both the approach (pattern) and final controller positions. The soldier will not be informed of his progress during the performance of the task.

Performance Measures	**GO**	**NO GO**
NOTE: Information included in the automatic terminal information service broadcast may be omitted if the pilot states the appropriate ATIS code.		
1. Issues approach information. a. Issues the altimeter setting. b. Issues ceiling and visibility information. c. Issues special weather observation. d. Issues the information on airport conditions that is considered necessary for safe operation of the aircraft. e. Informs the aircraft of the type of approach, runway, airport, heliport, or other point to which the approach is to be made. f. Informs the aircraft that no traffic or landing runway information is available.	___	___
2. Issues no-gyro approach information. a. Informs the aircraft of the type of no-gyro approach before issuing a no-gyro vector. b. Instructs the aircraft when to start and stop the turn.	___	___

Performance Measures	GO	NO GO
c. Instructs the aircraft to make half-standard rate turns after turning onto the final approach and prior to reaching the approach gate.		
3. Issues radar contact lost instructions.	___	___
a. If the aircraft has not started the final approach, the air traffic controller clears the aircraft to an appropriate NAVAID/fix for an instrument approach.		
b. If the aircraft has started the final approach, the air traffic controller instructs the aircraft, if runway environment is not in sight, to—		
(1) Execute a missed approach, if previously given or,		
(2) Climb to or maintain a specified altitude and fly a specified course.		
4. Issues landing check instructions for the type of pattern being used.	___	___
a. When the aircraft is flying a complete pattern, the air traffic controller issues instructions to perform landing checks on the downwind leg and in time to complete them before turning the base leg.		
b. When aircraft is flying an incomplete pattern, the air traffic controller issues instructions to perform landing checks—		
(1) Before handoff to the final controller for a PAR approach.		
(2) Before starting descent on the final approach for a surveillance approach.		
5. Issues position information.	___	___
6. Issues final controller changeover instructions.	___	___
7. Requests communication check.	___	___
8. Issues transmission acknowledgement.	___	___
9. Issues wheels-down checks.	___	___
10. Issues missed approach instructions.	___	___
a. The aircraft is making a full-stop landing.		
b. Weather reports indicate that the aircraft will be in IFR conditions on the final approach.		
11. Issues low approach and touch-and-go instructions.	___	___
a. Issues departure instructions to be followed upon completion of the approach.		
b. Includes a specific heading and altitude except when aircraft will maintain VFR and contact the tower.		
12. Issues a tower clearance.	___	___
a. Obtains one of the following clearances:		
(1) Full stop.		
(2) Touch and go.		

Performance Measures	GO	NO GO
(3) Low approach. b. Issues clearance and surface wind information to aircraft. c. Informs aircraft and issues alternative instructions if clearance is not obtained or is cancelled.		
13. Issues final approach abnormalities instructions. a. Instructs aircraft, if runway environment is not in sight, to execute a missed approach if previously given or, b. Instructs aircraft to maintain a specified altitude and fly a specified course.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
DA Form 3479-R	AV0905
DA Form 3479-1-R	AV0906
DA Form 3501-R	AV0914
DA Form 3502-R	
DA Form 3503-R	
FAA Order 7110.65	

Provide Airport Surveillance Radar Approach
011-143-1039

Conditions: As an ATC GCA operator at final position, you are given flight strips in holders and airfield and aircraft information. An aircraft requests an ASR approach.

Standards: Issues altitude information, visual reference report, descent notification, descent instructions, final approach guidance, and approach guidance termination according to FAA Order 7110.65.

Performance Steps

1. Provide Altitude Information. Provide recommended altitudes on final approach if the pilot requests them. If they are requested, inform the pilot that recommended altitudes that are at or above the published MDA will be given for each mile on final. The phraseology to use is shown below.

   Phraseology: "Recommended altitudes will be provided for each mile on final to minimum descent altitude/circling minimum descent altitude."

2. Request a Visual Reference Report. Aircraft may be requested to report the runway, approach/runway lights, or airport in sight. Helicopter pilots making a point-in-space approach may be requested to report when they are able to proceed to the landing area by visual reference to a prescribed surface route. The phraseology to use is shown below.

   Phraseology: "Report (runway, approach/runway lights or airport) in sight."

3. Provide Descent Notification.
   a. Issue advance notice of where the descent will begin and issue the straight-in MDA before issuing final descent for the approach.

NOTE: The point at which descent to the minimum descent altitude is authorized is the final approach fix unless an altitude-limiting step-down fix is prescribed.

   b. When the surveillance approach will terminate in a circle-to-land maneuver, request the aircraft approach category from the pilot. After receiving the aircraft approach category, provide the pilot with the applicable circling MDA before issuing final descent for the approach. The phraseology to use is shown below.

   Phraseology: "Prepare to descent in (number) mile(s)."

   For straight-in approaches, the phraseology is: "Minimum descent altitude (altitude)." For circling approaches, the phraseology is:

   "Request your aircraft approach category (upon receipt of aircraft approach category)."

   "Published circling minimum descent altitude (altitude)."

NOTE: Pilots are normally expected to furnish the aircraft approach category to the controller when the surveillance approach will terminate in a circling-to-land maneuver. If this information is not voluntarily given, solicit the aircraft approach category from the pilot and then issue the pilot the applicable circling MDA.

4. Issue Descent Instructions. When an aircraft reaches the descent point, issue one of the following, as appropriate:
   a. Unless a descent restriction exists, advise the pilot of the aircraft to descend to the MDA.
   b. When a descent restriction exists, specify the prescribed restricted altitude. When the aircraft has passed the altitude limiting point, advise the pilot to continue the descent to MDA. The phraseology to use is shown below.

   Phraseology: "(Number) miles from runway/airport/heliport. Descend and maintain (restriction altitude)."

5. Issue Final Approach Guidance. Inform the pilot of the aircraft when his aircraft is on course and frequently inform him of any deviations. Transmissions with aircraft on surveillance final approach should occur approximately every 15 seconds. The phraseology to use is shown below.

   Phraseology: "Heading (heading) on course."

   Or

   "Slightly/well left/right of course."

NOTE: To preclude a lengthy communications block, controllers should not key the radio transmitter continuously during radar approaches. The decision on how often transmitters are unkeyed is the controller's prerogative.

   a. Issue trend information, as required, to indicate target position with respect to the extended runway centerline and to describe target movement as appropriate corrections are issued. Trend information may be modified by the terms "rapidly and slowly," as appropriate. Examples of phraseology are: "Going left/right of course" and "left/right of course and holding/correcting."
   b. Inform the pilot of the aircraft of the distance from the runway, airport, heliport, or MAP, as appropriate, each mile on final. The phraseology to use is shown below.

   Phraseology: "(Number) mile(s) from runway/airport/heliport or missed approach point."

   c. Recommended altitudes shall be furnished if requested. The phraseology to use is shown below.

   Phraseology: "If requested, altitude should be (altitude)."

6. Terminate Approach Guidance.
   a. Discontinue surveillance approach guidance when—
      (1) Requested by the pilot.
      (2) In your opinion, continuation of a safe approach to the MAP is questionable.
      (3) The aircraft is over the MAP.
   b. Surveillance approach guidance may be discontinued when the pilot reports the runway or approach/runway light in sight or, if he is making a point-in-space approach, he reports that he is able to proceed to the landing area by visual reference to a prescribed surface route.

c. When approach guidance is discontinued and the pilot has reported that the runway or approach/runway lights are in sight, advise him of the position of his aircraft and tell him to proceed visually. The phraseology to use is shown below.

Phraseology: "Distance) mile(s) from runway/airport/ heliport."

Or

"Over missed approach point."

"Proceed visually (additional instructions/ clearance as required)."

d. When approach guidance is discontinued and the pilot has not reported that the runway or approach/runway lights are in sight, advise him of his position. Tell him to execute a missed approach unless the runway or approach/runway lights are in sight or, if he is performing a point-in-space approach, he reports that he can proceed visually. The phraseology to use is shown below.

Phraseology: "(Distance) mile(s) from runway."

Or

"Over missed approach point."

"If runway or approach/runway lights not in sight, execute missed approach/(missed approach instructions)." (Additional instructions/clearance, as required).

"(Distance and direction) from airport/heliport/missed approach point."

"If unable to proceed visually, execute missed approach." (Additional instructions/clearance, if required.)

NOTE: Terminal instrument approach procedures and flight inspection criteria require that a missed approach point be established for each procedure including the point to which satisfactory radar guidance can be provided.

Evaluation Preparation: Setup: This task may be simulated by using a radar target generator device. The supervisor may act as the pilot.

Brief Soldier: Tell the soldier he will be evaluated on using radio communications procedures. The soldier will not be informed of his progress during the performance of the task.

Performance Measures	**GO**	**NO GO**
NOTE: Applicable performance measures are determined by local conditions, mission requirements, and assigned equipment.		
1. Provides altitude information.	____	____
2. Requests a visual reference report.	____	____
3. Requests descent notification.	____	____
4. Issues descent instructions to aircraft.	____	____
5. Issues final approach guidance.	____	____
6. Terminates approach guidance.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
FAA Order 7110.65	AV0906
	AV0914

Provide Precision Approach Radar Approach
011-143-1040

Conditions: As a GCA controller assigned to the final control position, you are given a radar identified aircraft and all appropriate information.

Standards: Provide a precision approach radar approach according to FAA Order 7110.65.

Performance Steps

1. Provide glide path notification. Inform the pilot when his aircraft is approaching glide path (approximately 10 to 30 seconds before final descent). The phraseology to use is shown below.

   Phraseology: "Approaching glide path."

2. Issue descent instructions. When the aircraft reaches the point where final descent is to start, instruct the pilot to begin the descent. The phraseology to use is shown below.

   Phraseology: "Begin descent."

3. Issue glide path and course information. Issue course guidance and inform the pilot when his aircraft is on glide path and on course and frequently inform him of any deviations from glide path or course. Transmission with aircraft that are on precision final approach should occur approximately every five seconds. The phraseology to use is shown below.

   Phraseology: "Heading (give heading)."
   "On Glide path."
   "On Course."

   Or

   "Slightly/well above/below glide path."
   "Slightly/well left/right of course."

NOTE 1: To preclude a lengthy communications block, controllers should not key the radio transmitter continuously during radar approaches. The decision on how often transmitters are unkeyed is the controller's prerogative.
NOTE 2: As required, issue trend information to indicate target position with respect to the azimuth and elevation cursors and to describe target movement as appropriate corrections are issued. Tread information may be modified by the terms "rapidly" or "slowly," as appropriate. Examples of the phraseology to use are shown below.

Phraseology: "Going above/below glide path."

"Going left/right or course."

"Above/below glide path and coming down/up."

"Above/below glide path and holding."

"Left/right of course and holding/correcting."

4. Issue the distance from touchdown. Inform the pilot of his distance from touchdown at least once each mile on final approach. The phraseology to use is shown below.

   Phraseology: "(Number of miles) miles from touchdown."

5. Issue decision height. Inform the pilot when he reaches the published decision height. The phraseology to use is shown below.

   Phraseology: "At decision height."

6. Issue position advisories. Continue to provide glide path and course information prescribed in 3 above until the aircraft passes over the threshold.

NOTE: Glide path and course information that is provided below decision height is advisory only.

   a. Inform the pilot when the aircraft is passing over the approach lights. The phraseology to use is shown below.

      Phraseology: "Over approach lights."

   b. Inform the pilot when the aircraft is passing over the landing threshold and inform him of the position of the aircraft with respect to the final approach course. The phraseology to use is shown below.

      Phraseology: "Over landing threshold (position with respect to course)."

7. Issue communications transfer instructions. The phraseology to use is shown below.

   Phraseology: "Contact (terminal control function)."

   "(Frequency, if required) after landing."

NOTE: To keep from diverting the pilot's attention during transition and touchdown, communications transfer instructions should be delayed slightly until the aircraft is on landing roll-out.

8. Issue instructions when elevation fails during approach.
   a. If the elevation portion of the PAR equipment fails during a precision approach, discontinue PAR instruction and tell the pilot to take over visually. If he cannot take over visually, tell him to execute a missed approach. If the pilot executes a missed approach, apply the instructions in b below. The phraseology to use is shown below.

      Phraseology: "No glide path information available. If runway, approach/runway lights not in sight, execute missed approach (alternative instructions)."

   b. If a surveillance approach (ASR or PAR without glide slope) is established for the same runway, inform the pilot that a surveillance approach can be given. Use ASR or the azimuth portion of the PAR to conduct the approach. When the PAR azimuth is used, inform the pilot that mileage information will be from touchdown. At those runways where specific minimums have been established for PAR without glide slope, inform him that the PAR azimuth will be used for the approach. Examples of approach information when PAR azimuth is used are shown below.

Phraseology: "This will be a surveillance approach to runway three six. Mileage will be from touchdown."
Or

"This will be a surveillance approach to runway three six using P-A-R azimuth. Mileage will be from touchdown."

(Descent instructions) "Five miles from touchdown; descend to your minimum descent altitude/minimum altitude."

Evaluation Preparation: Setup: This task may be simulated by using a radar target generator device. The supervisor may act as the pilot.

Brief Soldier: Tell the soldier he will be evaluated on his ability to use radio communication procedures. The soldier will not be informed of his progress during the performance of the task.

Performance Measures	**GO**	**NO GO**
NOTE: Applicable performance measures are determined by local conditions, mission requirements, and assigned equipment.		
1. Provides glide path notification.	____	____
2. Provides decision height notification.	____	____
3. Issues descent instructions.	____	____
4. Issues glide path and course information.	____	____
5. Provides distance from touchdown advisories.	____	____
6. Issues the decision height.	____	____
7. Provides position advisories.	____	____
8. Issues communications transfer instructions.	____	____
9. Provides services for elevation failure.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
FAA Order 7110.65	AV0914
FM 3-04.303(FM 1-303)	

Identify Aircraft Using Radar Procedures
011-143-1044

Conditions: As a GCA controller assigned to a control position, you are given an aircraft and appropriate information.

Standards: Properly radar identify the aircraft according to FAA Order 7110.65.

Performance Steps

1. Identify an Aircraft Using Primary Radar Identification Methods.
   a. Observe a departing aircraft target within one mile of the end of the takeoff runway.
   b. Observe a target whose position with respect to a fix (displayed on the video map, scribed on the map overlay, or displayed as a permanent echo) or a visual reporting point (whose range and azimuth from the radar antenna has been accurately determined and made available to the controller) corresponds with a direct position report received from an aircraft. The observed track must also be consistent with the reported heading or route of flight. If a TACAN/VORTAC is located within 6,000 feet of the radar antenna, the TACAN/VORTAC may be used as a reference fix for radar identification without being displayed on the video map or map overlay.

NOTE 1: Visual reporting points used for radar identification are limited to those most used by pilots and whose range and azimuth have been determined by supervisory personnel.

NOTE 2: Establishing radar identification by using DME position information can be complicated by the fact that some military TACANs are not collocated with frequency-paired VORs and might be separated from them by as much as 31 miles.

   c. Observe a target make an identifying turn or turns of 30 degrees or more. However, the conditions discussed below must be met.
      (1) Except in the case of a lost aircraft, you receive a pilot position report, which assures you that the aircraft is within radar coverage and within the area being displayed.
      (2) Only one aircraft is observed making these turns.
      (3) For aircraft operating according to an IFR clearance, either issue a heading away from an area, which will require an increased minimum IFR altitude, or have the aircraft climb to the highest minimum altitude in your area of jurisdiction before issuing a heading.

NOTE: The use of identifying turns or headings that would cause the aircraft to follow normal IFR routes or known VFR flight paths might result in misidentification. When these circumstances cannot be avoided, additional methods of identification may be necessary.

2. Identify an Aircraft Using Beacon Identification Methods. When using only the mode 3/A radar beacon to identify a target, apply one of the methods discussed below.
   a. Request the aircraft to activate the "IDENT" feature on the transponder and observe the identification display. The phraseology to use is shown below.

      Phraseology: "IDENT."

      "SQUAWK (code) IDENT."

   b. Request that the aircraft change the transponder to STANDBY. Observe the target disappear for sufficient scans to ensure that the loss of the target resulted from placing the transponder in the STANDBY position. Then, request that the aircraft return the

transponder to normal operation and observe that the target reappears. The phraseology to use is shown below.

Phraseology: "SQUAWK STANDBY,"

Then

"SQUAWK NORMAL."

c. Request that the aircraft change to a specific discrete or nondiscrete code, as appropriate. Observe the target or code display change.

3. Identify Questionable Aircraft. Use more than one method of identification when the proximity of targets, duplication of observed action, or any other circumstances cause doubt as to target identification. If identification is questionable for any reason, take immediate action to reidentify the aircraft or terminate radar service.

4. Issue position information. Inform the pilot of the aircraft of his position whenever radar identification is established by identifying turns or any of the beacon-identification methods. Position information need not be given when identification is established by position correlation or when a departing aircraft is identified within one mile of the end of the takeoff runway.

5. Provide identification status. Inform the pilot of radar contact when the following occurs:
   a. Initial radar identification of the ATC system is established.
   b. Radar identification is reestablished subsequent to the loss of radar contact or when radar service is being terminated. The phraseology to use is shown below.

   Phraseology: "Radar contact (position of required)."

   c. Radar contact is lost. The phraseology to use is shown below.

   Phraseology: "Radar contact lost (alternative instructions when required)."

6. Inform the pilot of an aircraft when radar service is terminated. The phraseology to use is shown below.

   Phraseology: "Radar service terminated (nonradar routing if required)."

   a. Radar service is automatically terminated and the aircraft need not be advised of termination when—
      (1) The pilot cancels the IFR flight plan, except when the aircraft is in a TCA, ARSA, or TRSA or where stage II service is provided.
      (2) A pilot conducting an instrument, visual, or contact approach has landed the aircraft or has been instructed to change to an advisory frequency.

NOTE: At tower-controlled airports where radar coverage does not exist to within one-half mile of the end of the runway, inform the pilots of arriving aircraft when radar service is terminated.

   b. Terminate radar service when an arriving VFR aircraft lands that has been receiving radar service to a tower-controlled airport within a TCA, TRSA, or ARSA or where stage II service is provided. Also terminate radar services when the aircraft lands at another airport outside of a positive-control area.
   c. Terminate radar service when an aircraft completes a radar approach.

Evaluation Preparation: Setup: This task may be simulated by using a radar target generator device.

Brief Soldier: Tell the soldier he will be presented with different situations requiring him to identify an aircraft by radar.

Performance Measures	GO	NO GO
1. Identifies an aircraft using primary radar identification methods. a. Observes the departing aircraft target within a mile of the end of the takeoff runway. b. Observes the target through fix/position report correlation. c. Observes the target making an identifiable turn.	____	____
2. Identifies an aircraft using beacon identification methods.	____	____
3. Provides identification status.	____	____
4. Informs an aircraft when radar service is terminated.	____	____
5. Informs an aircraft of its position.	____	____
6. Identifies questionable aircraft.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
AR 95-2	AV0905
FAA Order 7110.65	
FM 3-04.303(FM 1-303)	

Provide Radar Separation
011-143-1045

Conditions: As a GCA controller assigned to a control position in an ATC radar facility.

Standards: Verify beacon accuracy and apply appropriate radar separation for aircraft operating in your assigned area according to FAA Order 7110.65.

Performance Steps

1. Verify beacon range accuracy. Use beacon targets for separation purposes if the beacon range is verified by one of the methods discussed below.
   a. Correlate beacon and primary targets of the same aircraft (not necessarily the one being provided separation) to ensure that they coincide.
   b. When beacon and primary targets of the same aircraft do not coincide, correlate them to ensure that any beacon displacement agrees with the specified distance and direction for that particular radar system.
   c. Refer to the beacon range monitoring equipment if it is installed.
   d. If beacon accuracy cannot be verified, use beacon targets only for traffic information.

2. Apply target separation. Target separation shall be applied between the following:
   a. The centers of primary radar targets. However, do not allow a primary target to touch another primary target or a beacon control slash.
   b. The ends of beacon control slashes.

NOTE: At TPX-42 sites, the bracket video feature must be activated to display the beacon control slash.

   c. The end of a beacon control slash and the center of a primary target.
   d. The centers of digitized targets (all-digital displays). (Do not allow targets to touch.)

3. Apply radar separation.
   a. Radar separation shall be applied to all RNAV aircraft operating on a random (impromptu) route at or below FL450.
   b. Radar separation may be applied between the following:
      (1) Radar-identified aircraft.
      (2) An aircraft taking off and another radar-identified aircraft when the aircraft taking off will be radar-identified within 1 mile of the end of the runway.
      (3) A radar-identified aircraft and one that is not radar-identified when either of the aircraft is cleared to climb/descend through the altitude of the other if all of the actions discussed below are applied.
         (a) The performance of the radar system is adequate and, as a minimum, primary radar targets are on the display being used in the airspace within which radar separation is being applied.
         (b) Flight data on the aircraft not radar-identified indicates that the aircraft is a type that can be expected to give adequate primary return in the area where separation is applied.
         (c) The airspace in which radar separation is applied is not less than the number of miles shown below from the edge of the radar display.
            - When less than 40 miles from the antenna—6 miles.
            - When 40 miles or more from the antenna—10 miles.
            - Narrow band radar operations—10 miles.

(d) Radar separation is maintained between the radar-identified aircraft and all observed primary and secondary radar targets until nonradar separation is established from the aircraft not radar-identified.
(e) When the aircraft involved are on the same relative heading, the radar-identified aircraft is vectored a sufficient distance from the route of the aircraft not radar identified to ensure that the targets are not superimposed before the clearance to climb/descend is issued.

4. Separate the aircraft from the edge of the radar display. Until nonradar separation has been established, separate (using the minimums shown below) a radar-controlled aircraft climbing or descending through the altitude of an aircraft that has been tracked to the edge of the scope/display.
   a. When less than 40 miles from the antenna—3 miles from the edge of the scope.
   b. When 40 miles or more from the antenna—5 miles from the edge of the scope.

5. Separate the aircraft from obstructions.
   a. Separate aircraft from prominent obstructions shown on the radar scope (displayed on the video/geographical map, scribed on the map overlay, or displayed as a permanent echo) by the minimums given below.
      (1) When less than 40 miles from the antenna—3 miles.
      (2) When 40 miles or more from the antenna—5 miles.
   b. Vertical separation of an aircraft above a prominent obstruction displayed as a permanent echo may be discontinued after the aircraft passes the obstruction.

NOTE: The determination of what constitutes a prominent obstruction is made locally after coordination with appropriate flight standards representatives. Prominent obstructions shall be displayed as permanent echoes on the radar display using parrots, MTI reflectors, or RTQC symbols. Digital map marks may be used to mark obstructions. DMMs are not to be used alone for map alignment but along with one or more of the permanent echo-marking devices. When RTQC alone is used for obstruction marking, it shall be certified by airway facilities per the appropriate certification manual.

6. Separate the aircraft from adjacent airspace.
   a. If coordination between the controllers concerned has not been effected, separate radar-controlled aircraft from the boundary of adjacent airspace in which radar separation is also being used by the minimums given below.
      (1) When less than 40 miles from the antenna—1 1/2 miles.
      (2) When 40 miles or more from the antenna—2 1/2 miles.
   b. Separate radar-controlled aircraft from the boundary of airspace in which nonradar separation is being used by the minimums given below.
      (1) When less than 40 miles from the antenna—3 miles.
      (2) When 40 miles or more from the antenna—5 miles.
   c. Ensure that targets of these aircraft do not touch the boundary of adjacent airspace.

Evaluation Preparation: Setup: In an actual setting, require that the soldier provide radar separation according to established procedures and minimums. The supervisor describing situations, which require that the controller provide radar separation, may simulate this task.

Brief Soldier: Tell the soldier he will be evaluated on providing radar separation. The soldier will not be informed of his progress during the performance of the task.

Performance Measures	GO	NO GO
1. Checks beacon range accuracy.	___	___
2. Applies target separation.	___	___
3. Applies radar separation.	___	___
4. Separates the aircraft from the edge of the radar display.	___	___
5. Separates the aircraft from obstructions.	___	___
6. Separates the aircraft from adjacent airspace.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
AR 95-2	AV0905
FAA Order 7110.65	AV0906
FM 3-04.303(FM 1-303)	AV0914
	AV0992

Align Radar, AN/TPN-18A
011-143-1050

Conditions: While assigned a control position at a GCA radar facility, you are given airfield elevation and glide slope angle, azimuth, range and bearing of three fixed targets, dial division values for ART ANGLE V setting, small flat-tip screwdriver, and TM 11-5840-281-12.

Standards: Identify the operator controls and switches. Align the radar (surveillance and precision mode and cursor), all targets, and range marks and make any adjustments without error to obtain an accurate target view, according to TM 11-5840-281-12.

Performance Steps

1. Identify the Operator Controls, Switches, and Indicators. To prevent burning holes in the CRT coating, the INTENSITY control should always be turned fully counterclockwise when the equipment is turned on or when it is shut down. The monitor switch on the local control monitor should be set to the METER CAL position to prevent damage to the meter when the radar is operating. The BITE-AZ TILT switch on the control indicator should be set to the AZ TILT position to preclude an incorrect reading of the AZ TILT/BITE meter during normal operations. Figure 1050-1 shows the C-6988A/ AN/TPN-18A front panel controls; Figure 1050-2 shows the 0-1690/AN/TPN-18A top deck; Figure 1050-3 shows the C-6988A/AN/TPN-18A control-indicator group; Figure 1050-4 shows the PPI display (search mode); and Figure 1050-5 shows the RT-1172/AN/TPN-18A main power panel controls. Table 1050-1 shows the C-6988A/AN/TPN front panel controls, switches, and indicators.

CAUTION

Carelessly operating or improperly setting certain controls and adjustments can cause damage to the radar set and injury to personnel.

WARNING

This equipment generates lethal amounts of voltage. Before operating the equipment, make sure all of the safety requirements in TB 43-0129 are met. Injury or death could result from improper or careless operation.

WARNING

Before placing the SCAN switch and HV to ON, be sure that the radar set group area is clear of personnel and items such as ladders, tools, and test equipment.

WARNING

THE AZIMUTH AND ELEVATION ANTENNAS CREATE A RADIATION HAZARD.

Do not stand closer than 80 feet in front of the azimuth and elevation antennas while the radar set is operating.

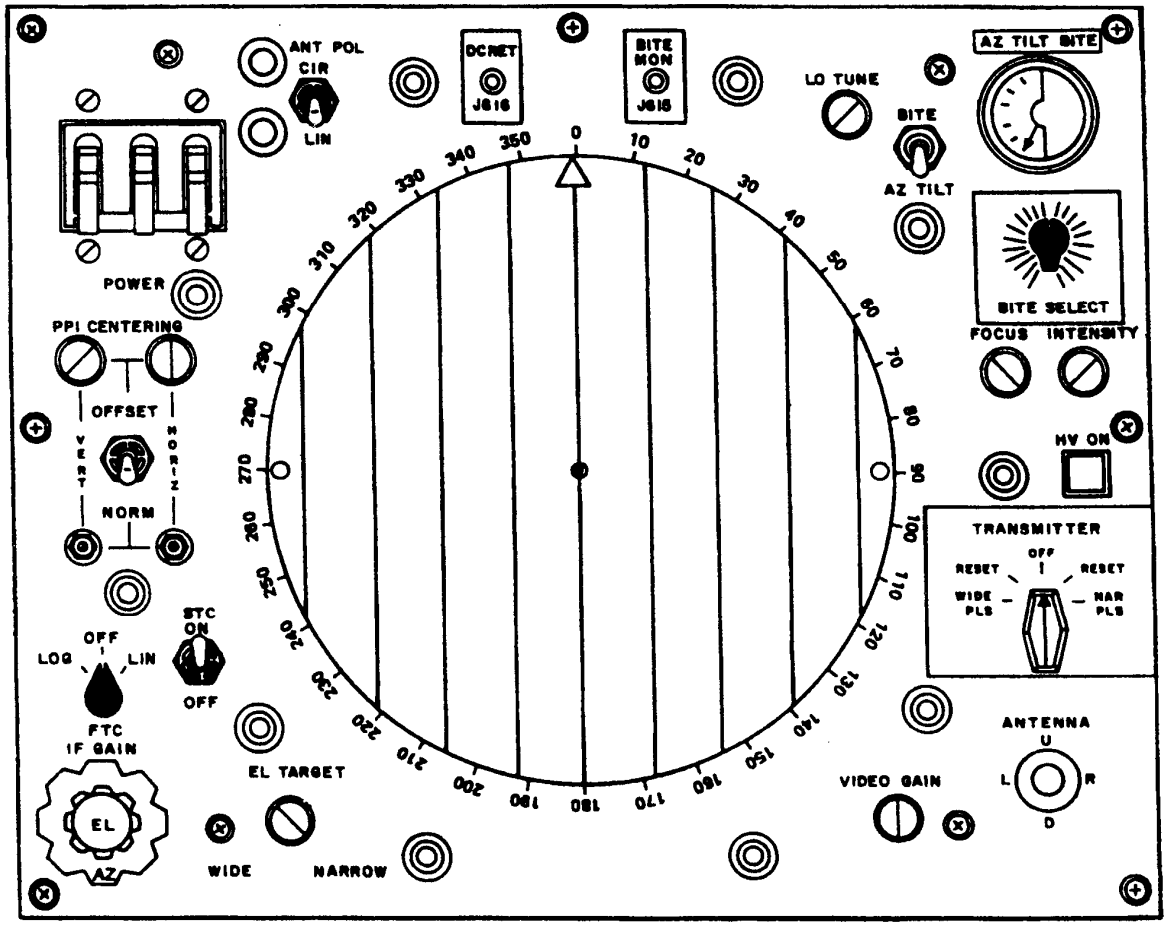


Figure 1050-1. C-6988A/AN/TPN-18A front panel controls.

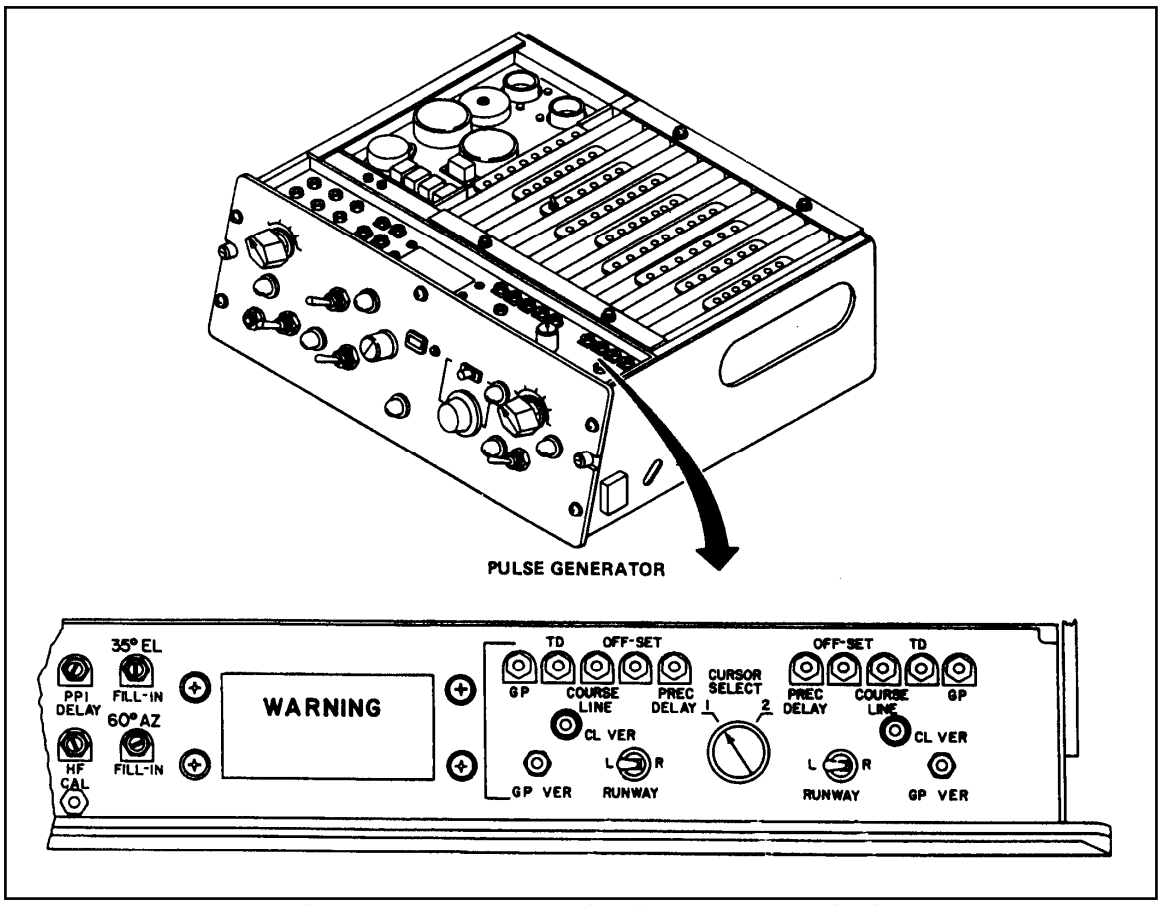


Figure 1050-2. 0-1690/AN/TPN-18A top deck.

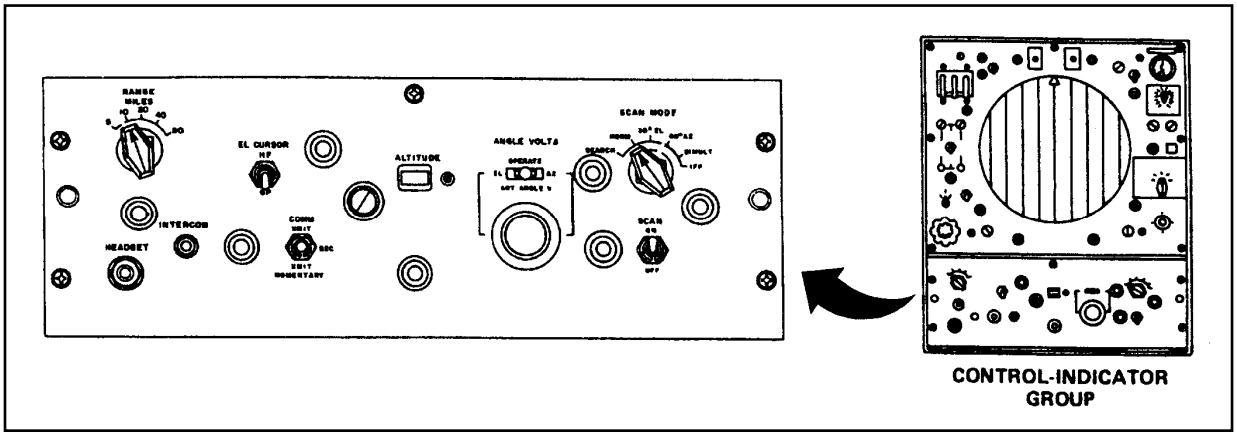


Figure 1050-3. C-6988A/AN/TPN-18A control-indicator group.

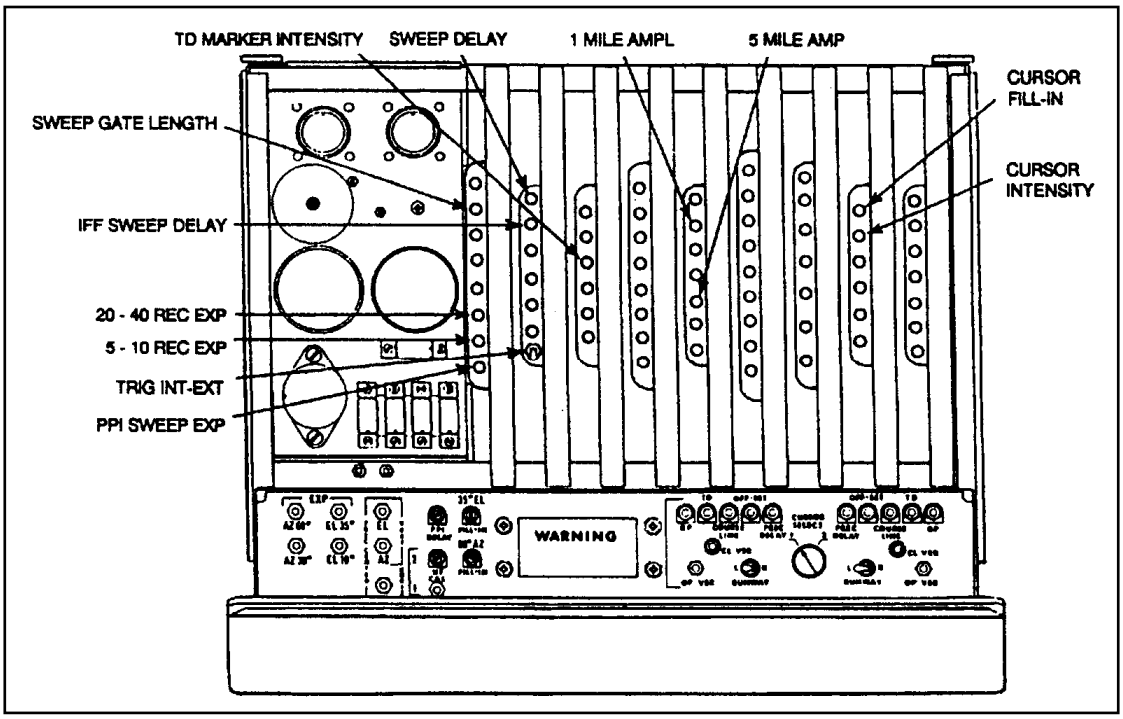


Figure 1050-4. PPI display (search mode).

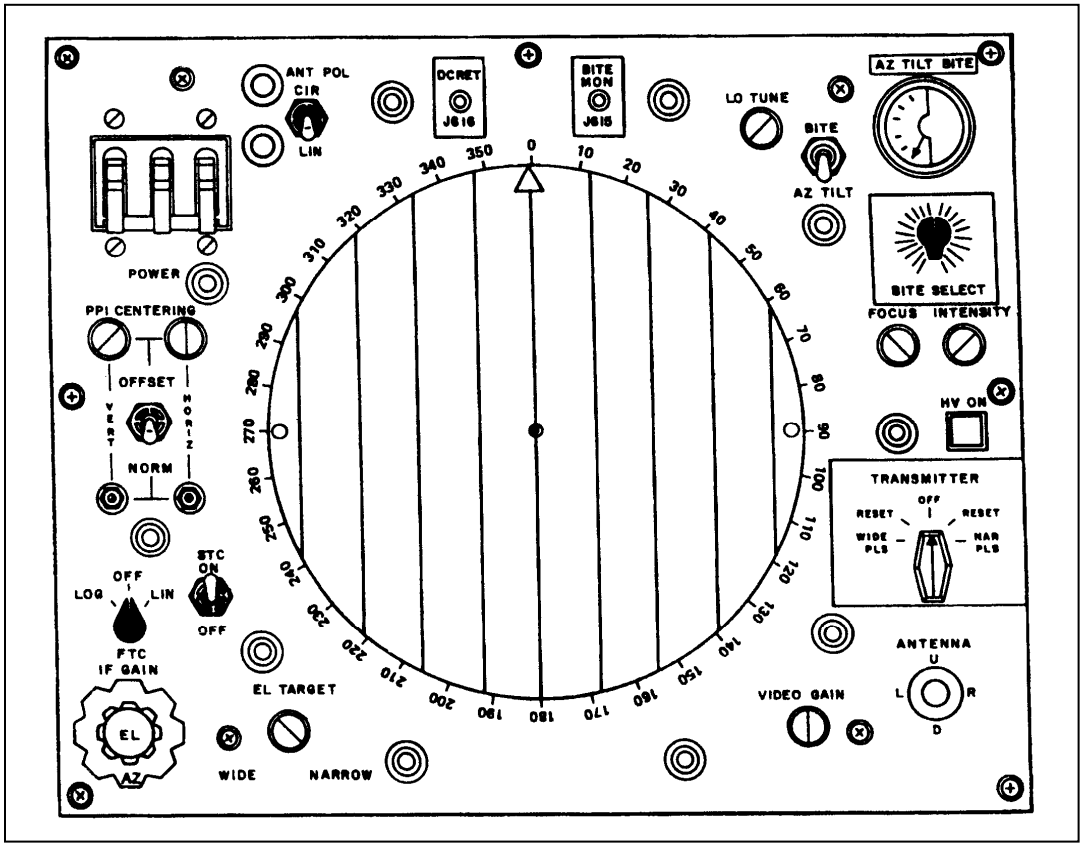


Figure 1050-5. RT-1172/AN/TPN-18A main power panel controls.

Table 1050-1. C-6988A/TPN-18A front panel controls and indicators.

Control, Switch, or Indicator	Function
INTENSITY control	Controls brightness of time-base sweep on the display. This control should be adjusted so that the sweep trace and range marks are just barely visible when video or receiver noise is not present.
FOCUS control	Controls focus of CRT electron beam. This control should be set for the best definition of the overall display.
VIDEO GAIN control	Controls brightness of video signals on the display. After the INTENSITY control has been properly adjusted, the VIDEO GAIN control should be set so that video signals are just below the brightness level at which they bloom and become unfocused.
PPI CENTERING NORM-OFFSET switch	Used to select either normal centering or offset centering controls.
PPI CENTERING VERT control	Controls vertical centering of the PPI display (offset centering) when the NORM-OFFSET switch is in the OFFSET position.
PPI CENTERING HORIZ control	Controls horizontal centering of the PPI display (offset centering) when the NORM-OFFSET switch is in the OFFSET position.
ANTENNA (tilt and servo) L-R U-D switch	This four-position switch controls vertical direction tilt of the azimuth antenna and the horizontal servo direction of the elevation antenna. The action of this switch is shown below. U (up)--Azimuth antenna tilts up and range mark blanked sector on elevation display moves up. D (down)--Azimuth antenna tilts down and range mark blanked sector on the elevation display moves down. R (right)--Elevation antenna servos to right and range mark blanked sector on azimuth display moves up. L (left)--Elevation antenna servos to left and range mark blanked sector on azimuth display moves down.
LO TUNE control	Tunes the frequency of the local oscillator from the master control-indicator. This control is adjusted for maximum radar video signal return on the display.
IF GAIN AZ, IF GAIN EL controls (concentric)	Controls the receiver gain of the receiver-transmitter from the operating site. These controls should normally be set to give a slight amount of receiver noise or grass on display. The AZ knob controls the IF gain on the search and beta azimuth display; the EL knob controls IF gain on the beta elevation display.
FTC (fast time constant) switch	This three-position switch controls video output of the receiver section of the receiver-transmitter. In the LIN position, the receiver IF signal is amplified linearly. The video is detected and applied to the FTC circuit to provide only the leading edge of the video returns 0.2 US wide in narrow pulse operation and 0.8 US wide in wide pulse operation. In the LOG position, the receiver IF signal is amplified logarithmically. The video is detected and applied to the FTC circuit. The FTC is used to break up large blocks of ground and rain clutter. In the OFF position, the radar video is amplified linearly and the FTC circuit is not used. The FTC permits an aircraft to be tracked more easily through heavy ground clutter or through precipitation. For the best results when using the FTC in the LIN position, the IF GAIN AZ and IF GAIN EL controls should be kept as low as possible without losing the target. Antenna tilt should be optimized at all times. For the best results in the LOG FTC, rotate the IF GAIN controls fully clockwise (maximum gain).

Table 1050-1. C-6988A/TPN-18A front panel controls and indicators (continued).

Control, Switch, or Indicator	Function
STC (sensitivity time control) switch	In the ON position, the STC switch reduces receiver IF gain at close ranges. Receiver gain can then increase with increasing range. STC wave form is applied to the TR limiter tubes and acts as a bias to increase insertion loss as determined by the STC curve.
POWER switch (circuit breaker)	A three-phase circuit breaker that applies 400 Hz AC power to the control-indicator circuits and blower motor.
BITE-AZ TILT switch	A two-position switch that provides meter selection to monitor azimuth antenna tilt or monitor BITE signals.
AZ TILT/BITE meter indicator	Provides azimuth antenna tilt indication and maintenance go/no-go indication of control-indicator voltages.
EL TARGET control	Used to adjust monopulse operation of the receiver section of the receiver-transmitter. In the CCW position, monopulse operation is disabled and the elevation display target appears as seen by the full beamwidth of the elevation antenna. For landing approach operation where extreme ground clutter is masking the elevation glide path display, the control may be rotated CW from the WIDE toward the NAR-ROW position. Radar target elevation angular resolution will be improved and targets and ground clutter will appear narrower in the vertical plane.
ANT POL switch and CIR and LIN indicators	Used to select either circular (CIR) or linear (LIN) polarization of RF radiation and indicates polarization selected. Circular polarization enhances operation during precipitation clutter; however, the maximum range is reduced approximately 20 percent.
HV ON switch/indicator	Controls the application of high voltage to the radar transmitter.
TRANSMITTER switch	Used to select the width of the transmitter pulse. Clockwise, the five positions of the switch are WIDE PLS, RESET, OFF, RESET, and NAR PLS. The RESET positions will prevent damaging the transmitter SCRs when changing from WIDE PLS to NAR PLS or from NAR PLS to WIDE PLS. The HV ON switch must be pressed to turn on the high voltage when WIDE PLS or NAR PLS is selected. The WIDE PLS setting is used for normal tracking and increases the maximum range detection capability during search operation. The NAR PLS setting improves range resolution for precision operation and aids in tracking through clutter and precipitation.
SCAN MODE switch	Used to select the scan mode desired. Both the antenna scan and the display change to the desired mode when the switch position is selected. The six positions of the switch are shown below. (1) **SEARCH**, PPI display. (2) **NORM**, dual beta display, 30-degree azimuth and 11-degree elevation scan. (3) **35 EL**, dual beta display, 30-degree azimuth and 36-degree elevation scan. (4) **60 AZ**, dual beta display, 60-degree azimuth and 11-degree elevation scan. (5) **SIMULT**, PPI display on slave indicator and dual beta on master indicator. (6) **IFF**, PPI display with radar and IFF targets in ranges to 40 miles and, when IFF equipment is used, PPI displays IFF targets only when in the 80-mile range.
RANGE MILES switch	Selects display ranges of 5, 10, 20, 40, or 80 nautical miles. In the 80-mile position, radar video is not displayed.

Table 1050-1. C-6988A/TPN-18A front panel controls and indicators (continued).

Control, Switch, or Indicator	Function
EL CURSOR switch	Used to select the cursor on elevation display. In the GP position, the elevation display has an approach glide path cursor. In the HF position, the elevation display presents a height finder cursor representing a level line in space at a height determined by setting the ALTITUDE control and indicator.
SCAN switch	Starts or stops the antenna scan in any scan function by energizing and deenergizing the scan drive motor. This switch operates in a series with the SCAN switch on the receiver-transmitter main power panel.
ALTITUDE control and indicator	Varies the height of the height finder cursor on the elevation display and is calibrated to read from 0 to 30,000 feet (in hundreds of feet). The operator rotates the ALTITUDE control to intercept an aircraft target with the height finder cursor. He then reads the aircraft altitude on the ALTITUDE indicator.
ANGLE VOLTS switch and ART ANGLE V control	This is a three-position switch, and the control is a calibrated potentiometer. With the ANGLE VOLTS switch in the OPERATE position, the antenna position (AZ-EL) is supplied from the radar set. In the EL position, the elevation display artificial sweep is positioned by setting the ART ANGLE V control. In the AZ position, the azimuth display artificial sweep is positioned by setting the ART ANGLE V control. The ANGLE VOLTS switch and ART ANGLE V control are used during alignment procedures.
COMM switch (not used unless specifically provisioned)	This is a three-position communications control switch. In the center REC position, the communications receiver operates. In the XMIT position, the communications transmitter is held keyed until the switch is returned to the REC position. This allows the operator to have both hands free during the final approach talk-down. The spring-loaded third position, MOMENTARY, is used for short transmissions.
HEADSET (jack)	This is a three-way jack for use with the combination headphones and carbon microphones.
INTERCOM switch	This is a two-position, spring-loaded return switch. It normally connects the HEADSET jack to the receiver audio and microphone audio lines from the communications transceiver. In the INTERCOM (up) position, lines are interrupted and the HEADSET jack is connected to the intercom line from the radar set group.
CURSOR SELECT 1-2 switch	Used to select one of two sets of controls which are used to align landing approach cursors (azimuth and elevation). The two sets are identical and permit cursors for two different runway approach paths to be prealigned. The controls in each set are PREC DELAY, OFF-SET, RUNWAY L (left) or R (right), COURSE-LINE, CL VER, TD, CP, and GP VER.
RUNWAY R-L switches	Transfers azimuth cursor circuits to permit operation from either side of the runway. (There is one RUNWAY R-L switch for each set of cursor controls).
MAIN POWER circuit breaker	Applies primary 120 VAC, three-phase, 400 Hz power to the receiver transmitter group.
AC OUTLETS circuit breaker	Applies 120 VAC, single-phase 400 Hz power to the AC outlets.
HV switch	Applies +28V enable voltage to interlock the transmitter high-voltage power supply.
SCAN switch	This switch is in series with the SCAN switch on the pulse generator unit to operate the relay that applies primary AC power to the scan drive motors.

2. Align Surveillance Radar. The search function (search mode of operation) locates aircraft within a 40-nautical-mile radius of the airfield. It also provides range and bearing information necessary to direct the aircraft into position for making a precision (GCA) approach. When the AN/TPX-44 interrogator set is used, the search function can display IFF information within an 80-nautical-mile radius of the airfield. The search function uses display ranges of 5, 10, 20, 40, and 80 nautical miles (80-mile range displays IFF video only), which are selected by the operator to best serve his needs. Range marks of 1, 5, or 10 miles are automatically displayed when the RANGE MILES switch is positioned to select the display range. A 30-degree sector of the range marks is blanked to represent the alignment position of the precision approach path. The azimuth antenna may be tilted from -1 degree to +25 degrees for high-altitude coverage. To align the radar set in the search mode, proceed as described below.
   a. Set the RANGE MILES switch to 10 miles.
   b. Adjust the INTENSITY clockwise until the luminescent line formed by the sweep is barely visible.
   c. Adjust the FOCUS to provide the best definition on the display by ensuring returns are sharp and clear. The FOCUS is adjusted along with the INTENSITY.
   d. Adjust the antenna tilt by moving the ANTENNA tilt (SERVO) up or down. The degree of antenna tilt is determined from the AZ TILT METER.
   e. IF GAIN AZ control is adjusted along with the VIDEO GAIN. Initially, the IF AZ GAIN is adjusted fully clockwise. Adjusting the VIDEO GAIN to the desired level with the IF AZ GAIN full clockwise often produces receiver noise. The IF AZ GAIN is then adjusted counterclockwise to eliminate this effect.
   f. Adjust the VIDEO GAIN to provide strong, sharp returns of video signals. When properly adjusted, video returns will be below the brightness or strength level where the targets bloom and become out of focus.

NOTE: The objective is to adjust the VIDEO and IF GAINS so that the aircraft targets provide adequate returns while simultaneously eliminating unwanted returns from ground clutter.

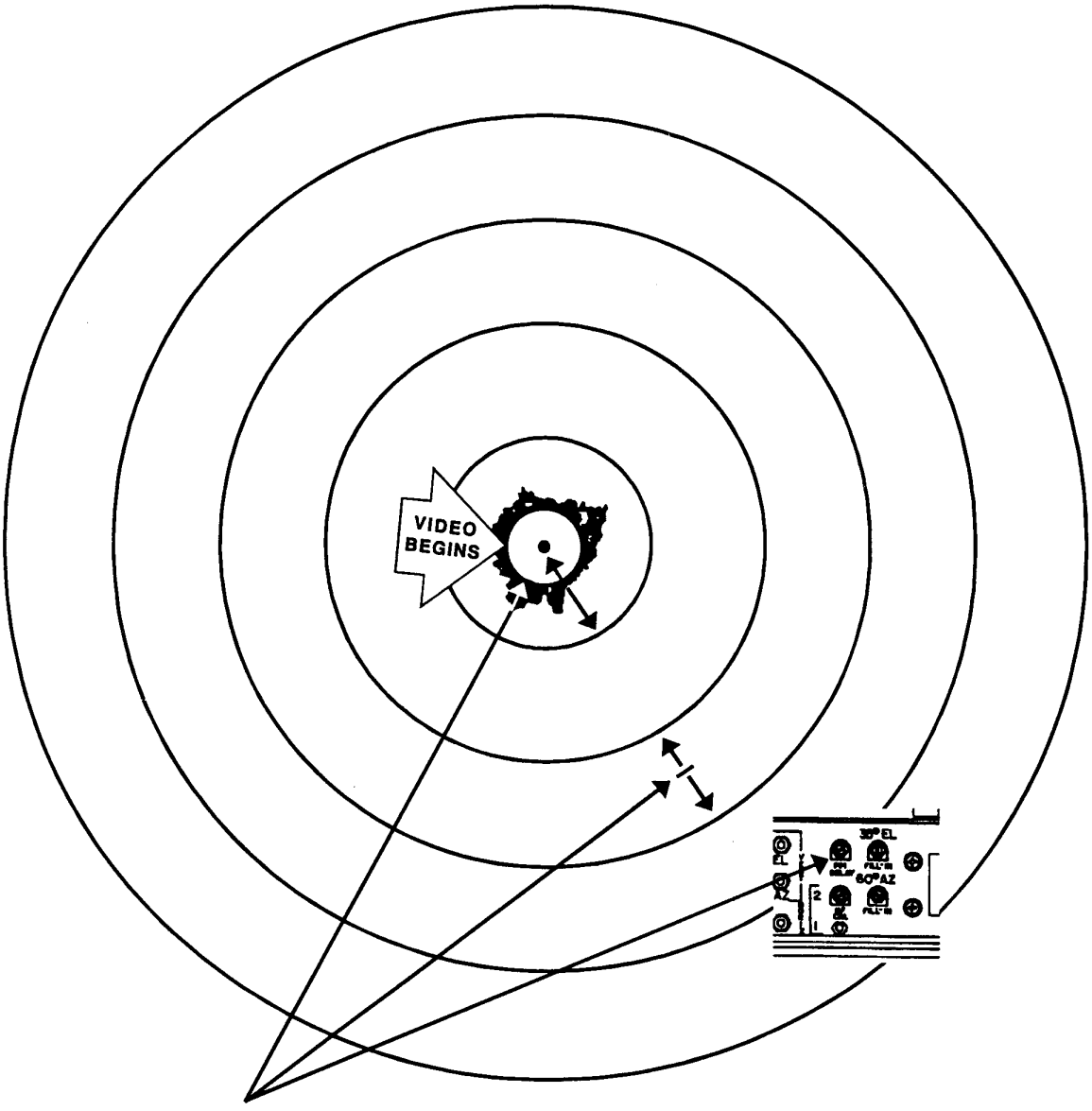
   g. Using the HORIZ and VERT POT controls, place the sweep start in the center of the scope for normal operations. The small circle in the center of the navigational head will help you locate the exact center.
   h. To preset the PPI OFFSET (Figure 1050-6) for surveillance approaches to the desired runway—
      (1) Turn the arrow of the center grid line to the appropriate runway heading.
      (2) Use the HORIZ/VERT knobs to place the sweep start on the "T" formed by the base of the arrow.
      (3) Turn PPI centering back to NORM.

NOTE: The center grid arrow only acts as a general reference point for determining where the surveillance final is to be located. The intent of off-setting the sweep start is to provide an excess of 10 miles of radar coverage when on the 10-mile range setting. This enables the controller to view ranges in 1-mile increments beyond 10 miles.

   i. For a one-mile amplitude, adjust the range mark intensity to the lowest usable level.
   j. For a five-mile amplitude, adjust the intensity to a desired level that is brighter than the 1-mile range mark. The object is for the controller to determine ranges quickly by being able to distinguish between 1- and 5-mile ranges.
   k. Adjust the PPI delay to place a known target at a known range (Figure 1050-7).
   l. Adjust the PPI ORIENT to place a known target at a known bearing.

NOTE: To use the compass ring, ensure that the PPI centering NORM OFFSET switch is in the NORM position and the sweep start is centered on the scope.

   m. Set RANGE MILES to 20.



RANGE MARK START (ZERO RANGE MARK)

PPI DELAY: Moves the video presentation (reflected returns) in or out from the sweep start while the range marks remain stationary. This allows a target to be set at its correct range.

Figure 1050-6. PPI display (search mode).

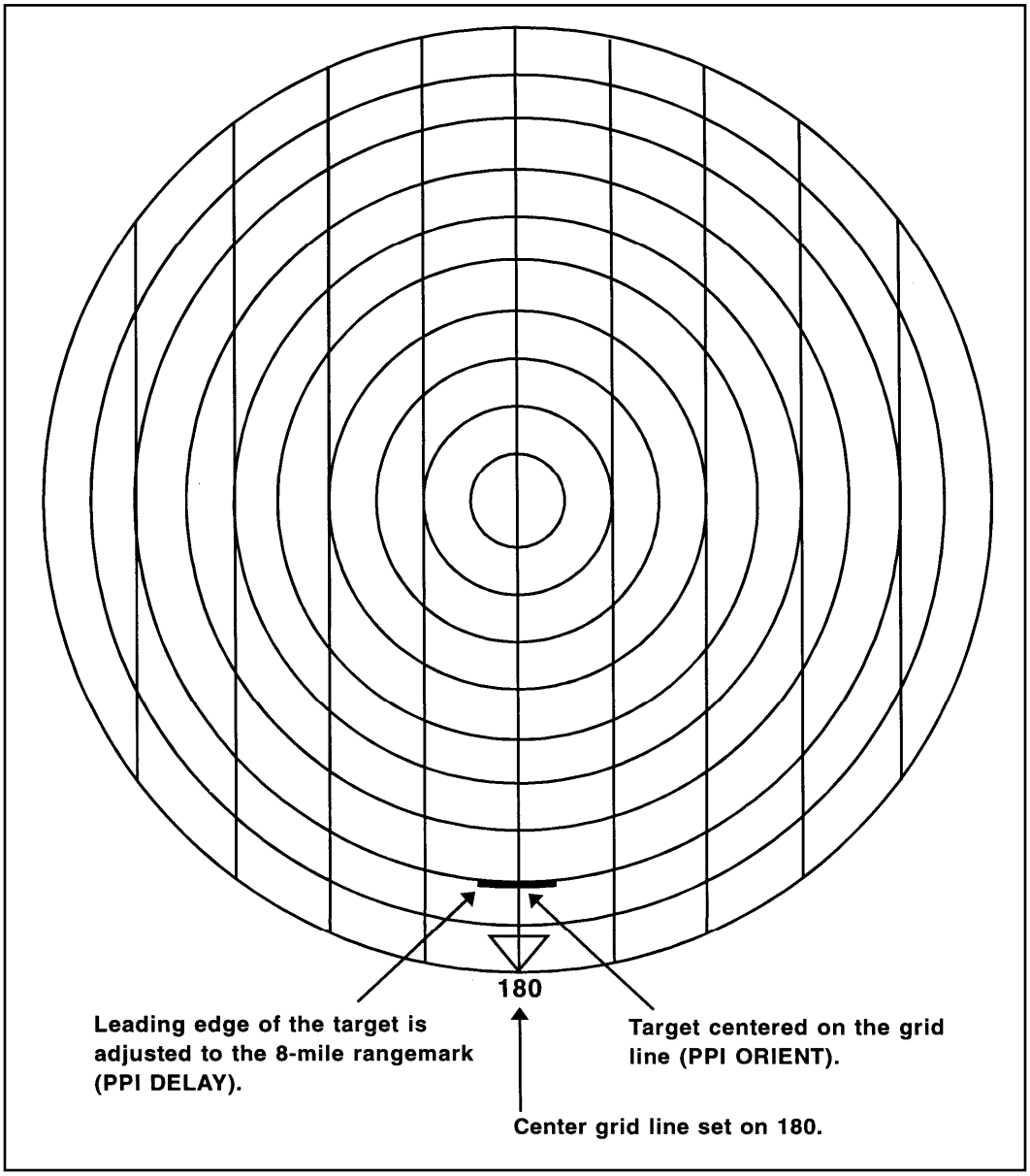


Figure 1050-7. Search mode (10-mile range).

n. Adjust the PPI sweep EXP so that the 20-mile range mark is one-eighth inch in from the outer edge of the scope.

o. Set RANGE MILES to 10 and LO TUNE.

(1) Turn FTC and STC off.
(2) Stop the scan on ground clutter.
(3) Turn the IF AZ GAIN fully clockwise.
(4) Adjust LO TUNE for maximum return.
(5) Turn FTC and STL on.
(6) Adjust IF GAIN AZ for clearly defined returns.

NOTE: Proper alignment of the PPI DELAY and PPI ORIENT will ensure that the position of an aircraft on the scope corresponds with the actual position of the aircraft.

3. Align Precision Radar (Figure 1050-8).
   a. The precision approach function (normal mode of operation) is used to control aircraft along a course line and glide path to the prescribed GCA minimums or, theoretically, to within 20 feet of runway touchdown. The precision approach display is a dual beta scan; that is, the upper half of the CRT presentation displays elevation data, and the lower half displays azimuth data. As in the search mode, the sweep ranges (excluding 80 miles) are 5, 10, 20, and 40 nautical miles with range marks at 1-mile intervals for 5 and 10 mile ranges, and 5- mile intervals for ranges of 20 and 40 miles. Range marks are exponential on 5 and 10 mile ranges. Two sets of preset, electronically generated cursors are available on the azimuth and elevation displays, which provide separate glide path and course line indications for each of two runway approaches.
   b. In the precision mode of operation, azimuth sectors of 30 and 60 degrees may be scanned (NORM, 35? EL, and 60? AZ positions of the SCAN MODE switch). Elevation scanning is 11 degrees (-1 degree to +10 degrees). Elevation scanning may be increased to 30 degrees (-1 degree to +35 degrees, 35? EL position of the SCAN MODE switch), with 30-degree azimuth scanning to provide wide vertical coverage for steep glide paths and for height-finding operations. To align the radar set in the precision (normal) mode of operation, proceed as described below.
      (1) Set the SCAN MODE switch to NORM. This changes the display from surveillance (ASR) to precision (PAR) mode.
      (2) Set RANGE MILES to 10.
      (3) Rotate the grid lines to the vertical position.
      (4) Adjust the INTENSITY until a well-defined sweep is visible.
      (5) Adjust the PREC CENTER HORIZ to place the sweep start at the last grid line to the left.
      (6) Adjust the PREC SWEEP GATE length so that it ends under the last grid line to the right.
      (7) Adjust the 5-10 PREC EXP so that the tenth range mark is under the last grid line on the right.
      (8) Set the ANGLE VOLT switch to AZ. This stops the AZ display sweep, making it possible to view the stationary artificial sweep line.
      (9) Set the ART ANGLE V dial to 0 dial divisions.
      (10) Rotate the grid lines to the horizontal position.
      (11) Adjust PREC CENTER and VERT AZ to align the artificial AZ sweep line under the bottom grid line.
      (12) Set the ART ANGLE V dial to 300 dial divisions.
      (13) Adjust the EXP AZ 30 to align the AZ artificial sweep line one-eighth of an inch below the center grid line.

NOTE: In the horizontal plane, each degree equals 10 dial divisions. Therefore, to represent a scan area of 30 degrees, multiply 30 degrees by 10. Use 300 DD to electronically represent an AZ scan of 30 degrees.

      (14) Set the ANGLE VOLT switch to EL.
      (15) Set the ART ANGLE V dial to 0 DD.
      (16) Adjust the PREC CENTER VERT EL to align the EL artificial sweep line one-eighth of an inch above the center grid line.
      (17) Set the ART ANGLE V dial to 220 DD.

NOTE: In the vertical plane, each degree equals 20 DD. To represent a scan area of 11 degrees, multiply 11 degrees by 20. Use 220 DD to electronically represent an EL scan of 11 degrees.

      (18) Adjust the EL 10 EXP to align the EL artificial sweep line under the top grid line.

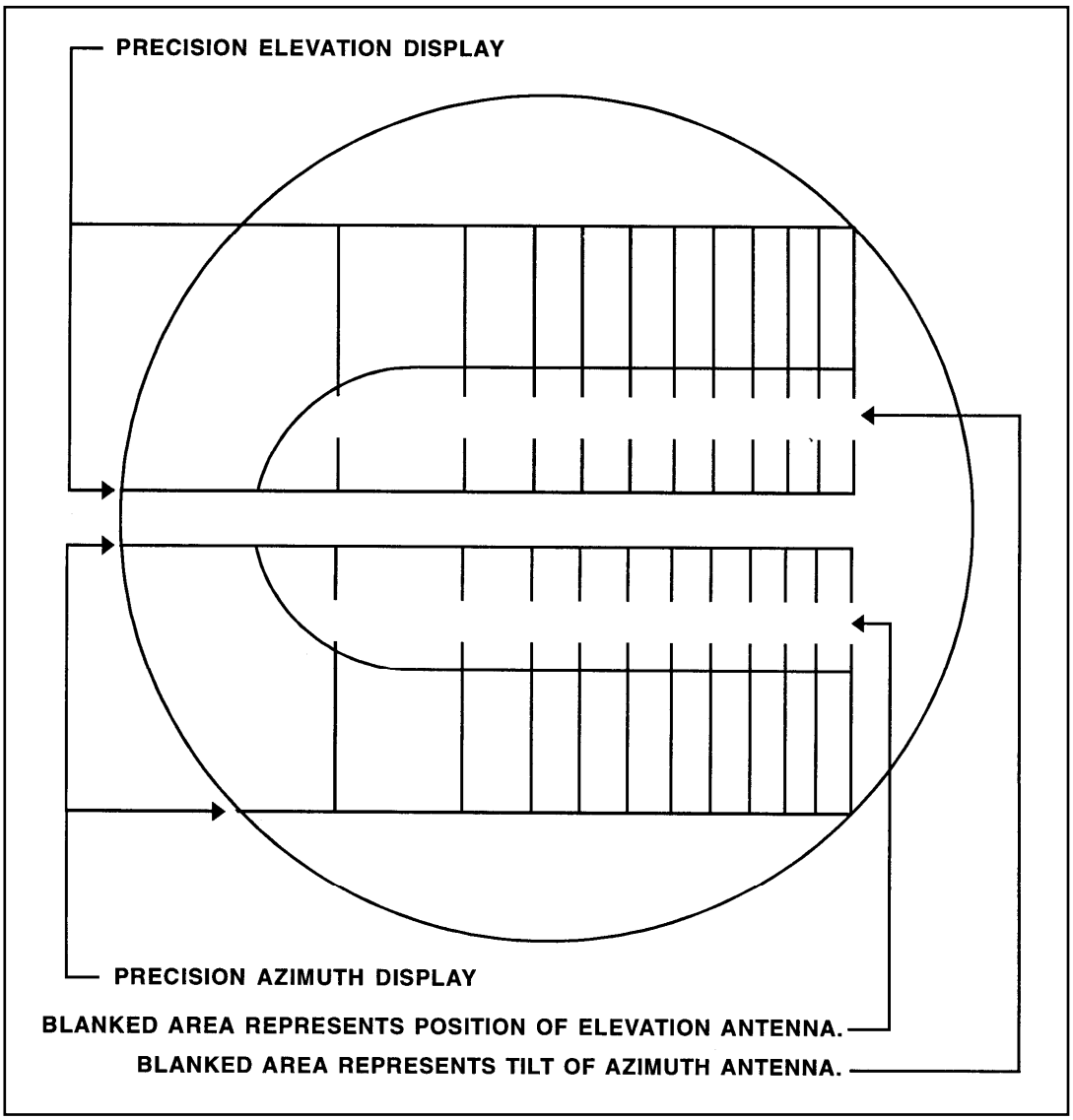


Figure 1050-8. Normal mode precision display.

4. Align the Cursor. To align the cursor, proceed as described below.
   a. Set RANGE MILES to 10 miles.
   b. Set the EL cursor to the GP position to observe the correct cursor.
   c. Set SCAN MODE to NORM to provide a precision video display.
   d. Set CURSOR SELECT to 1 or 2. Two sets of AZ and EL cursor controls make prealigning the precision display for two different PAR approaches possible.
   e. Set the RUNWAY SELECT switch to L or R, depending on whether the radar set group is to the right or left of the runway as viewed from the direction of landing.
   f. Turn the CURSOR FILL IN to OFF.
   g. Turn the INT/EXT trigger to EXT.
   h. Adjust the CURSOR INTENSITY to the lowest usable level.
   i. Adjust the TD range mark intensity to a level lower than the range marks.
   j. Rotate the PREC DELAY clockwise or counterclockwise to align the TD range mark on the leading edge of the TD reflector.

NOTE: When the sweep is stopped, each range mark appears as an intensified dot along the sweep line. The additional intensified dot is referred to as the cursor dot. The cursor dot represents the position of the cursor along the artificial sweep line. During the alignment process, the dial divisions necessary to place the artificial sweep line on the final approach course at a particular range area are set in. Adjusting the cursor dot to coincide with the same range mark dot ensures that the cursor is properly aligned at that point. When the cursor dot is moved, the cursor is moved. Aligning two points along a cursor or course ensures that the entire cursor is aligned. This same procedure applies when aligning the elevation cursor.

k. Rotate the OFFSET clockwise or counterclockwise to place the AZ cursor between the brackets or to bisect the center line reflector.
l. Set the ANGLE VOLT to AZ and turn the ART ANGLE V to the correct DD. This is the setting required to align the AZ cursor dot at the 5-mile range mark.
m. Rotate the course line clockwise or counterclockwise to align the AZ cursor dot on the 5-mile range mark dot. Use this dot along with the CL VER.
n. Rotate the CL VER clockwise or counterclockwise to accurately place the cursor dot at 5 miles.

NOTE: This procedure ensures that the aircraft target centered on the AZ cursor is aligned with the runway and the extended runway center line.

o. Rotate the TD clockwise or counterclockwise to place the EL cursor through the TD reflector.
p. Select EL on the ANGLE VOLT switch, and place the ART ANGLE V at the appropriate DDs to align the EL cursor dot at the 5-mile range mark dot.
q. Rotate the GP clockwise or counterclockwise to align the EL cursor dot on the 5-mile range mark dot. Use this POT along with the GP VER.
r. Rotate the GP VER clockwise or counterclockwise to place the cursor dot at 5 miles.
s. Set the ANGLE VOLT switch to OPERATE.

NOTE: If an adjustment is required at touchdown or the 5-mile point, recheck the point previously adjusted. Once the cursor alignment is completed, recheck both cursors to ensure that the cursor dot is properly aligned. Routinely check the cursor alignment and make a visual check of the entire presentation.

Evaluation Preparation: Setup: In an actual setting, require that the soldier identify the operator controls, align the radar (surveillance mode, precision mode, and cursor), align all targets and range marks, and make any adjustments without error to obtain an accurate target view.

Brief Soldier: Tell the soldier he will be evaluated on the alignment of the AN/TPN-18A Radar.

Performance Measures	GO	NO GO
1. Identify the operator controls, switches, and indicators.	___	___
2. Align the surveillance radar.	___	___
3. Align the precision radar.	___	___
4. Align the cursor.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
TM 11-5840-281-12	None

Perform the Initial Orientation of Radar Set, AN/TPN-18A
011-143-2001

Conditions: You are a member of a tactical ground-controlled approach team with an assembled AN/TPN-18A and associated equipment, two personnel, 100-foot tape measure and TM 11-5840-281-12-1.

Standards: Install reflectors, determine ground angle, perform set orientation, inspects equipment, and performs initial adjustment of radar set AN/TPN-18 according to TM 11-5840-281-12-1.

Performance Steps

1. Install the Target Reflectors.
   a. Installation methods. Reflections from the radar target simulators (target reflectors) appear on the control-indicator radar display as radar target reflector returns. The target reflectors must be placed accurately to provide permanent reference points for aligning the radar display. The target reflector sighting procedures outlined in Methods A and B assume that the radar set group is located at a right-of-runway position, as viewed by the pilot of an approaching aircraft. These procedures are applicable, however, to both right-of-runway and left-of-runway radar set locations. Two methods are offered for installing the radar target simulators. Method A requires three radar target simulators. Method B requires two radar target simulators. Three radar target simulators are provided as part of the radar set; therefore, if both approaches to a single runway are to be served or multiple approaches covered from a single site, additional radar target simulators will be required. The orientation of the radar set group must be accomplished each time approaches or runways are changed. Two sets of cursors can be preadjusted for two GCA approaches and selected as appropriate. GCA service with more than two approaches will require realignment of the cursors.
   b. Radar target simulator sighting procedures. The radar target simulator (target reflector) sighting procedures using Method A begin on page 252; sighting procedures using Method B begin on page 256. Method A is the preferred method because it does not require that a target reflector be placed off the end of the runway and aligned with the runway centerline as does Method B. Both procedures require the use of a theodolite or transit for accuracy. If a theodolite or transit is not available, another means of determining positions for the target reflectors may be used. This may be any readily available measuring instrument (optical or mechanical) if the target reflectors are properly positioned and reasonable accuracy can be obtained. Sighting and positioning the target reflectors requires two people. One person should operate the theodolite or transit, and the second should hold the stadia rod or any straight rod or pole 6 feet or more in length.

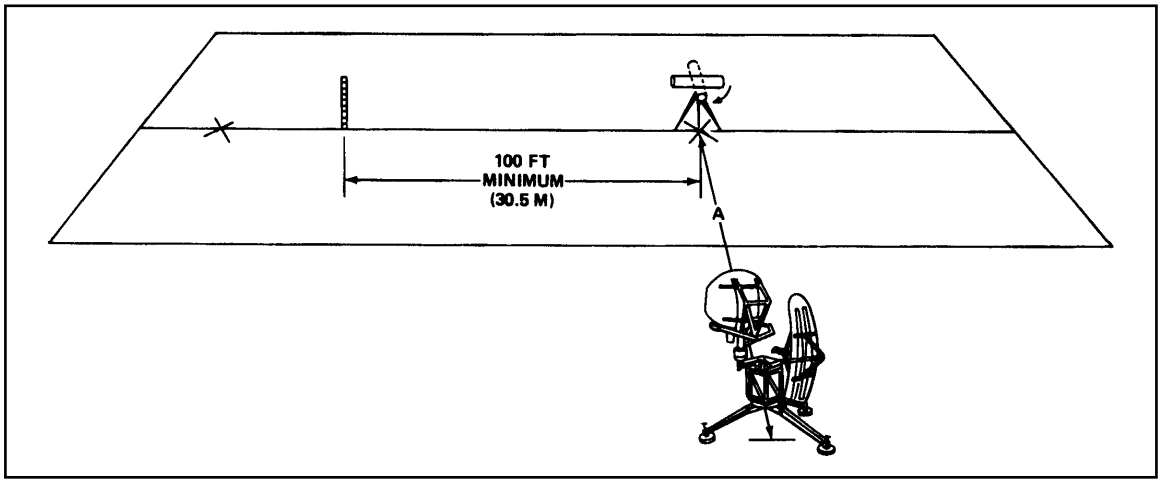
NOTE 1: Bracketing target reflectors may be emplaced using the procedures in Method A or Method B. Method A is normally the preferred method and is used if the reflectors can be separated at least 150 feet or if they can be emplaced in a way that will not result in ground clutter, which obscures target reflector returns. Method B should be used if either of the above conditions exist.

NOTE 2: Methods A and B correspond with Methods 3 and 4 in TM 11-5840-281-12-1.

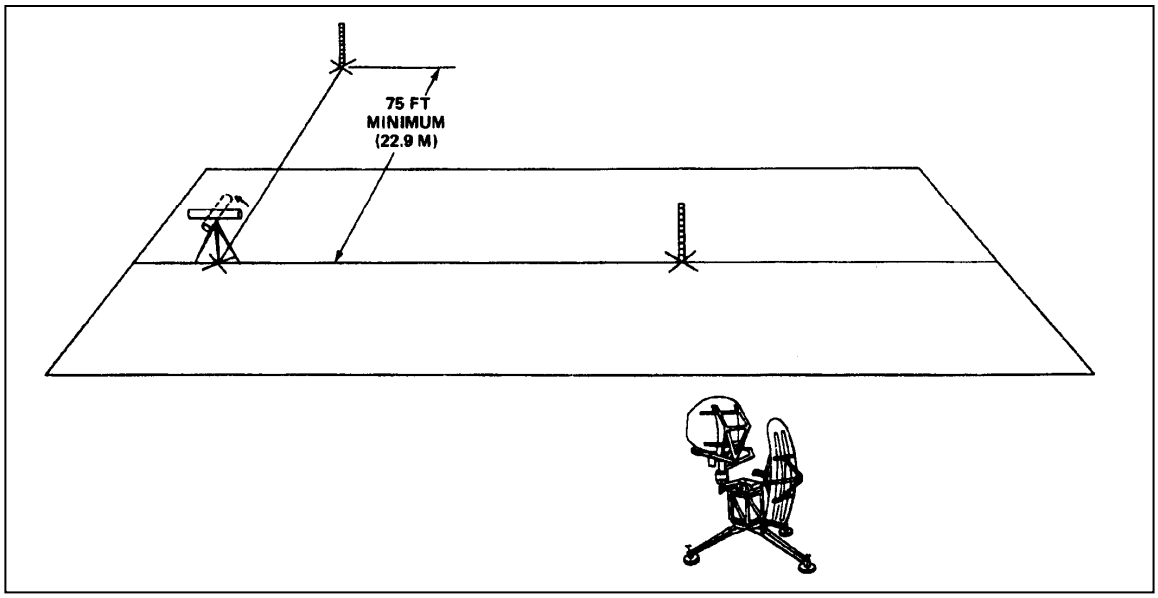
(1) Method A (installation with bracketing target reflectors placed adjacent to touchdown point). This procedure is used when a minimum of 150 feet can be established between two bracketing target reflectors (one on either side of the runway at the

touchdown point) and a third target reflector can be installed at a greater distance from the radar set group to represent the runway parallel line. Figure 2001-1 shows the siting procedures for Method A.

NOTE: The touchdown point and centerline of runway should be identified and marked before the target reflectors are positioned. When positioning the target reflectors, face the grid side of the reflector directly at the radar set group (grid perpendicular to radar set group). Secure the target reflectors by suspending any convenient weight beneath the target reflector supports after they have been positioned.

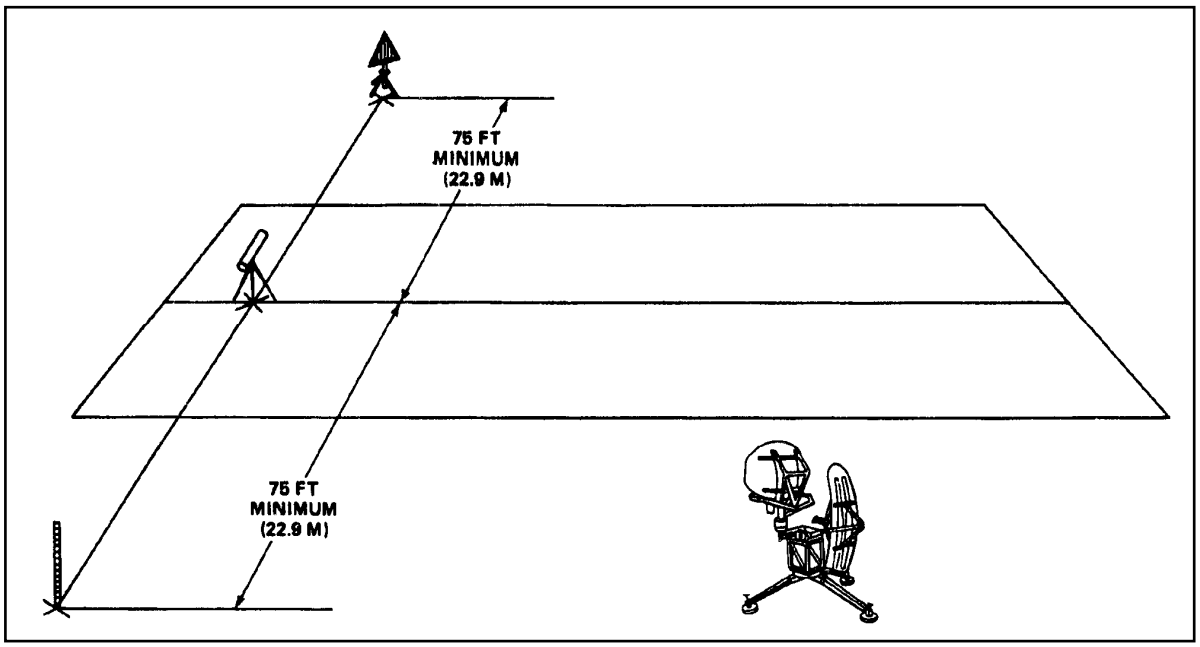


Sighting Procedure #1

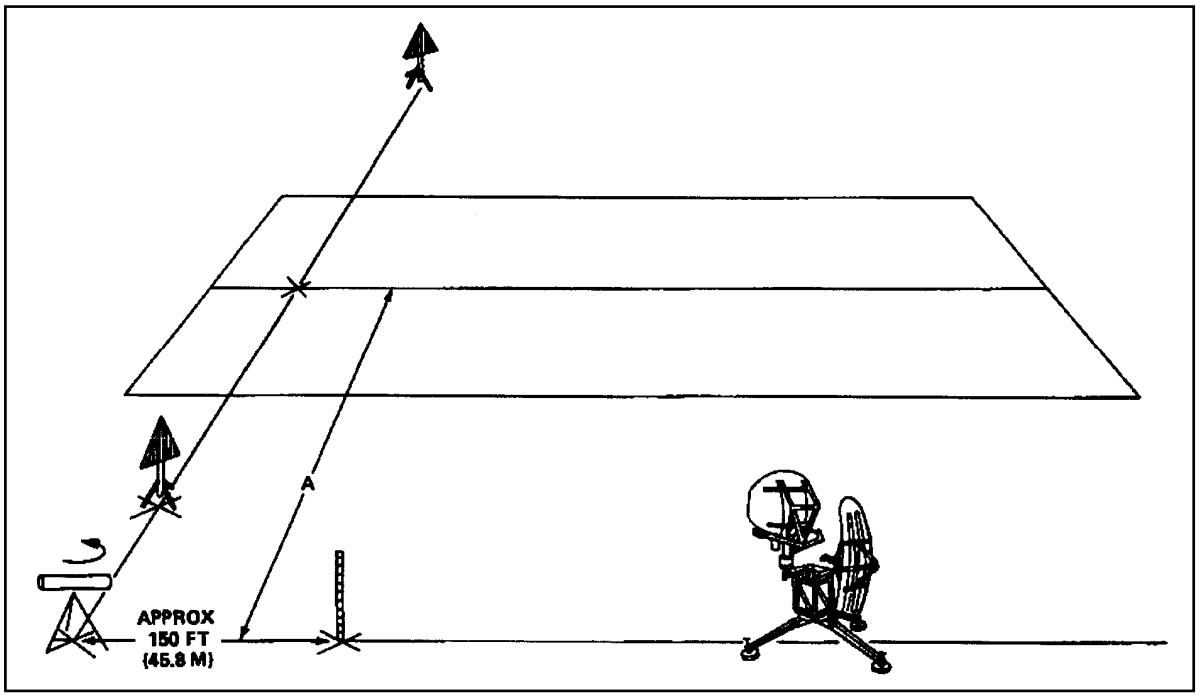


Sighting Procedure #2

Figure 2001-1. Method A sighting procedures.

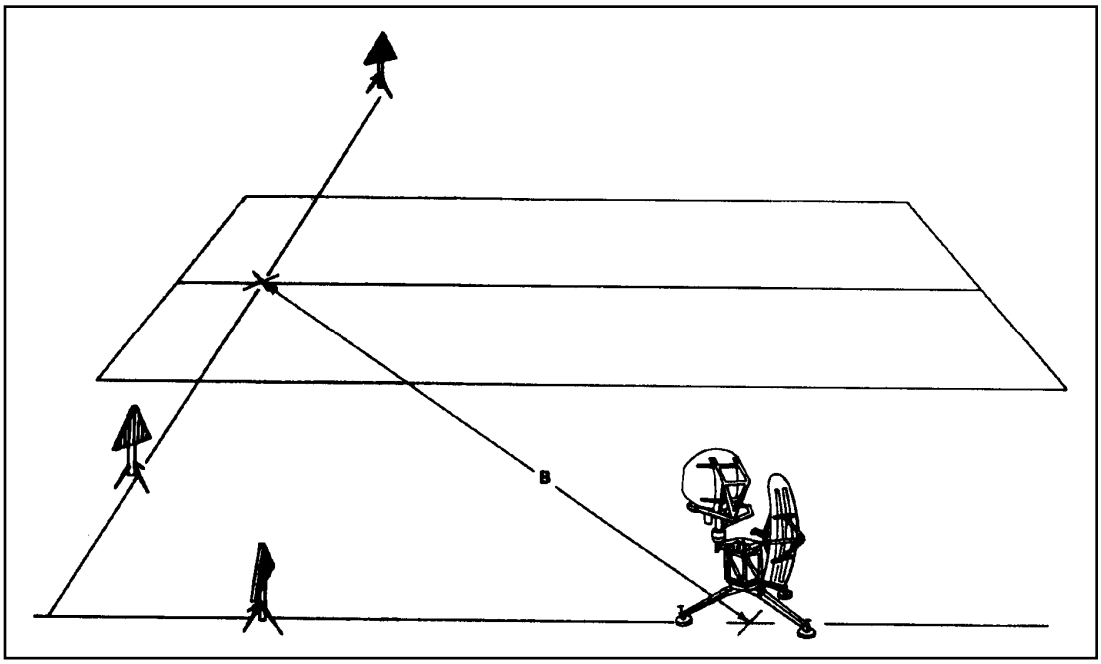


Sighting Procedure #3



Sighting Procedure #4

Figure 2001-1. Method A sighting procedures (continued).



Sighting Procedure #5

Figure 2001-1. Method A sighting procedures (concluded).

(a) Rotate the radar set group so that the antennas point toward the runway parallel line.
(b) Assemble three target reflectors as described below.
- Assemble the reflector on its supports.
- Clip the circular polarization grid, which is part of the radar target simulator, in place.

(c) Find the centerline of runway by measuring the width of the runway and dividing by two.
(d) Set up the theodolite (or transit) on the centerline of runway opposite the radar set group.
(e) Direct the second person to hold the stadia rod vertically on the centerline of runway 100 feet or more toward the touchdown point and facing the theodolite.
(f) Sight the vertical cross hair of the theodolite on the stadia rod. Record the azimuth degree indication at the theodolite reference mark.
(g) Rotate the theodolite 90 degrees in azimuth toward the radar set group; lock in the azimuth.
(h) If the vertical cross hair of the theodolite is lined up on the vertical center of the receiver-transmitter group, proceed to step (j). If the vertical cross hair of the theodolite is not lined up on the vertical center of the receiver-transmitter group, move the theodolite in the appropriate direction along the centerline of runway.
(i) Repeat steps (g) and (h) until the theodolite cross hair is lined up.
(j) Mark the point on the centerline of runway where the theodolite is located. Measure the distance from this mark to the center of the receiver-transmitter group. Record the measurement.

(k) Set up the theodolite at the touchdown point on the centerline of runway as shown in step (c). Direct the second person to hold the stadia rod on the point marked in step (j).
(l) Sight the vertical cross hair on the stadia rod. Record the azimuth degree indication at the theodolite reference mark.
(m) Rotate the theodolite 90 degrees in azimuth toward the side of the runway opposite to the radar set group; lock in the azimuth. Record the azimuth degree indication at the theodolite reference mark.
(n) Direct the second person to move the stadia rod along this perpendicular line until it is 75 feet or more from the centerline of runway and coincident with the vertical cross hair of the theodolite. Mark this point and measure its distance from the theodolite.
(o) Position the first bracketing target reflector at the point established in step (n).
(p) Rotate the theodolite 180 degrees in azimuth toward the runway parallel line. Lock in the azimuth and record the azimuth degree indication at the theodolite reference mark.

NOTE: This procedure extends the perpendicular line established in step (l) from the centerline ofrunway across the other side of the runway.

(q) Direct the second person to move the stadia rod along this perpendicular line until it is the same distance from the centerline of runway as that recorded in step (j) and coincident with the vertical cross hair of the theodolite. Mark this point.
(r) Direct the second person to move the stadia rod along this perpendicular line toward the theodolite until it is the same distance from the centerline of runway as that recorded in step (n) and coincident with the vertical cross hair of the theodolite. Mark this point and position the second bracketing target reflector at this mark.
(s) Set up the theodolite at the point marked in step (q), and sight the vertical cross hair on the vertical center line of the receiver-transmitter group. Record the azimuth degree indication at the theodolite reference mark.

NOTE: The theodolite now points along a line parallel to the centerline of runway. This is the runway parallel line.

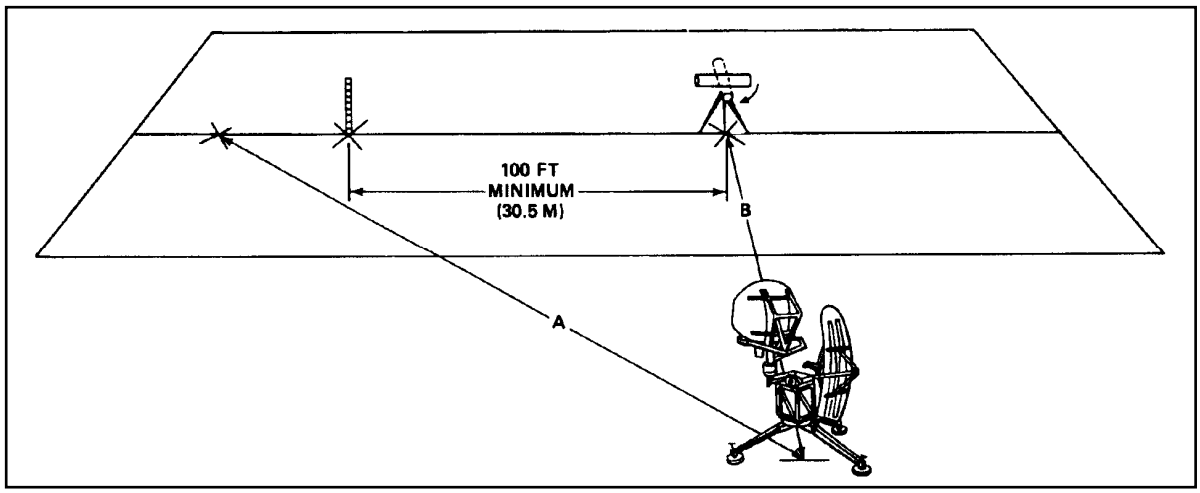
(t) Rotate the theodolite 180 degrees from the azimuth indication recorded in step (s), and lock in the azimuth.

NOTE: This procedure extends the runway parallel line away from the radar set group beyond the end of touchdown point.

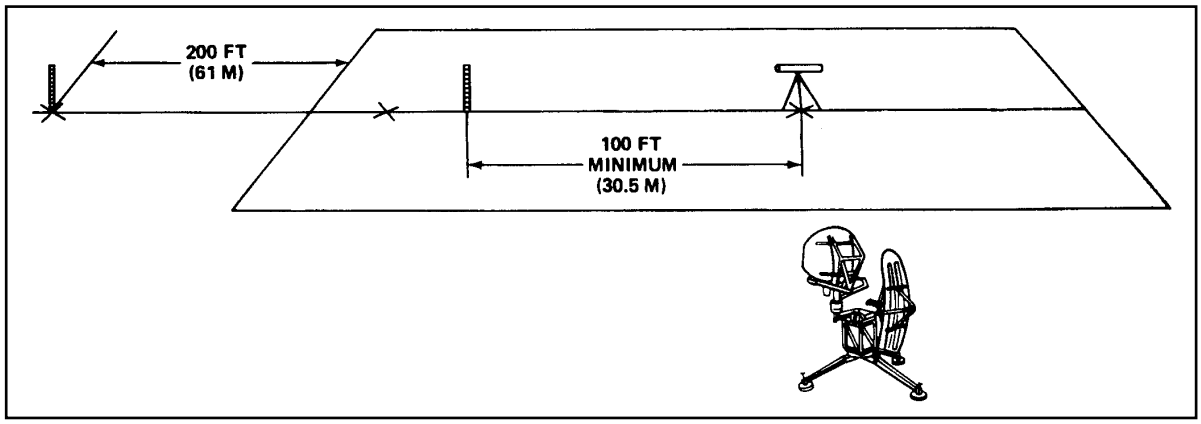
(u) Direct the second person to move the stadia rod along this parallel line until it is approximately 150 feet from the end of the runway and coincident with the vertical cross hair of the theodolite. Mark this point.
(v) Position the runway parallel line target reflector at the point established in step (u).

(2) Method B (installation using one runway parallel line target reflector and one centerline of runway target reflector). This procedure is used to install two radar target simulators (target reflectors) for each runway approach. (Using Method A, three target reflectors are installed for each runway approach.)

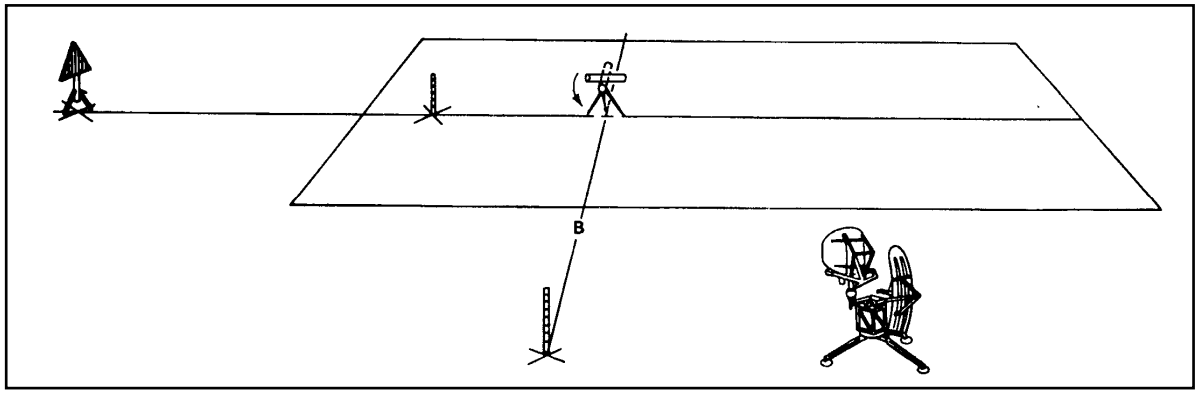
NOTE 1: Although Method A is normally preferred, use Method B if space does not allow a minimum separation of 150 feet between bracketing target reflectors or if obstacles on either side of the runway will cause ground clutter to obscure the target reflector returns.
NOTE 2: Become familiar with the installation procedures in steps (a) through (v) before installing the target reflectors. Figure 2001-2 shows the siting procedures for Method B.
NOTE 3: Ensure that the centerline-of-runway target reflectors do not present a flight hazard.



Sighting Procedure #1

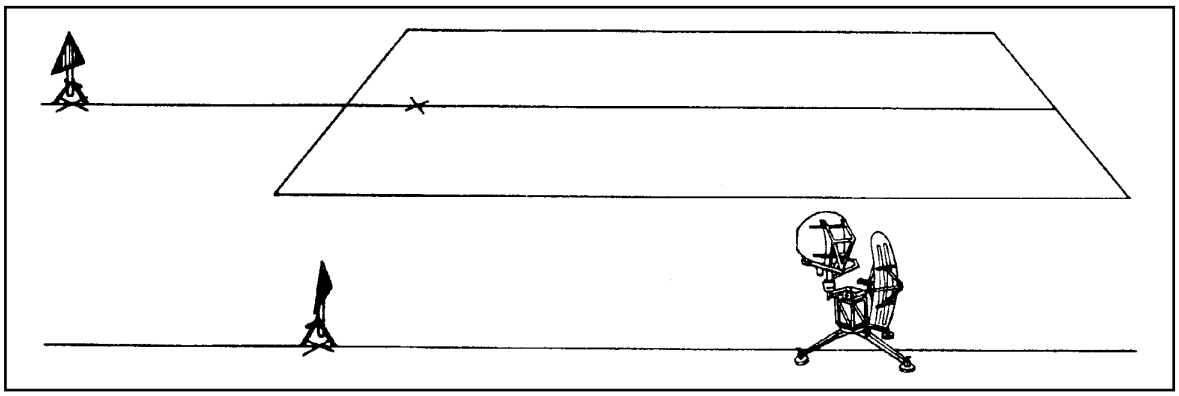


Sighting Procedure #2

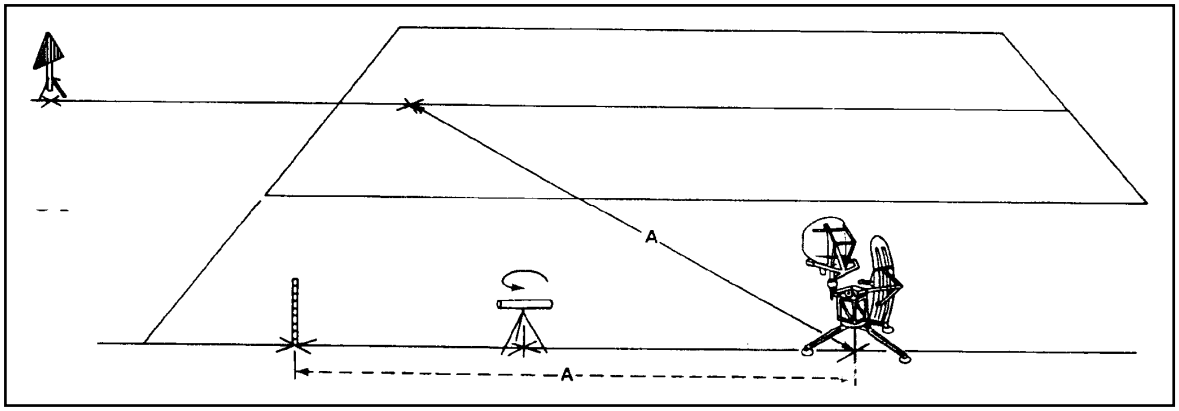


Sighting Procedure #3

Figure 2001-2. Method B sighting procedures.



Sighting Procedure #4



Sighting Procedure #5

Figure 2001-2. Method B sighting procedures (concluded).

(a) Rotate the radar set group so that the antennas point toward the touchdown point.
(b) Assemble the two target reflectors as described below.
- Assemble the reflector on its support.
- Clip the circular polarization grid, which is part of the radar target simulator, in place.

(c) Find the centerline of runway by measuring the width of the runway and dividing by two.
(d) Measure a straight line from the radar set group to the touchdown point on the centerline of runway; record the distance.
(e) Set up the theodolite (or transit) on the centerline of runway opposite the radar set group.
(f) Direct the second person to hold the stadia rod in a vertical position on the centerline of runway (100 feet or more toward the touchdown point) facing the theodolite.
(g) Sight the vertical cross hair of the theodolite on the stadia rod. Record the azimuth degree indication at the theodolite reference mark.

(h) Direct the second person to hold the stadia rod in a vertical position at a point beyond the touchdown point in the vicinity of the centerline of runway where the centerline of runway target reflector will be located.
(i) Direct the second person to move the stadia rod until it is coincident with the vertical cross hair of the theodolite. Mark this point and position the centerline of runway target reflector over the mark.
(j) Rotate the theodolite 90 degrees in azimuth toward the radar set group; lock in the azimuth.
(k) If the vertical cross hair of the theodolite is lined up on the vertical center of the receiver-transmitter group, proceed to step (m). If the vertical cross hair of the theodolite is not lined up on the vertical center of the receiver-transmitter group, move the theodolite in the appropriate direction along the centerline of runway.
(l) Repeat steps (e) through (k) until the theodolite cross hair lines up.
(m) Mark the point on the centerline of runway where the theodolite is located, then measure the distance from this mark to the center of the receiver-transmitter group. Record the measurement.
(n) Set up the theodolite on the centerline of runway approximately midway between the touchdown point and the radar set group.
(o) Sight the vertical cross hair of the theodolite on the vertical position of the centerline of runway target reflector, which was installed in step (i).
(p) Rotate the theodolite 90 degrees in azimuth toward the radar set group side of the runway; lock in the azimuth.

NOTE: The theodolite now points along a line that is perpendicular to the centerline of the runway.

(q) Direct the second person to move the stadia rod along the perpendicular line until the rod is the same distance from the centerline of runway as that recorded in step (m) and coincident with the vertical cross hair of the theodolite. Mark this point.
(r) Set up the theodolite at the point marked in step (q), and sight the vertical cross hair of the theodolite on the vertical centerline of the receiver-transmitter group. Record the azimuth degree indication at the theodolite reference mark.

NOTE: The theodolite now points along a line which is parallel to the centerline of runway. This is the runway parallel line.

(s) Rotate the theodolite 180 degrees from the azimuth indication recorded in step (r); lock in the azimuth.
(t) Direct the second person to move the stadia rod along the runway parallel line until the rod is the same distance from the radar set group as that recorded in step (d) and coincident with the vertical cross hair of the theodolite. Mark this point.
(u) Position the touchdown point/runway parallel line target reflector at the point established in step (t).

2. Determine the Ground Angle.

a. A sighting scope and a clinometer are supplied with the radar set. They are used to determine the ground angle and are stored inside the doors of the receiver-transmitter. When the sighting scope is attached to a mounting bracket on the azimuth antenna, it is used with the antenna scan protractor as a transit or theodolite. When the clinometer is attached to the elevation antenna, it serves as the elevation scan protractor. The clinometer, shown in Figure 2001-3, is adjustable from -5 to +40 degrees and is positioned in 1-degree increments.

b. The vernier scale on the adjustment knob on the clinometer bubble-level support has a 1-degree range calibrated in increments of .05 degrees. The black degree markings on the degree and vernier scales are read as positive angles; the red degree markings are read as negative

angles. For example, an angle of +3.2 degrees positions the pointer at the third notch above the black zero on the degree scale and the vernier knob at 0.2 on its black scale. For an angle of -3.2 degrees, the pointer would be at the third notch below the red zero, and the vernier knob would be at 0.2 on its red scale. As described below, use the sighting scope and the clinometer to find the ground angle.

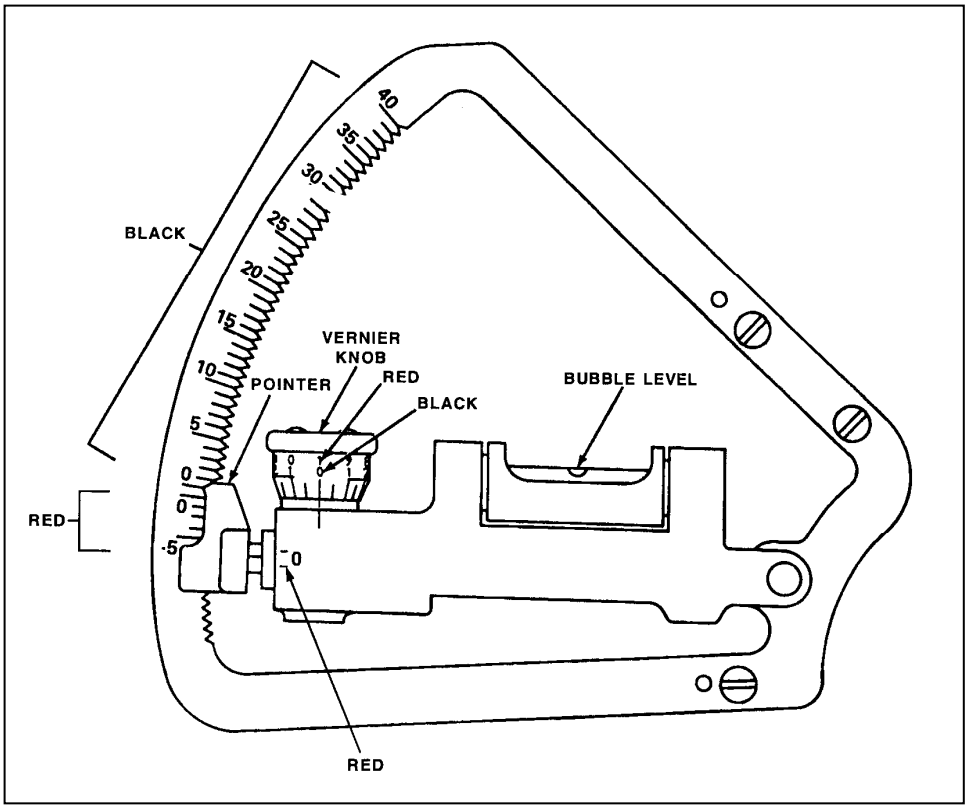


Figure 2001-3. Clinometer.

(1) Elevation ground angle.
   (a) Attach the sighting scope to the sighting scope bracket and the clinometer to the clinometer bracket on the elevation antenna reflector.
   (b) Loosen but do not remove six screws in the three strap clamps that secure the receiver-transmitter to the antenna pedestal.
   (c) Manually rotate the receiver-transmitter group so that the elevation antenna faces the touchdown point on the runway.
   (d) Check the bubble level to ensure that the radar set group is level.
   (e) Mark the stadia rod at a height that represents the center of elevation horn and polarizer when the clinometer indicates level.
   (f) Direct a second person to hold the stadia rod temporarily in a vertical position on the touchdown point on the runway.

NOTE: In step (g), the elevation antenna must be at 0 degrees as indicated by the protractor on the back of the elevation antenna.

(g) Manually position the elevation antenna by turning the knurled end of the motor shaft, which is under the red cover on the right side of the elevation antenna, so that the sighting scope cross hairs are centered on the stadia rod marking. Maintain the elevation antenna in this position.
(h) Adjust the clinometer pointer and the vernier knob to the center bubble. For future reference, record the angle indicated by the elevation clinometer. (This is the ground angle to use in aligning the elevation cursor.)
(i) Remove the stadia rod from the touchdown point.

NOTE: If the touchdown point is lower than the radar site elevation, a negative ground angle will result. This ground angle cannot exceed -1 degree. If more than one runway approach is to be used, determine and record the ground angle for each touchdown point using steps (a) through (i).

(2) Actuator check (10 to 35 degrees). The 10- to 35-degree actuator should be checked after the initial turn-on procedure has been accomplished. Perform the 10- to 35-degree actuator check as described below.
(a) On the local control monitor, set the LOCAL/REMOTE switch to RT and the SCAN MODE switch to NORM.
(b) Observe the elevation antenna scan protractor and servo the elevation antenna to approximately zero degrees in azimuth using the ANT SERVO switch on the local control monitor.
(c) Attach the clinometer to the elevation antenna clinometer mount, and check the bubble level to ensure that the antenna pedestal is level.

NOTE: If it is not level, level the antenna pedestal.

(d) Manually tilt the elevation antenna to top dead center of its scan, and adjust the clinometer to indicate 20.6 degrees. Verify that the clinometer bubble is centered.
(e) If the clinometer bubble is not centered as indicated above, loosen the two locknuts and adjust the elevation antenna shaft until the clinometer bubble is centered. When the clinometer bubble is centered, tighten the two locknuts while keeping the clinometer bubble centered.

NOTE: If the adjustment in step (e) cannot be accomplished, turn the 10- to 35-degree actuator in to higher maintenance for a complete realignment.

(f) Remove the clinometer from the elevation antenna clinometer mount, and store it in the transmitter door.

3. Perform Radar Set Orientation.
a. Orientation requirements.
(1) For the radar display data to be valid, the radar set group must be oriented (aligned) with the runway to which GCA landing service is being provided. Physically rotate the radar set group on its pedestal (in azimuth) to align the antenna scan sectors to the runway. This ensures accurate azimuth and elevation data that refers to the runway in service.
(2) The radar set group must be initially oriented, as described below, to each runway for which GCA landing service will be provided from the one radar site. Thereafter, to change to a second runway (an approach other than the one oriented to), perform only steps (1) and (2) in paragraph b to orient the radar set group. Radar set antenna scans normally cover a 30-degree sector in azimuth when operating in the precision mode.
(3) When the sighting scope mounted on the elevation drive support tube is sighted on the runway parallel line reflector, the 30-degree scan sector is centered on the runway parallel line (15 degrees on either side). Optimum scan coverage occurs with this siting.

(4) When conditions such as unusually short runways or inadequate approach coverage in a multiple approach siting will not permit the 30-degree scan sector to be centered on the runway parallel line, the 30-degree scan sector can be offset any number of degrees (up to a maximum of 10) toward the runway. Offsetting the scan sector 10 degrees toward the runway (from the runway parallel line) permits a coverage of 25 degrees toward the runway and 5 degrees away from the runway parallel line. In any case, the scan sector must include the touchdown point and target reflectors.

(5) When the runway bracketing target reflectors are used, the edges of the 30-degree scan sector must extend at least 1 degree beyond the touchdown point bracketing target reflectors. The radar set group orientation procedures below describe the use of the sighting scope and azimuth protractor (located on the azimuth antenna drive) along with the target reflectors to initially orient the radar set group to the runways.

b. Orientation procedures.

NOTE: Perform steps (1) through (14) below for each runway approach to be serviced from the radar site. After steps (1) through (14) have been initially accomplished for two runway approaches, perform only steps (1) and (2) to change the runway approaches to orient the radar set group to the second approach.

(1) Mount the siting scope on the antenna drive support tube sighting scope mount.

(2) Loosen but do not remove six screws in the three strap clamps. Rotate the receiver-transmitter until the vertical cross hair of the sighting scope is centered on the runway parallel target reflector. Tighten the six screws.

(3) Remove the sighting scope from the antenna drive support tube and the mount on the azimuth antenna sighting scope mount.

(4) Manually rotate the azimuth antenna toward the runway until the 14-degree mark is indicated on the azimuth protractor.

NOTE: If the conditions in step (5) cannot be met or an azimuth scan coverage of other than 15 degrees left and 15 degrees right is required, perform steps (7) through (14).

(5) Slowly rotate the azimuth antenna toward the 0 degree mark on the azimuth protractor while you observe the target reflectors through the sighting scope. Determine if the farthest touchdown point bracketing target reflector or runway centerline target reflector (whichever is used) and the touchdown point on the runway are within the 14- to 0-degree azimuth scan area. The radar set group is now oriented to the runway for operation with an azimuth precision scan coverage from 15 degrees left to 15 degrees right of the runway parallel line. Remove and store the sighting scope.

(6) Tighten the six screws to secure the receiver-transmitter on the mount.

(7) Mount the sighting scope on the sighting scope bracket on the azimuth antenna.

(8) Manually rotate the azimuth antenna toward the runway until the 14-degree mark is indicated on the azimuth protractor.

(9) Loosen but do not remove six screws in the strap clamps.

(10) Manually rotate the receiver-transmitter until the vertical cross hair of the sighting scope is centered on the bracketing target reflector (when used) farthest from the radar set group. If the runway centerline target reflector is used instead of the bracketing target reflectors, center the vertical cross hair of the sighting scope on a stadia rod held in the vertical position on the touchdown point on the runway.

(11) Tighten the six screws in the strap clamps.

(12) Manually rotate the azimuth antenna away from the runway until the vertical cross hair of the sighting scope is centered on the runway parallel line target reflector.

(13) Observe the indication on the azimuth protractor and verify that the indication is 10 degrees or less. If the indication on the azimuth protractor is 10 degrees, omit step (14). If the indication on the azimuth protractor is more than 10 degrees, perform step (14).

(14) If the azimuth protractor indication exceeds 10 degrees, perform one or more of the following steps and repeat the procedure beginning with step (7).
  (a) Place the bracketing target reflectors closer to the runway. (Do not place them closer than 75 feet from the centerline of the runway).
  (b) Move the radar site farther back from the touchdown point along the runway parallel line.
  (c) Move the touchdown point closer to the approach end of the runway. When used, the bracketing reflectors also must be moved to bracket the touchdown point.
  (d) Move the radar site closer to the centerline of the runway.
(15) Remove and store the sighting scope in the transmitter door.

4. Check the installation of the equipment. After the radar set is installed, but before the initial application of power, perform the following checks.
   a. Inspect the reference designations on the interconnecting cables and connections on the receiver-transmitter at the radar site and on the control indicators at the operating site.
   b. Inspect all cables and waveguides on the radar set group for tightness and correct fit.
   c. Check the azimuth filler plug in the azimuth antenna drive and the elevation filler plug in the elevation antenna drive to ensure that the vent holes are outside (open).
   d. Check the three adapters installed in the waveguides to ensure that the dehydrator cartridge and adapters are installed in each of them.
   e. Check the earth anchors and the strap ratchet. Ensure that they are tight and secure.
   f. Check the pins in the azimuth antenna servo actuator to ensure that they are installed and secure.
   g. Check the pins in the elevation antenna servo actuator to ensure that they are installed and secure.
   h. Make sure that the clip is installed in the lower elevation antenna support pin.
   i. Check the azimuth antenna drive and ensure that the protective cover is removed.
   j. Check the bottom and the receiver sides of the receiver-transmitter. Verify that the vent cover and the exhaust port cover on the receiver side of the receiver-transmitter is open or removed.
   k. Manually rotate the azimuth antenna through 360 degrees of azimuth rotation. Listen for any unusual noises. Ensure that movement is not restricted and the scan radius is clear.
   l. Manually operate the elevation antenna through its scan cycle either by turning the knurled end of the motor shaft or by pushing on the actuator arm crank which is on the left side of the elevation antenna drive. Ensure that movement is not restricted and no unusual noises are heard.
   m. Ensure that the bubble level on the elevation antenna drive shows a level indication. Level the radar set group if necessary.
   n. Verify that the red ventilation cover on the rear cover of the control-indicators (master and slave) is open.

Evaluation Preparation: Setup: In an actual setting, as a member of a tactical GCA team, have the soldier orient the radar set.

Brief Soldier: Tell the soldier to perform the initial orientation of the AN/TPN-18A radar set.

Performance Measures	GO	NO GO
Target reflectors are installed using either methods one or method two. Ground angle is determined with a sighting scope and clinometer. Radar set group aligned to GCA landing runway. Equipment installation is inspected on the AN/TPN-18A. Initial adjustments are made. All procedures are performed according to TM 11-5840-281-12-1.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
TM 11-5840-281-12-1	None

SUBJECT AREA 9: FLIGHT-FOLLOWING PROCEDURES

Locate a Geographic Coordinate on a Sectional, JOG-A ,or TPC
011-141-0001

Conditions: You are given an aeronautical chart, JOGA, or TPC and five sets of geographic coordinates to plot.

Standards: Properly locate a geographical coordinate on a sectional, JOGA, or TPC according to FM 3-25.26.

Performance Steps

1. Locate Degrees and Minutes of Latitude.
   a. The distance of a point north or south of the equator is known as its latitude. Lines of latitude run east and west and make parallel circles above and below the equator. Distances north and south are measured between these lines.
   b. Geographic coordinates are expressed in angular measurements. Each circle is divided into 360 degrees; each degree, into 60 minutes. The degree is symbolized by °; the minute, by '. Starting with 0° at the equator, the parallels of latitude are numbered to 90° both north and south. The extremities are the north pole at 90° north latitude and the south pole at 90° south latitude.
   c. Latitude is measured on a north-south line. To find the latitude of an item on a sectional aeronautical chart, JOGA, or TPC, move up the scale (see Figure 0001-1 on the next page), keeping track of the measurements until you are aligned with the item. Look back at the last major measurement of degrees and count the tick marks up to the point where you are aligned with the item. This is the measurement of latitude. The latitude of the point indicated by the "X" in (Figure 0001-1) is 32°35'N.

2. Locate Degrees and Minutes of Longitude.
   a. The meridians of longitude are a second set of rings around the globe at right angle to the lines of latitude and passing through the poles. One meridian is designated as the prime meridian. (The prime meridian of the system we use runs through Greenwich, England.) The distance east or west of the prime meridian to a point is known as its longitude. Lines of longitude run north and south and measure distances east and west between them.
   b. Starting with 0 at the prime meridian, longitude is measured both east and west around the world. Lines east of the meridian are numbered to 180° and are identified as east longitude. Lines west of the meridian are numbered to 180° and are identified as west longitude. The direction east (E) or west (W) must always be given. The line directly opposite the prime meridian (180°) may be referred to as either east or west longitude.
   c. Longitude is measured on an east-west line. To find the longitude of an item on a sectional aeronautical chart, JOGA, or TPC, move left (right if you are in Europe) on the scale (Figure 0001-2), keeping track of the measurements until you are aligned with the item. Look back at the last major measurement of degrees and count the tick marks to the point where you are aligned with the item. This is the measurement of longitude. The longitude of the point indicated by the "X" in Figure 0001-2 is 86°22'W.

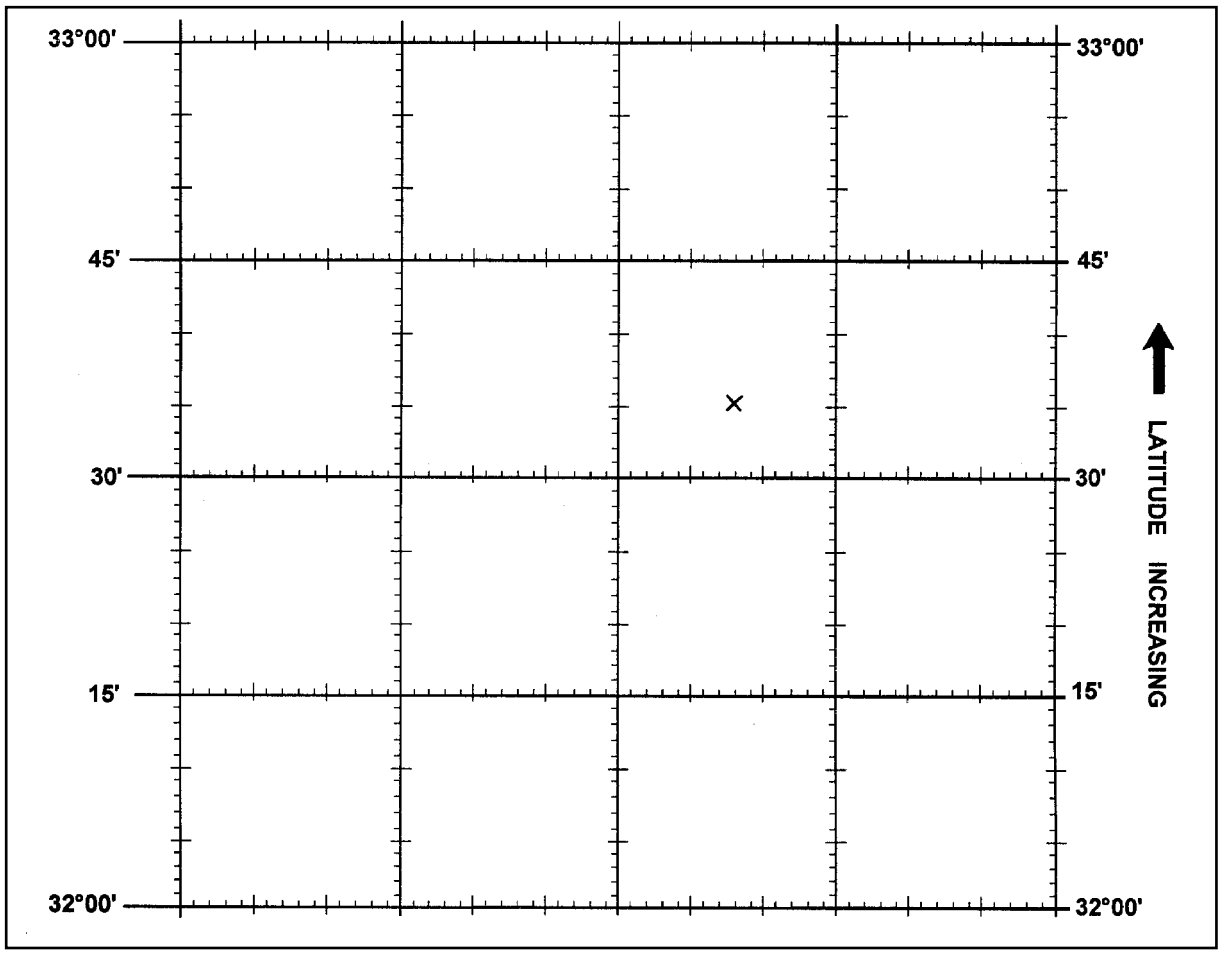


Figure 0001-1. Degrees and minutes of latitude.

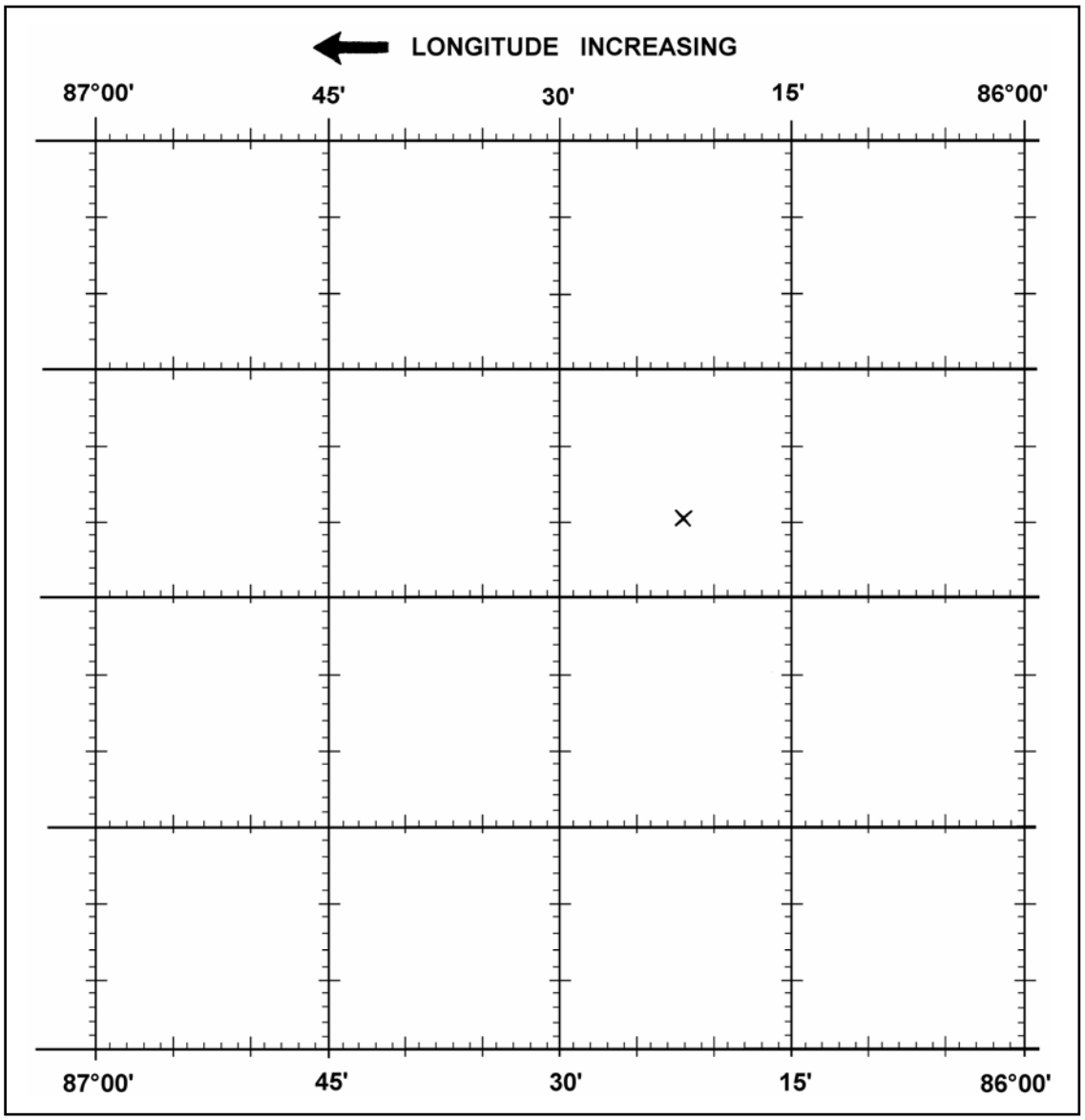


Figure 0001-2. Degrees and minutes of longitude.

3. Locate a 6-digit Grid on a JOGA Map.
   a. When plotting geographic coordinates, read latitude first; then read longitude. Read the coordinates in the direction in which the numbers are increasing. The coordinates of the point indicated by the "X" in Figure 0001-3 are 32°35'N, 86°22'W.
   b. When writing coordinates, write latitude first; then write longitude.

Evaluation Preparation: Setup: In a suitable training environment. Provide all items required in the condition statement.

Brief Soldier: Tell the soldier to plot the designated point on the map from the given coordinates. Go over the materials needed to perform the task.

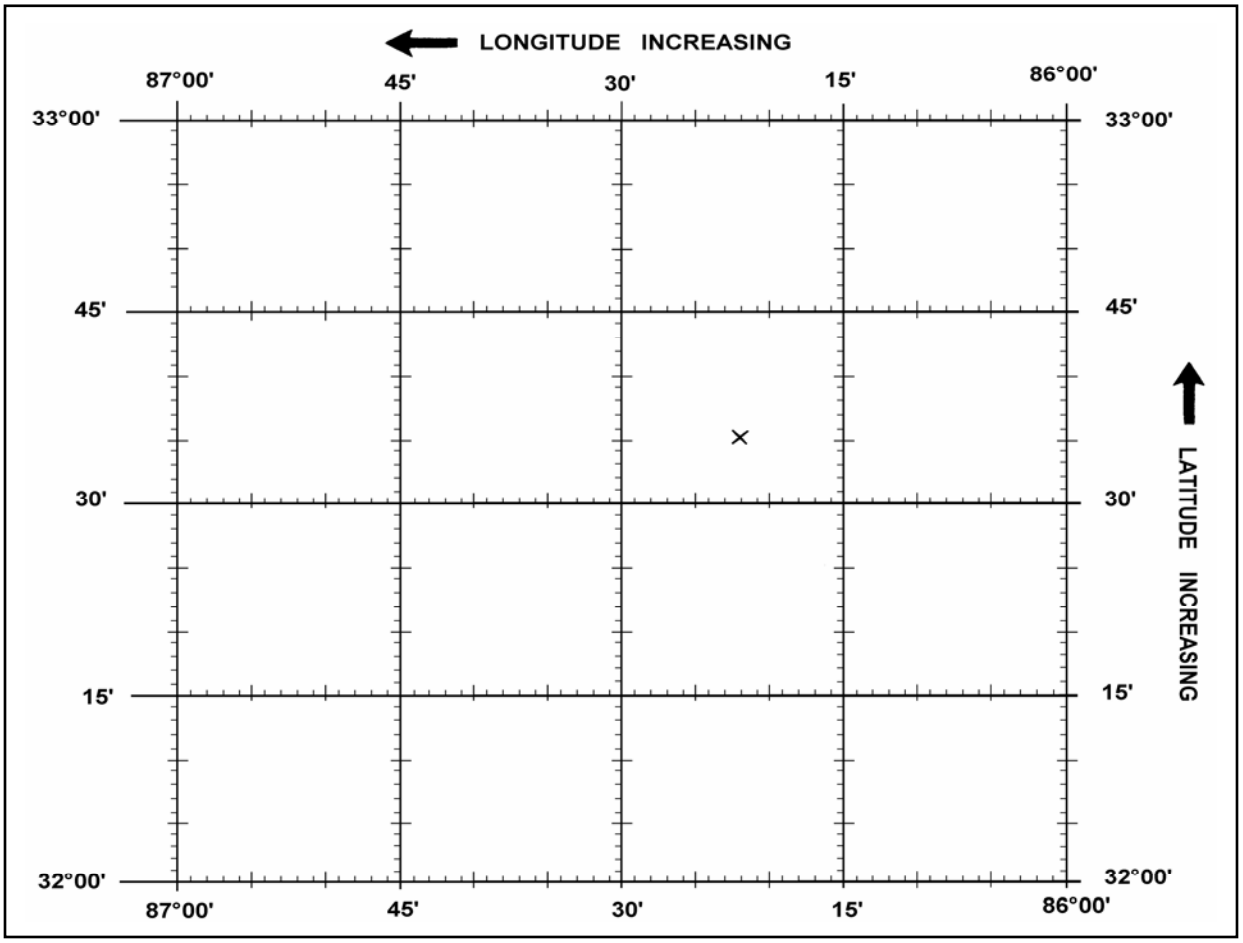


Figure 0001-3. Plotting geographic coordinates.

Performance Measures	GO	NO GO
1. Locates degrees and minutes of latitude.	____	____
2. Locates degrees and minutes of longitude.	____	____
3. Plots geographic coordinates.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
FM 3-25.26	None

Provide Flight-Following Service
011-143-0020

Conditions: While performing duties as an air traffic control operator in a flight-following center, flight coordination center, or tower, and aircraft are reporting current information to you, you are given flight strips, strips holders, maps, and overlays. You are tasked to track the movements of friendly aircraft operating in your area of responsibility.

Standards: Coordinate information, transmit information, post flight progress strips, assist with search and rescue operations, and initiate flight following map according to FAA Order 7110.65, FM 3-04.120(FM 1-120), FM 3-04.303(FM 1-303), FM 3-52(FM 100-103), and unit SOP.

Performance Steps

1. Coordinate Information with Other Facilities.
   a. Coordinate—
      - air routes.
      - preplanned artillery fires.
      - restricted zones.
      - the FLOT.
      - the location and designation of ATC facilities and/or NAVAIDS.
      - the location of airfields and heliports.
      - coordination altitudes.
      - ADA data.
   b. Provide ATS in designated airspace.
   c. Process flight plans and clearances between the FOC and the originator.
   d. Assist in search and rescue operations.
   e. Maintain flight data.
   f. Provide ATC services as required.

2. Transmit Information to Aircraft. Transmit the following information, as appropriate:
   a. Weather and/or chaff information.
   b. Reporting points.
   c. Handoff points.
   d. Boundary areas depicted on the map that would be easily recognized from the air.
   e. Range information including firing points, impact areas, and the type of armament being fired.
   f. Any other information or advisories that a controller may deem necessary.

3. Post FAA Form 7230-21 (Flight Progress Strip).
   a. Initiate. Initiate the flight progress strips according to the instructions given below.
      (1) Block 1—Enter the aircraft ID code.
      (2) Block 2—Enter the type of aircraft and the symbol used for special equipment such as the DME transponder.
      (3) Block 3—Enter the altitude.
      (4) Block 4—Enter the code.
      (5) Block 5—Enter the route or area of flight.
      (6) Block 6—Enter the radio or radar contact time in UTC.
      (7) Block 7—Enter the destination such as the training area or intended landing area.

(8) Block 8—Enter the ETA at the destination in UTC.
(9) Block 9—Enter coordination effected such as CRC, FCC, range control, and AD12.
(10) Block 10—Enter the type of mission; for example, NOE, NVG, and administrative.
(11) Block 11—Enter the time of last radio contact and handoff information.
(12) Block 12—Enter the time at reporting points.
(13) Blocks 13 and 14—Enter the reporting points, amendments, clearances, and so forth that correspond to Block 12. Blocks 13 and 14 can be changed or modified by the facility as necessary.

b. Update. Use flight progress strips to post current data on air traffic and clearances required for control and other air traffic control services. To prevent misinterpretation when data is hand printed, use standard hand-printed characters.
(1) Without delay, enter on the appropriate flight progress strip the estimated times, clearance information, position reports, and any other IFR flight data received over any communications channel.
(2) Maintain only the necessary current data; remove the strips from the flight progress boards when they are no longer required for control purposes. To correct, update, or preplan information, follow the instructions given below.
(a) Do not erase or write over any item. Use an X to delete a climb/descent, a maintain arrow, an at or above/below symbol, a cruise symbol, and any unwanted altitude information. Write the new altitude information in the same space adjacent to the unwanted information. On other unwanted information, draw a horizontal line through the item and write the new item in the same space adjacent to the old information.
(b) Do not draw a horizontal line through an altitude being vacated until the pilot of the aircraft has reported leaving that altitude or the aircraft is observed (valid Mode C) leaving the altitude.
(3) The flight progress of each participating aircraft shall be monitored to the extent possible. Maximum time between position reports shall be 30 minutes. Less time may be required depending on the type, length, and area of some routes such as an NOE route.

c. Sequence. Arrange flight progress strips under the appropriate fix designators according to the instructions given below.
(1) Post the flight progress strips in the appropriate low or high altitude sector according to the assigned altitude or flight level.
(2) Place the flight progress strips in chronological order of arrival over a particular fix (time sequencing) or in ascending order of assigned altitudes over a holding fix (altitude sequencing).
(3) Post arriving aircraft in time sequence below departing aircraft when they are displayed under the same fix designator or sequence arrivals and departures together if doing so is more appropriate for a given fix. Arriving aircraft and departing aircraft may be displayed in two different bays.

NOTE: Facilities will be different depending on the local SOP.

4. Assist in Search and Rescue Operations.
a. Provide maximum assistance to aircraft in distress. Upon pilot request or when you deem necessary, enlist the services of available radar facilities and DF facilities operated by the FAA, the military services, and the FCC and its emergency services and facilities.
b. The National SAR Plan assigns search and rescue responsibilities. These responsibilities are discussed below.
(1) Military agencies conduct physical search and rescue operations.
(2) The FAA is responsible for the following:

(a) Providing emergency service to aircraft in distress.
(b) Assuring that SAR procedures will be initiated if an aircraft is overdue or unreported. This is accomplished through the ATC system for IFR aircraft and the flight plan system for VFR aircraft.
(c) Attempting to locate overdue or unreported aircraft by using the INREQ and ALNOT communications search.
(d) Making all possible facilities available to the searching agencies.

c. Flight service stations serve as the central points for collecting and disseminating information on overdue or missing aircraft that are not on an IFR flight plan.
d. Centers serve as the central points for collecting information, coordinating SAR, and conducting a communications search by distributing ALNOTs. These ALNOTs contain the information discussed below.
(1) Overdue or missing IFR aircraft.
(2) IFR aircraft in an emergency occurring in their respective areas.
(3) An aircraft on a combination VFR/IFR flight plan. For SAR purposes, this aircraft is treated the same as an IFR aircraft.
(4) An aircraft on an airfield IFR flight plan and 30 minutes have passed since the pilot requested IFR clearance and neither communications nor radar contact can be established with the aircraft. For SAR purposes, this aircraft is treated the same as an IFR aircraft.
(5) An overdue or missing aircraft that has been authorized to operate according to a special VFR clearance.

NOTE: The ARTCC serves as the central point for collecting information and coordinating with RCC or ELT signals.

5. Initiate a Flight-following Map. Each facility shall have an up-to-date map of its area. A 1:100,000-scale map is ideal; however, the area and size of the facility may require a different scale map. Each map shall depict the areas and routes shown below.
a. EOD route.
b. Impact areas.
c. Firing points.
d. Navigational aids.
e. ADIZ and no-fly areas.
f. Prominent obstructions.
g. NOE, NVS, and RPV routes.
h. Mandatory reporting points.
i. Radio and radar blind spots.
j. Airfields and landing areas.
k. Unit or interarea boundaries.
l. Restricted and warning areas.
m. Aircraft entry and exit routes.
n. Handoff and changeover points.
o. Corridors, transition areas, and training areas and ranges.
p. The same crash grids as other area ATC and search and rescue facilities.

Evaluation Preparation: Setup: This task may be simulated by the supervisor using a canned flight-following problem. The supervisor should act as the calling or receiving party.

Brief Soldier: Tell the soldier he will be evaluated on the decisions he makes and the procedures and phraseology he uses to provide flight-following service. Do not inform the soldier of his progress during the evaluation.

Performance Measures	GO	NO GO
1. Maintains current arrival, departure, and en route information.	___	___
a. Enters on the appropriate strip the flight data pertinent to flight following.		
b. Removes the strirom flight progress boards when no longer required.		
2. Issues information and advisories to arriving, departing, and en route aircraft.	___	___
a. Transmits only those messages necessary to perform the assigned functions of flight-following service.		
b. Relays operational information to aircraft or personnel responsible for operations according to existing directives.		
c. Coordinates with other facilities and controllers as necessary.		
3. Assists in search and rescue procedures.	___	___
a. Provides maximum assistance for search and rescue if an aircraft is reported to be overdue, missing, or downed.		
b. Forwards detailed data to the appropriate authority when information is received about an aircraft in distress.		

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required

FAA Form 7230-21
Unit SOP

Related

FAA Order 7110.65
FM 3-52(FM 100-103)
FM 3-04.303(FM 1-303)
FM 3-04.120(FM 1-120)

SUBJECT AREA 10: GENERAL AIR TRAFFIC CONTROL PROCEDURES

Implement Basic Airspace Command and Control Procedures
011-143-7000

Conditions: As an air traffic controller and assigned as a member of a FCC or FOC and given a requirement to know the basic A^2C^2 role in a combat environment.

Standards: Identify basic A^2C^2 functions according to FM 3-52(FM 100-103).

Performance Steps

1. Identify Definitions of Terms.
2. Identify Basic A^2C^2 Measures.
3. Define Basic Functions Within Brigades and Battalions.

   CONDITION: According to FM 3-52(FM 100-103).

Evaluation Preparation: Setup: This task may be simulated by the supervisor. Give the soldier a possible combat situation and a requirement to provide A^2C^2 services.

Brief Soldier: Tell the soldier he will be evaluated on his ability to implement basic A^2C^2 procedures.

Performance Measures	GO	NO GO
Identify basic A^2C^2 measures according to FM 3-52(FM 100-103).	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
FM 3-52(FM 100-103)	None
FM 3-04.120(FM 1-120)	

Control Aircraft, Vehicles, and Personnel by ATC Light Gun Signals
011-143-0015

Conditions: While performing duties as an air traffic control operator in an ATC tower, and a situation occurs that requires control instructions to be given using an approved light gun signaling device.

Standards: Control aircraft, vehicles, and personnel with the light gun signals, which are appropriate for each control situation according to FAA Order 7110.65.

Performance Steps

1. Control Aircraft in the Air Using the Appropriate Signal.
2. Control Aircraft on the Ground Using the Appropriate Signal.
3. Control Vehicles and Personnel in the Movement Area Using the Appropriate Signal.

Evaluation Preparation: Setup: Require the soldier to determine and direct the correct light gun signal to aircraft, vehicles, and personnel when radio communications cannot be used. This requirement may be simulated. Provide the soldier with an operational light gun. Require him to direct a light gun signal toward the supervisor after he describes a situation requiring a light signal.

Brief Soldier: Tell the soldier he will be evaluated on controlling aircraft, vehicles, and personnel using light gun signals. The soldier will not be informed of his progress during performance of the task.

Performance Measures	GO	NO GO
1. Control aircraft in the air.	___	___
2. Control aircraft on the ground.	___	___
3. Control vehicles and personnel in the movement area.	___	___
4. Correctly determines position and situation of aircraft, vehicle, equipment or personnel not responding to radio instructions; then issues correct light gun signals and observes the response according to FAA Order 7110.65.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
FAA Order 7110.65	None
FM 3-04.303(FM 1-303)	

Control Aircraft Taxi

011-143-5060

Conditions: While performing duties as an air traffic control operator in an ATC tower, you are given a situation which requires control instructions to be given to ground traffic operating on the airfield.

Standards: Determine position, issue information, prevent aircraft from entering ILS critical area, coordinate with local controller, and use light gun signals to control taxiing aircraft according to FAA Order 7110.65.

Performance Steps

1. Determine Aircraft Position.
   a. Determine the position of an aircraft before issuing taxi instructions or takeoff clearance.

NOTE: The position of the aircraft may be determined visually by the controller, the pilot, or using the ASDE.

   b. When a local controller delivers or amends an ATC clearance to an aircraft awaiting departure and that aircraft is holding short of a runway or is holding in position on a runway, an additional clearance shall be issued to prevent the possibility of the aircraft inadvertently taxiing onto the runway and/or beginning a takeoff roll. In such cases, append one of the following ATC instructions: "Hold short of runway," or "Hold in position."

2. Issue Taxi Information. When ground movement information is required, issue the route for the aircraft or vehicle to follow on the movement area in concise, easily understood terms.

NOTE: Movement of aircraft or vehicles on nonmovement areas is the responsibility of the pilot, aircraft operator, or airport management.

   a. When authorizing a vehicle to proceed on the movement area or an aircraft to taxi to any point other than an assigned takeoff runway, the absence of holding instructions authorizes an aircraft or vehicle to cross all taxiways and runways that intersect the taxi route. If the intent is to hold the aircraft or vehicle short of any given point along the taxi route, issue the route, if necessary, then state the holding instructions. The phraseology to use is shown on the following page.

Phraseology: "Hold position."

"Hold for (reason)."

"Cross (runway/taxiway)."

Or,

"Taxi/continue taxiing/proceed."

"Via (route)."

Or,

"On (runway number or taxiway)."

Or,

"To (location)."

Or,

"(Direction)."

Or,

"Across runway (number)."

Or,

"Via (route), hold short of (location)."

Or,

"Follow (traffic) (restrictions as necessary)."

Or,

"Behind (traffic)."

"Cross runway two eight left."

"Taxi/continue taxiing/proceed to the hangar."

"Taxi/continue taxiing/proceed straight ahead then via ramp to the hangar."

"Taxi/continue taxiing/proceed on taxiway Charlie; hold short of runway two seven."

b. When authorizing an aircraft to taxi to an assigned takeoff runway and hold short instructions are not issued, specify the runway preceded by the words "taxi to" and issue taxi instructions, if necessary. This authorizes the aircraft to cross all runways or taxiways that the taxi route intersects except the assigned takeoff runway. This does not authorize the aircraft to enter or cross the assigned takeoff runway at any point. The phraseology to use is shown below.

Phraseology: "Taxi to runway (number) via. . ."

"Taxi to runway one two."

"Taxi to runway three six via taxiway Echo."

c. When assigning a takeoff runway and hold short instructions are issued, specify the runway, issue taxi instructions if necessary, and then state the hold short instructions. The phraseology to use is shown below.

Phraseology: "Runway (number), taxi/proceed VIA (route if necessary), hold short of (runway number)."

Or,

"Short of (location)."

Or,

"On (taxi strip, run-up pad, and so forth)" and, if necessary,

"Traffic (traffic information)."

Or,

"For (reason)."

"Runway three six, taxi via taxiway Echo. Hold short of runway two seven."

d. Request that runway hold short instructions be read back when they are not received from the pilot or vehicle operator.
e. Issue instructions to expedite a taxiing aircraft or a moving vehicle. The phraseology to use is shown below.

Phraseology: "Taxi without delay (traffic if necessary)."

"Exit/proceed/cross (runway/taxiway) without delay."

f. Issue progressive taxi or ground movement instructions when the pilot or operator requests them or the specialist deems it necessary because of traffic or field conditions such as construction or closed taxiways.

NOTE: Progressive ground movement instructions include step-by-step routing directions.

3. Hold Taxiing Aircraft Clear of the Runway. Hold an aircraft or vehicle short of the runway as described below.
   a. Instruct aircraft or vehicles to hold short of a specific runway.
   b. Instruct aircraft or vehicles to hold at a specific point.
   c. Issue traffic information as necessary.

4. Prevent Aircraft From Entering ILS-critical Areas. If an ILS- or MLS-critical area is marked and identifiable, restrict aircraft and surface vehicle operations and issue traffic information when the ILS/MLS is being used for approach or landing guidance. Restrictions to the operation of aircraft and vehicles are required to assure the integrity of ILS/MLS course signals and to meet obstacle clearance needs. Airport operators are responsible for installing and maintaining the appropriate signs and markings showing taxi lanes, hold lines, and no parking areas associated with the ILS- or MLS-critical areas.

5. Coordinate with the local controller. Local and ground controllers shall exchange information as necessary for the safe and efficient use of airport runways and movement areas. This may be done verbally or by using flight progress strips, other written information, or automation displays. As a minimum, provide aircraft identification and applicable runway, intersection, or taxiway information as shown below.
   a. Ground control shall notify local control when a departing aircraft has been taxied to a runway other than one previously designated as active.
   b. Ground control shall notify local control of any aircraft that has taxied to an intersection for takeoff unless departure from that intersection is specifically designated through coordination or a facility directive as SOP for the runway to be used. When the SOP requires that departing aircraft use a specific intersection, ground control shall notify local control when the aircraft have taxied to other portions of the runway for departure.
   c. When the runways in use for landing or departing aircraft are not visible from the tower or the aircraft using them are not visible on radar, advise the local or ground controller of the location of the aircraft before releasing the aircraft to the other controller.

Evaluation Preparation: Setup: This task may be simulated by the supervisor. Give the soldier the situation and have him issue the traffic information and advisories to assist all ground traffic.

Brief Soldier: The soldier will be evaluated on how he issues control instructions to ground traffic operating on the airfield.

Performance Measures	**GO**	**NO GO**
NOTE: Applicable performance measures are determined by local conditions, mission requirements, and assigned equipment.		
1. Determines aircraft position.	____	____
2. Issues taxi information.	____	____
3. Holds taxiing aircraft clear of runways.	____	____
4. Prevents aircraft from entering ILS critical areas.	____	____
5. Coordinates actions with the local controller.	____	____
6. Issues taxi instructions using light gun signals.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
FAA Order 7110.65	None

Conduct Landing Zone/Pickup Zone (LZ/PZ) Operations
011-143-0008

Conditions: You have been given an established LZ or PZ, all appropriate equipment, and personnel to operate the LZ/PZ.

Standards: Conduct LZ/PZ operations in accordance with FM 3-21.38(FM 57-38).

Performance Steps

1. Establish a Communications Check Point.
   a. As Each helicopter serial reaches the CCP on the flight route, the flight leader contacts the appropriate helicopter landing site control center. The CC then gives the flight leader the heading from the CCP to the landing site, the landing direction, and the following other pertinent information:
      (1) The enemy situation.
      (2) Friendly field elevation.
      (3) Landing information.
      (4) Terrain conditions.
      (5) Traffic situation.
      (6) Obstacles.
      (7) Availability of smoke or light gun.
      (8) Visual approach path indicator setting.
      (9) The next reporting point.
   b. All helicopters in a flight switch to the pathfinder control frequency on instructions from the flight leader before reaching the CCP.

NOTE: Pathfinders are prepared at all times to provide ATC and navigation assistance to all aircraft in and around the landing site in case those aircraft do not follow a specified flight plan.

   c. The helicopter formation continues along the flight route to the RP. Pilots are assisted by the electronic and visual navigation aids at the RP (if manned). All helicopters pass over or near the RP and each flight RP (if manned). Each flight leader reports passage of the RP to his respective landing site CC and then flies directly to his assigned landing site. The individual landing site CC assists any flight that cannot locate its site, using visual signals, steering commands, or electronic homing techniques.
      (1) Day Operation Signals. For daylight operations, a specified smoke color may be assigned to identify different landing sites. Since the number of smoke colors is limited, the same color may have to be used by more than one helicopter site. Sites that use the same color should be farther apart. Smoke is employed sparingly because it marks a location not only for friendly forces but for enemy observers as well. Generally smoke is used only in response to a pilot's request for help in identifying or locating his helicopter site.
      (2) Night Operation Signals. For night operations, pyrotechnics or other visual signals are used in lieu of smoke. As in daylight, red signals mean do not land, or they indicate other emergency conditions. Emergency codes must be planned and understood by all concerned. Each flight lands at its assigned site in the manner indicated by CC messages and the visual aids displayed. Pathfinders may use arm-and-hand signals to assist in controlling the landing, hovering, and parking of helicopters.

2. Establish Air Control Points as Required. Pathfinders may be tasked to manage ACPs to assist aircraft en route to the L Z.
   a. The ACP party consists of two or three pathfinders or at least one pathfinder with assistants. They position and operate the electronic and or visual navigation aids. They also operate radios in the pathfinder internal net (if used) and the GTA net. Monitoring the GTA net permits ACP personnel to respond immediately to requests from pilots for assistance in locating an ACP.
   b. The pathfinder in charge of the ACP installs navigation aids immediately upon arrival at the site (or according to plan). Whenever possible, aids should be established concurrently. If a priority for installing these aids is required due to limited personnel or other factors, then the following priority is used.
      (1) GTA radio.
      (2) Visual navigation aids.
      (3) Pathfinder internal net recorder.
      (4) Security personnel.

3. Tactical Landing Lights. The tactical landing light system provides visual cues for landing in a tactical landing site. The inverted "Y" is the recommended system when the approach is made from terrain flight altitudes. Approaches to a tactical landing site are normally made without the aid of the search landing light. The lighting for a tactical landing zone may consist of hand-held flashlights or "beanbag" lights arranged on the ground. Regardless of the type of lights used, a minimum of two lights will be used to identify the touchdown point.
   a. At night, lights of different colors may be used to designate different helicopter sites or to separate flights within a larger formation. A lighted inverted "Y" indicates the landing point of the lead helicopter in the flight. At additional touchdown points, helicopters should land with the right landing gear or skid just to the left of the light. All lights should be hooded or turned upside down for security until the last practical moment when the helicopters are inbound. Lights should be beamed in the direction from which the helicopters approach. A signalman should be used at a slingload point.
   b. During darkness, approaches are slightly steeper and slower than a daylight approach.
   c. One example of emergency night lighting is to use vehicle headlights. Place two vehicles about 35 meters apart and 35 meters downwind of the landing point with their headlight beams intersecting at the center of the landing point. The helicopter approaches into the wind, passes between the vehicles and lands in the lighted area. This method is not suitable for large helicopters.

4. External Loads. External load employment can be difficult during darkness; however, several methods are available to the pathfinder. In the absence of sufficient signalmen, reference lights (three lights spaced triangularly 5 meters apart) are positioned 25 meters in front of the load as a marker. This lighting configuration aids the flight crew during hook-up, lift off, and landing. Upon lift off, the aircraft climbs vertically until the load clears the ground. As the aircraft begins forward movement, sufficient power is applied to maintain a climb that allows the slingload to clear obstacles along the lift off path. The shorter the sling, the less altitude required to clear obstacles. Sling length should be added to obstacle height for computation of the distance required for departure clearance.

5. Multihelicopter Operations. Due to reduced vision at night, formation flying cannot be safely conducted in a complete blackout mode at terrain flight altitudes unless the unit is equipped with night vision goggles.

6. Night Vision Goggles. To operate at terrain flight altitudes during low or mid light levels, use night vision goggles. Because the lights in the tactical lighting set are too bright for these goggles, place a filter over the clear lens cover. If a filter is not available, paint the lens cover or cover it with plastic tape to reduce light intensity.

Evaluation Preparation: Setup: This task may be simulated by the supervisor. Give the soldier the situation and have him prepare the LZ/PZ and conduct LZ/PZ operations.

Brief The Soldier: Tell the soldier that he will be evaluated on his ability to properly setup and conduct LZ/PZ operations according to FM 3-21.38(FM 57-38).

Performance Measures	**GO**	**NO GO**
1. Establish a CCP.	___	___
2. Establish ACP.	___	___
3. Install tactical landing lights.	___	___
4. Conduct external load operations.	___	___
5. Conduct multi-helicopter operations.	___	___
6. Use night vision goggles.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	**Related**
TM 11-5820-890-10-1	ARTEP 1-425-MTP
TM 11-5820-890-10-6	
FM 3-21.38(FM 57-38)	

Interpret Crash Grid Map

011-143-0010

Conditions: As an ATC operator in a field/garrison environment, you are given any ATC subsystem/ facility, a crash grid map, two-place grid coordinates, and a specified point on the map. Locate a point on a crash grid map.

Standards: Locate the two-place crash grid coordinate on the map to within one-half nautical mile and determine a two-place grid coordinate for the specified point to within one-half nautical mile.

Performance Steps

1. Locate a Point on a Crash Grid Map.

NOTE: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment.

2. Determine Crash Grid Coordinates of a Point on a Crash Grid Map.

NOTE: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment.

NOTE: Applicable performance measures are determined by local conditions, mission requirements, and the assigned equipment.

Evaluation Preparation: Setup: Require the soldier to determine a physical location on a crash grid map correctly when the coordinates are given and determine the grid coordinates correctly when the physical location is given.

Brief Soldier: Tell the soldier he will be evaluated on interpreting a crash grid map.

Performance Measures	GO	NO GO
1. Locate a point on a crash grid map.	____	____
2. Determine crash grid coordinates of a point on a crash grid map.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
None	AR 420-90
	FM 3-25.26

Provide Traffic Information/Advisories
011-143-0018

Conditions: As an ATC GCA, tower operator, in a simulated field environment, manning a control position in an ATC facility, as appropriate, you are given simulated traffic with hazards to aircraft safety in your area of responsibility as observed by, or reported to, you.

Standards: Issue timely advisories to the pilot, without error, according to FAA Order 7110.65.

Performance Steps

1. Issue a Safety Alert.
   a. Issue a safety alert to an aircraft if you are aware that the aircraft is at an altitude, which, in your judgement, places it in unsafe proximity to terrain, obstructions, or other aircraft. When the pilot informs you action is being taken to resolve the situation, you may discontinue the issuance of further alerts. Do not assume that because someone else has responsibility for the aircraft that the unsafe situation has been observed and the safety alert has been issued. Inform the appropriate controller.

NOTE 1: The issuance of a safety alert is the controller's first priority when he observes and recognizes that an aircraft is in unsafe proximity to terrain, obstacles, or other aircraft. The work load, traffic volume, quality and/or limitations of the radar system, and available lead time to react are factors which help determine if the controller can observe and recognize unsafe conditions. Although a controller cannot immediately see the development of every situation where a safety alert must be issued, he must remain vigilant and issue a safety alert when it is needed.

NOTE 2: Recognition of situations of unsafe proximity may result from an observation on a PAR scope or pilot report.

NOTE 3: Once the alert is issued, the pilot must determine what course of action, if any, he will take.

   b. Immediately issue or initiate a terrain or obstruction alert to the pilot if you are aware that his aircraft is at an altitude which, in your judgement, places it in unsafe proximity to terrain or obstructions. The alert is issued using the phraseology shown below.

Phraseology: "(Identification) low altitude alert."

"Check your altitude immediately."

"Then, as appropriate, MEA/MVA/MOCA/MIA."

"In your area is (altitude)."

If the aircraft is past the final approach fix (nonprecision approach), the outer marker, or the fix used in lieu of the outer marker (precision approach),

"Then, as appropriate, MDA/DH (if known) is (altitude)."

NOTE: When an alternate course of action is given, end the transmission with the word "immediately." The phraseology to use is shown below.

Phraseology: "(Identification) traffic alert (position of traffic if time permits)."

"Advise you turn left/right (specific heading, if appropriate)."

And/or

"Climb/descend (specific altitude if appropriate), immediately."

2. Issue Wake Turbulence Cautionary Advisories.
   a. Issue wake turbulence cautionary advisories to the aircraft discussed in the following paragraphs. Include the position, altitude (if known), and direction of flight of the heavy jets.
      (1) VFR aircraft that are not being radar-vectored but are behind heavy jets.
      (2) IFR aircraft that accept a visual approach or visual separation.
      (3) Arriving VFR aircraft that have been radar-vectored previously but vectoring has been discontinued.
   b. Issue cautionary information to any aircraft if, in your opinion, wake turbulence may have an adverse effect on it. When traffic is known to be a heavy aircraft, include the word heavy in the description.

NOTE: Wake turbulence may be encountered by aircraft in flight and when they are operating on the airport movement area. Because wake turbulence is unpredictable, the controller is not responsible for anticipating its existence or effect. Although not mandatory during ground operations, controllers may use the terms "jet blast, prop wash, or rotor wash" in lieu of wake turbulence when issuing a caution advisory. The phraseology to be used is shown below.

Phraseology: "Caution wake turbulence (traffic information)."

3. Issue Traffic Advisories. Unless an aircraft is operating within the positive control area or the pilot requests an omission, issue traffic advisories to all aircraft (IFR or VFR) on your frequency when, in your judgement, their proximity may diminish to less than the applicable separation minimums. Where no separation minimums apply, such as for VFR aircraft outside an ARSA, TRSA, or TCA, issue traffic advisories to those aircraft on your frequency when, in your judgement, their proximity warrants it.
   a. Provide the information discussed in the following paragraphs to radar-identified aircraft. The phraseology to use with examples is shown below.
      (1) Give the azimuth from the aircraft in terms of the 12-hour clock or, when rapidly maneuvering aircraft prevent accurate issuance of traffic, specify the direction from an aircraft's position in terms of the eight cardinal compass points (N, NE, E, SE, S, SW, W, and NW). This method shall be terminated at the pilot's request.
      (2) Give the distance from aircraft in miles.
      (3) Give the direction in which traffic is proceeding and/or relative movement of traffic.

NOTE: Relative movement includes closing, converging, parallel, same direction, opposite direction, diverging, overtaking, crossing left to right, crossing right to left.

Phraseology: "Traffic, (number) o'clock."

Or, when appropriate,

"(Direction), (number) miles, (direction)bound and/or (relative movement)."

And, if known,

"(Type of aircraft and altitude)."

Or, when appropriate,

"(Type of aircraft and relative position), (number of feet) feet above/below you."

If the altitude of the aircraft is unknown,

"Altitude unknown."

Examples: "Traffic, eleven o'clock, one zero miles, southbound, converging, DC-8, one seven thousand."

"Traffic, twelve o'clock, one five miles, opposite direction, altitude unknown."

"Traffic, ten o'clock, one two miles, southeast bound, one thousand feet below you."

(4) When requested by the pilot, issue radar vectors to assist in avoiding the traffic provided the aircraft to be vectored is within your area of jurisdiction or coordination has been effected with the sector or facility in whose area the aircraft is operating.
(5) Inform the pilot if you are unable to provide vector service.
(6) If the pilot informs you he does not see the traffic you have issued, inform him when the traffic is no longer a factor. The phraseology to use is shown below.

Phraseology: "Traffic no factor."

Or

"(Number) o'clock traffic no factor."

Or

"(Direction) traffic no factor."

b. Provide the information discussed in the following paragraphs to aircraft that are not radar-identified. The phraseology to use with examples is shown below.
(1) Give the distance and direction from the fix.
(2) Give the direction in which traffic is proceeding.
(3) Give the type of aircraft and its altitude, if known.
(4) Give the ETA of the aircraft over the fix, if appropriate.

Phraseology: "Traffic, (number) miles/minutes (direction) of (airport or fix), (direction)bound"

And, if known,

"(Type of aircraft and altitude)."

"Estimated (fix) (time)."

Or

"Traffic, numerous targets vicinity (location)."

If the altitude of the aircraft altitude is unknown,

"Altitude unknown."

Examples: "Traffic, one zero miles east of Forsythe V-O-R, southbound, DC-8, descending to one six thousand."

"Traffic, reported one zero miles west of Downey V-O-R, northbound, Apache, altitude unknown, estimated Joliet V-O-R one three one five."

"Traffic, eight minutes west of Chicago Heights V-O-R, westbound, Mooney, eight thousand, estimated Joliet V-O-R two zero three five."

"Traffic, numerous targets, vicinity of Delia Airport."

4. Issue Bird-activity Information.
   a. Issue advisory information on pilot-reported and tower-observed or radar-observed and pilot-verified bird activity. Include their position, species, size, (if known) course of flight, and altitude. Unless visual observation or subsequent reports reveal that the activity no longer exists, repeat this information for at least 15 minutes after receiving the bird-activity report. Examples of bird-activity information is shown below.

   Examples: "Flock of geese, one o'clock, seven miles, northbound, last reported at four thousand."

   "Flock of small birds, southbound Mohawk River, last reported at three thousand."

   "Numerous flocks of ducks, vicinity Lake Winnebago, altitude unknown."

   b. Relay bird-activity information to adjacent facilities and to FSSs whenever the activity might become a factor in their areas.

5. Issue a SIGMET or CWA Alert. Controllers shall advise pilots of hazardous weather that may impact operations within 150 nautical miles of their sector or area of jurisdiction. Hazardous weather information contained in HIWAS broadcasts include airmen meteorological information, significant meteorological information, convective SIGMET, urgent pilot weather reports, and center weather advisories. Facilities shall review alert messages to determine the geographical area and operational impact for hazardous weather information broadcasts. The broadcast is not required if aircraft on your frequencies will not be affected.

a. Controllers within commissioned HIWAS areas shall, upon receipt of hazardous weather information, broadcast a HIWAS alert on all frequencies except emergency frequencies. Controllers are required to disseminate data based on the operational impact on the sector or area of control jurisdiction.

Phraseology: "Attention all aircraft. Hazardous weather information for (geographical area) available on HIWAS, flight watch, or flight service."

b. Controllers outside of commissioned HIWAS areas shall advise pilots of the availability of hazardous weather advisories. Pilots requesting additional information should be directed to contact the nearest flight watch or flight service. These controllers shall also apply the same procedure when HIWAS outlets or outlets with radio coverage extending into the sector or airspace under your jurisdiction are out of service. The phraseology to use is shown below.

Phraseology: "Attention all aircraft. Hazardous weather information for (geographical area) available from flight watch or flight service."

c. Terminal facilities have the option to limit hazardous weather information broadcasts. Tower cab and approach control facilities may opt to broadcast hazardous weather information alerts only when any part of the area described is within 50 nautical miles of the airspace under their jurisdiction.

NOTE: Facilities shall ensure that aircraft departing and leaving the terminal area of control jurisdiction are alerted to hazardous weather information.

6. Issue Weather and Chaff Services.
   a. Issue pertinent information on observed or reported weather or chaff areas. Provide radar navigational guidance and/or approve deviations around weather or chaff areas when requested by the pilot. Do not use the word "turbulence" in describing radar-derived weather.
      (1) Issue weather and chaff information by defining the area of coverage in terms of azimuth (by referring to the 12-hour clock) and distance from the aircraft or by indicating the general width of the area and the area of coverage in terms of fixes or distance and the direction from the fixes.
      (2) When a deviation cannot be approved as requested and the situation permits, suggest an alternative course of action.
   b. In areas of significant weather, plan ahead and be prepared to suggest, upon pilot request, the use of alternative routes/altitudes.

NOTE: Weather significant to the safety of aircraft includes such conditions as tornadoes, lines of thunderstorms, embedded thunderstorms, large hail, wind shear, moderate to extreme turbulence (including CAT), and light-to-severe icing.

   c. Inform any tower for which you provide approach control services if you observe any weather echoes on radar, which might affect their operations. The phraseology to use with examples is shown below.

Phraseology: "Weather/chaff area between (number) o'clock and (number) o'clock (number) miles."

Or

"(Number) mile band of weather/chaff from (fix or number of miles and direction from fix) to (fix or number of miles and direction from fix)."

Or

"(Level number and intensity adjective) weather echo between (number) o'clock, (number) miles. Moving (direction) at (number) knots, tops (altitude)."

Or

"Deviation approved, (restrictions if necessary), advise when able to return to course."

Or

"Resume own navigation."

Or

"Fly heading (heading)."

Or

"Proceed direct to (name of NAVAID). Unable deviation (state possible alternate courses of action)."

Example 1: "Level five intense weather echo between eleven o'clock and one o'clock, one zero miles. Moving east at two zero knots, tops flight level three niner zero."

Example 2: "Level (number) weather echo between (number) o'clock and (number) o'clock, (number) miles. Weather area is (number) miles in diameter."

NOTE: Phraseology using level number and intensity adjective is only applicable when the radar weather echo intensity information is determined by NWS radar equipment or ASR-9 radar equipment.

d. The area supervisor, area manager, or controller-in-charge shall verify the ASR-9 weather channel information by the best means available (pilot reports, local tower personnel, and so on) if the weather data displayed by the ASR-9 is questionable or erroneous. Errors in weather radar presentation shall be reported to the AF technician. The AT supervisor shall determine if the weather channel is to be disabled and a NOTAM distributed.

7. Issue Parachute-jumping Advisory Information.
   a. Issue a traffic advisory to the jump aircraft before the jump. Include the type of aircraft, its altitude, and the direction of flight of all known traffic that will transit the airspace within which the jump will be conducted.
   b. Issue advisories to all known aircraft that will transit the airspace within which the jump operations will be conducted. Advisories shall consist of the location, time, duration, and altitude from which the jump will be made.

c. When time or numbers of aircraft make individual transmissions impractical, advisories to nonparticipating aircraft may be broadcast on appropriate control frequencies or, when available, the ATIS broadcast.
d. When requested by the pilot and to the extent possible, assist nonparticipating aircraft to avoid the airspace within which the jump will be conducted.

8. Issue Traffic Information.
   a. Describe vehicles, equipment, or personnel on or near the movement area in a manner that will help pilots recognize them. Examples of the phraseology are shown below.

   Examples: "Mower left of Runway Two Seven."

   "Trucks crossing approach end of Runway Two fix."

   "Workman on Taxiway Bravo."

   "Aircraft left of Runway One Eight."

   b. Describe the relative position of traffic in an easy to understand manner such as "to your right" or "ahead of you." Examples of the phraseology are shown below.

   Examples: "Traffic, Eastern DC-9 on downwind leg to your left."

   "Twin Bonanza inbound from outer marker on straight-in approach to Runway One Seven."

   c. When using a certified tower radar display, you may issue traffic advisories using the standard radar phraseology.

Evaluation Preparation: Setup: This task may be simulated by the supervisor. Give the soldier the situation and have him issue the traffic information and advisories to assist pilots.

Brief Soldier: Tell the soldier he will be evaluated on providing traffic information and advisories to aircraft operating within control zones, airport traffic areas, terminal radar service areas, and terminal control areas.

Performance Measures	**GO**	**NO GO**
1. Issues a safety alert.	____	____
2. Issues wake turbulence cautionary advisories.	____	____
3. Issues traffic advisories.	____	____
4. Issues traffic information.	____	____
5. Issues bird activity information.	____	____
6. Issues a SIGMET or center weather advisory alert.	____	____
7. Issues weather and chaff services.	____	____

Performance Measures	GO	NO GO
8. Issues parachute jumping advisory information.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
FAA Order 7110.65	None

Select Runway for Use
011-143-0019

Conditions: While assigned to the local control position in an ATC facility and given airport wind data and other pertinent data and a pilot's request for a specific runway.

Standards: Selects the appropriate runway for use and approves the use of STOL runways, according to FAA Order 7110.65.

Performance Steps

1. Select the Runway for Use.

NOTE 1: If a pilot prefers to use a runway different from that specified, he is expected to advise ATC.

NOTE 2: At airports where a runway-use program is established, ATC will assign runways that have the least noise impact. If, in the interest of safety, the pilot prefers a runway different from that specified, he is expected to advise ATC accordingly. ATC will honor such requests and advise the pilot when the requested runway is noise-sensitive.

   a. When the wind speed is 5 knots or more, use the runway most nearly aligned with the wind except where a runway-use program is in effect; use the calm-wind runway when the wind speed is less than 5 knots. (Set the tetrahedrons accordingly.) However, another runway can be used if its use will be operationally advantageous of if the pilot requests another runway.
   b. When conducting aircraft operations on other than the advertised active runway, state the runway in use.

2. Assign STOL Runways.
   a. A designated STOL runway may be assigned only when requested by the pilot or as specified in a letter of agreement with an aircraft operator.
   b. Issue the measured STOL runway length if the pilot requests it.

NOTE: When authorizing use of runways and a tail wind component exists, always state both the wind direction and velocity. The wind may be described as calm, when appropriate.

Evaluation Preparation: Setup: In an actual setting, have the soldier select the proper runway for use or STOL runway. If you must simulate the requirements, give the soldier a description of the wind speed/direction and have the soldier describe the actions required.

Brief Soldier: Tell the soldier to select the proper runway for use/STOL runway. Advise the soldier that you will not inform him of his progress during performance of the task.

Performance Measures	GO	NO GO
Selects the appropriate runway.	___	___
a. Uses the runway most nearly aligned with the wind when the wind is 5 knots or more.		
b. Uses the calm wind runway when the wind is less than 5 knots.		

Performance Measures **GO** **NO GO**

c. Uses the runway that is operationally advantageous.
d. Uses the runway requested by the pilot.

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
None	FAA Order 7110.65
	FM 3-04.303(FM 1-303)

Identify Data in DOD Flight Information Publications (FLIPs)
011-143-0021

Conditions: As a member of an ATC team, you are given a request to locate aeronautical data and DOD FLIPs for IFR Supplement; Instrument Approach Procedures; En route Low Altitude Chart; and VFR Supplement. (You are given a request to locate aeronautical data.)

Standards: Identify the correct aeronautical data in the corresponding DOD FLIP.

Performance Steps

1. Identify the Following Aeronautical Data in the IFR Supplement:
   a. Basic information (name, location, runway, and so on).
   b. Service section.
   c. Remarks section.
   d. Communications section.
   e. NAVAIDs section.
   f. ILS/radar section.
2. Identify the Following Aeronautical Data in the Instrument Approach Procedures:
   a. ATC communications frequencies.
   b. NAVAIDs.
   c. Required procedure turns and holding patterns.
   d. Minimum safe and emergency altitudes.
   e. Headings and distances from en route NAVAIDs and intersections to the initial approach fix.
   f. Altitudes.
   g. Obstructions.
3. Identify the Following Aeronautical Data in the En Route Low Altitude Chart:
   a. Air traffic service route data.
   b. Reporting points.
   c. Boundaries.
   d. Airspace information.
   e. Miscellaneous.
   f. Special-use airspace.
   g. Military training routes.
4. Identify the Following Information in the VFR Supplement:
   a. Name of the airport, state, and city.
   b. Geographical coordinates.
   c. Airport classification.
   d. Airport lighting or pilot-controlled lighting.
   e. Time conversion.
   f. En route and/or area chart where the airport is located.
   g. Fuel.
   h. FAA identifier.
   i. Airport remarks.
   j. Communications section.

Evaluation Preparation: Setup: In an actual setting, require the soldier to determine aeronautical data correctly given the appropriate DOD FLIP, and describe what was found at the physical location given.

Brief Soldier: Tell the soldier that he will be evaluated on his ability to locate various aeronautical data from DOD FLIPs. He will also be evaluated on his ability to correctly identify/ decode the data that were located. Tell the soldier that he will not be informed of his progress during the performance of the task.

Performance Measures	GO	NO GO
1. Identify aeronautical data in the IFR Supplement.	____	____
2. Identify aeronautical data in the Instrument Approach Procedures.	____	____
3. Identify aeronautical data in the En Route Low Altitude Chart.	____	____
4. Identify information in the VFR Supplement.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
DOD FLIP En route Low Altitude Chart	DOD FLIP General Planning
DOD FLIP IFR Supplement	
DOD FLIP VFR Supplement	
DOD FLIP Instrument Approach Procedures	

Provide Emergency Assistance
011-143-0022

Conditions: As an air traffic controller, either in a tower or radar facility, given an aircraft in distress.

Standards: Provide emergency assistance according to FAA Order 7110.65.

Performance Steps

1. Provide Assistance for an In-flight Aircraft Emergency.
   a. As defined in FAA Order 7110.65, an emergency can be either a distress or an urgency condition. A pilot who has a distress condition should declare an emergency by beginning the initial communication with the word "Mayday." Preferably, he should repeat the word three times. For an urgency condition, the pilot should use the word "Pan-Pan" in the same manner. If the pilot does not use Mayday or Pan-Pan and you are in doubt that the situation constitutes an emergency or potential emergency, handle it as though it were an emergency.
   b. Because of the infinite variety of possible emergencies, specific procedures cannot be prescribed. However, when you believe an emergency exists or is imminent, select and pursue the course of action that seems to be the most appropriate and one that most nearly conforms to the instructions in FAA Order 7110.65.
      (1) Obtain the minimum required information. Begin to assist the pilot of the aircraft as soon as he gives you enough information to act on. Information requirements will vary depending on the situation. The minimum required information for in-flight emergencies is—
         (a) The type and identification of the aircraft.
         (b) The nature of the emergency.
         (c) The desires of the pilot.
      (2) Begin assistance. Provide the maximum amount of assistance to aircraft in distress. When requested by the pilot or when deemed necessary, enlist the services of available radar and DF facilities operated by the FAA, military services, and Federal Communications Commission.
         (a) The National SAR Plan assigns search and rescue responsibilities. Military agencies conduct physical search and rescue operations. The FAA provides emergency service to aircraft in distress and ensures that SAR procedures are initiated when an aircraft is overdue or unreported. This is accomplished through the ATC system for IFR aircraft and the flight plan system for VFR aircraft. The FAA attempts to locate overdue or unreported aircraft by using the INREQ and ALNOT communications search. It makes all possible facilities available to the searching agencies.
         (b) Flight service stations are the central points for collecting and disseminating information on overdue or missing aircraft, which are not on an IFR flight plan. Flight coordination centers are the central points for collecting information, coordinating with SAR, and conducting a communications search by distributing necessary ALNOTs. ALNOTs contain information concerning—
            - Overdue or missing IFR aircraft.
            - IFR aircraft in an emergency occurring in the FCC's respective area.
            - Aircraft on a combination VFR/IFR flight plan.

- An aircraft on an airfield IFR flight plan and 30 minutes have passed since the pilot requested IFR clearance. Neither communication nor radar contact can be established with the aircraft.
- Overdue or missing aircraft that are authorized to operate according to special VFR clearances.

NOTE 1: For SAR purposes, aircraft on a combination VFR/IFR flight plan and aircraft on an airfield IFR flight plan are treated the same as IFR aircraft.
NOTE 2: The ARTCC is the central point for collecting information and coordinating with the RCC or ELT signals.

(3) Obtain additional information. After initiating action, obtain the information listed below or any other necessary information from the pilot or aircraft operator.

NOTE: Normally, do not request this information from military fighter-type aircraft flying at low altitudes (on approach, immediately after departure, on a low-level route, and so on). If the aircraft has not been visually sighted or displayed on radar, ask the pilot to give his position if he has not already done so.

(a) Altitude of the aircraft.
(b) Fuel remaining (in time).
(c) Pilot-reported weather.
(d) Capability for IFR flight.
(e) Time and place of the last known position.
(f) Heading since the last known position.
(g) Airspeed.
(h) Navigation equipment capability.
(i) NAVAID signals received.
(j) Visible landmarks.
(k) Color of the aircraft.
(l) Number of people on board.
(m) Point of departure and destination.
(n) Emergency equipment on board.

(4) Orient the aircraft. Orient an aircraft by the means most appropriate for the circumstances. The recognized methods include—
- Radar.
- DF.
- NAVAIDs.
- Pilotage.
- Sighting by other aircraft.

(5) Coordinate efforts to the extent possible. Coordinate efforts to the extent possible to assist any aircraft believed overdue, lost, or in an emergency status.

(6) Operate all appropriate lighting aids as required (tower only). Operate runway lights, approach lights, and all other required airport lighting systems for at least 30 minutes before the ETA of the unreported aircraft, until the aircraft has been located, or for 30 minutes after the fuel supply of the aircraft is estimated to be exhausted.

2. Provide Assistance for Airport Ground Emergency (Tower Only). When an emergency occurs on the airport proper, control other air and ground traffic to avoid conflicts in the area where the emergency is being handled. This also applies when routes within the airport proper are required for movement of local emergency equipment going to or from an emergency, which occurs outside the airport proper.

NOTE: Aircraft operated in proximity to an accident or other emergency or disaster locations may hinder airborne and surface rescue or relief operations. Congestion, distractions, or other

effects, such as wake turbulence from nearby airplanes and helicopters, could prevent or delay the proper execution of these operations.

3. Apply Overdue Aircraft Procedures. Consider an aircraft overdue when neither communications nor radar contact can be established with it and 30 minutes have passed since—
   - Its ETA over a specified or compulsory reporting point or at a clearance limit in your area.
   - Its clearance void time.

NOTE: If you have reason to believe that an aircraft is overdue before 30 minutes have lapsed, take the appropriate action immediately. The center in whose area the aircraft is first unreported or overdue makes this determination and takes any subsequent action.

   a. Alert the ARTCC or appropriate agency. When an aircraft is considered overdue or in an emergency status, the terminal facility shall alert the ARTCC and forward the information listed below.
      (1) The flight plan, including the color of the aircraft, if known.
      (2) The time of the last transmission received, who received it, and the frequency used.
      (3) The last position report and how the position was determined.
      (4) The action taken by the reporting facility and the proposed action.
      (5) The number of persons on board the aircraft.
      (6) The fuel status.
      (7) The facility working the aircraft and the frequency used.
      (8) The last known position, estimated present position, and maximum range of flight of the aircraft based on the remaining fuel and airspeed.
      (9) The position of other aircraft near the route of flight of the aircraft in distress, when requested.
      (10) Whether an ELT signal has been heard or reported in the vicinity of the last known position.
      (11) Other pertinent information.
   b. Solicit the assistance of other aircraft. Plot the flight path of the aircraft on a chart. Include position reports, predicted positions, the possible range of the flight, and any other pertinent information. Solicit the assistance of other aircraft known to be operating near the aircraft in distress. Forward this information to the RCC or the ARTCC, as appropriate.
   c. Restrict or suspend other IFR traffic. Unless radar separation is used when an aircraft is unreported or overdue, the facility responsible shall restrict or suspend other IFR traffic for 30 minutes after whichever of the times shown below applies.
      (1) The time at which approach clearance was delivered to the pilot.
      (2) The EFC time delivered to the pilot.
      (3) The arrival time over the NAVAID serving the destination airport.
      (4) The control facility's or the pilot's current estimate, whichever is later, at the appropriate en route NAVAID or fix and at the NAVAID serving the destination airport.
      (5) The clearance void and release time.
   d. Resume normal air traffic control. After the 30-minute traffic suspension period expires, resume normal air traffic control if the operators or pilots of the other aircraft concur. This concurrence must be maintained for 30 minutes after the suspension period expires.

4. Provide Radar Assistance to VFR Aircraft in Weather Difficulty (Radar Only). If a VFR aircraft requests radar assistance when it encounters or is about to encounter IFR weather conditions, ask the pilot if he is qualified for and capable of conducting IFR flight. If the pilot

states he is qualified for and capable of IFR flight, request that he file an IFR flight plan and then issue clearance to the destination airport, as appropriate.

a. Provide radar assistance to a pilot that is not IFR qualified. If the pilot states he is not qualified for or not capable of conducting IFR flight or he refuses to file an IFR flight plan, take whichever of the following actions is appropriate:
   (1) Inform the pilot of airports where VFR conditions are reported, provide other available pertinent weather information, and ask him if he will elect to conduct VFR flight to such an airport.
   (2) If the pilot declines to conduct VFR flight to another airport, provide radar assistance if the pilot declares an emergency or refuses to declare an emergency and you have determined the exact nature of the radar services the pilot desires.
   (3) If the aircraft has already encountered IFR conditions, inform the pilot of the appropriate terrain/obstacle clearance minimum altitude. If the aircraft is below the appropriate terrain or obstacle clearance minimum altitude and sufficiently accurate position information has been received or radar identification established, furnish a heading or radial on which to climb to reach the appropriate terrain/obstacle clearance minimum altitude.

NOTE: A Mode-C-equipped VFR aircraft that is in weather difficulty but does not require the assignment of Code 7700 shall be assigned a beacon code that will allow MSAW alarm processing.

b. Provide assistance to aircraft with communications failure. Take the actions discussed below if two-way radio communications is lost with an aircraft.

NOTE 1: When the pilot of an IFR aircraft experiences two-way radio communications failure, air traffic control is based on anticipated pilot actions. Pilot procedures and recommended practices are outlined in the AIM, FARs, and applicable military regulations.

NOTE 2: If the pilot of an aircraft equipped with a coded radar beacon transponder experiences a loss of two-way radio capability, he should adjust his transponder to reply on Mode A/3, Code 7700 for 1 minute. He then changes to Code 7600 and remains on 7600 for 15 minutes or for the remainder of the flight, whichever occurs first. The pilot repeats the first two steps as practicable.

   (1) If communications are lost with an aircraft under your control jurisdiction, use all of the appropriate means available to reestablish communications. These may include, but are not limited to, emergency frequencies, NAVAIDs that are equipped with voice capability, FSS, Aeronautical Radio, Incorporated, and so on.

NOTE 1: ARINC is a commercial communications corporation that designs, constructs, operates, leases, or otherwise engages in radio activities serving the aviation community. ARINC can relay information to and from subscribing aircraft throughout the country.

NOTE 2: The aircraft communications addressing and reporting system or selective calling may be used to reestablish radio communications with suitably equipped aircraft. ACARS can be accessed by contacting the watch supervisor at the San Francisco ARINC communications center, commercial telephone (415)312-7930/7931/7932. Provide ARINC the aircraft call sign, the approximate location, and contact instructions.

NOTE 3: To use the SELCAL system, the SELCAL code for the subject aircraft must be known. If the SELCAL code is not in the remarks section of the flight plan, contact the pertinent air carrier dispatch office. Then contact the watch supervisor, San Francisco ARINC communications center, commercial telephone (415)349-4455. Provide ARINC the aircraft call sign, SELCAL code, approximate location, and contact instructions.

   (2) Broadcast clearances through any available means of communications, including the voice feature of NAVAIDs.

NOTE 1: Some UHF-equipped aircraft have VHF navigation equipment and can receive 121.5 MHz.

NOTE 2: "Any available means" includes the use of flight service stations and ARINC.

(3) Attempt to reestablish communications by having the pilot of the aircraft use the transponder, make turns to acknowledge clearances, and answer questions. The transponder can be used to make the requests shown below.
   (a) A request that the pilot reply on Mode 3/A INDENT.
   (b) A request that the pilot reply on Code 7600 or, if he is already on Code 7600, the appropriate stratum code.
   (c) A request that the pilot change to stand-by for enough time for you to be sure that the lack of a target is the result of the action requested. The phraseology to use is shown below.

Phraseology: "Reply not received, (appropriate instructions)."

"(Action) observed, (additional instructions and information, if necessary)."

(4) Broadcast a clearance for the aircraft to proceed to its filed alternate airport at the MEA if the pilot concurs.

c. Provide assistance for emergency locator transmitter signals. Take the actions discussed below when an ELT signal is heard or reported.

(1) Notify the RCC (en route).

NOTE: FAA Form 7210-8, (ELT Incident) provides a standard format for coordination with the RCC.

(2) Notify the ARTCC that will coordinate with the RCC (terminal).

NOTE 1: Operations ground testing of ELTs is authorized during the first 5 minutes of each hour. To avoid confusing the tests with an actual alarm, testing is restricted to no more than three audio sweeps.

NOTE 2: Controllers can expect pilots to report the position of the aircraft and the time when the signal was first heard, the position of the aircraft and the time when the signal was last heard, the position of the aircraft at the time the signal was the strongest, the flight altitude, and the frequency of the emergency signal (121.5/243.0).

(3) Request that the DF net attempt to obtain fixes or bearings on the signal. Forward bearings or fixes obtained and any other pertinent information to the RCC (en route).

(4) Attempt to obtain fixes or bearings on the signal (terminal).

(5) Solicit the assistance of other aircraft known to be operating in the signal area.

(6) Forward fixes or bearings and any other pertinent information to the ARTCC (terminal).

NOTE: Fix information in relation to a VOR or VORTAC (radial-distance) facilitates accurate ELT-plotting by the RCC and should be provided when possible.

(7) When ELT signal strength indicates that the signal may be emanating from somewhere on an airport or in the vicinity of an airport, notify the on-site airways facilities personnel and the regional operations center (en route).

(8) When ELT signal strength indicates that the signal may be emanating from somewhere on the airport or vicinity thereof, notify the on-site Airway Facilities personnel and the ARTCC so they can take action (terminal).

(9) Air traffic control personnel shall not leave their required duty stations to locate the source of an ELT signal.

NOTE: When no Airway Facilities personnel are available, portable hand-carried receivers assigned to air traffic facilities may be loaned to responsible airport personnel or local authorities to help locate the source of the ELT signal.

(10) Notify the RCC and the ROC and deactivate the DF net if the source of the signal is located or terminated (en route).

(11) Notify the ARTCC if the source of the signal is located or terminated (terminal).

d. Provide assistance to hijacked aircraft. When you observe a Mode 3/A Code 7500, perform the actions described below.

NOTE 1: Military facilities will notify the appropriate FAA ARTCC or the host nation agency responsible for en route control of any indication that an aircraft is being hijacked. They will also provide full cooperation with the civil agencies in the control of such aircraft.

NOTE 2: Only discrete Code 7500 will be decoded as the hijack code.

(1) Acknowledge and confirm the receipt of Code 7500 by asking the pilot to verify the code. If the aircraft is not being subjected to unlawful interference, the pilot should respond to the query by broadcasting in the clear that he is not being subjected to unlawful interference. If the reply is in the affirmative or if no reply is received, do not question the pilot any further but be responsive to the pilot's requests. The terminology to use is shown below.

Phraseology: "(Identification) (name of facility) Verify Squawking 7500."

NOTE: Code 7500 is assigned only after the pilot notifies you that his aircraft is being subjected to unlawful interference. Therefore, pilots have been requested to refuse the assignment of Code 7500 in any other situation and to inform the controller accordingly.

(2) Notify supervisory personnel of the situation.

(3) Flight-follow the aircraft and use normal handoff procedures without requiring transmissions or responses from the pilot of the aircraft unless the pilot of the aircraft has already established communications.

(4) If aircraft are dispatched to escort the hijacked aircraft, provide all possible assistance to the escort aircraft to help place them behind the hijacked aircraft.

(5) To the extent possible, afford the same control services to the aircraft operating VFR observed on the hijack code.

Evaluation Preparation: Setup: Require the soldier to select and simulate a course of action based on situations that the supervisor describes. This task may be performed in a simulated, tactical or nontactical environment.

Brief Soldier: Tell the soldier he will assist in aircraft emergency or distress situations. The soldier will then simulate the appropriate emergency assistance.

Performance Measures	GO	NO GO
1. Provides assistance for in-flight emergencies. a. Obtains the minimum required information. b. Starts emergency assistance. c. Obtains additional information. d. Orients efforts to the extent possible.	____	____
2. Provides assistance for an airport ground emergency (tower).	____	____
3. Applies overdue aircraft procedures. a. Alerts the ARTCC or appropriate agency. b. Solicits the assistance of other aircraft. c. Restricts or suspends other IFR traffic. d. Resumes normal air traffic control.	____	____

Performance Measures	GO	NO GO
4. Provides radar assistance to VFR aircraft in weather difficulty (radar only). a. Requests the aircraft contact the appropriate control facility. b. Informs the appropriate facility of the aircraft situation. c. Relays the information and clearance. c. Provide assistance for ELT. d. Provide assistance to hijacked aircraft.	___	___
5. Interprets the crash grid map.	___	___

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
AR 95-2	None
FAA Order 7110.65	
FM 3-04.303(FM 1-303)	

Issue Airport Condition Information
011-143-0023

Conditions: As an ATC operator in a tactical or fixed base ATC facility, you receive, or observe airport conditions that affects the safe use of the landing area.

Standards: Issues all airport conditions that will have adverse affects on the safe operation of aircraft in time for it to be useful to the pilot. Describes these conditions in a manner, which will assist the pilot in recognizing them. Relays this information to the airport manager or the military operations office concerned according to FAA Order 7110.65.

Performance Steps

1. Issue the Condition of the Landing Area to the Pilot of the Aircraft. If you observe or are informed of any condition that affects the safe use of a landing area, take the actions described below.

NOTE 1: The airport management or military operations office is responsible for observing and reporting the condition of the landing area.
NOTE 2: The agency operating the airport is responsible for providing the tower with current information about airport conditions.
NOTE 3: Once the occupants of a disabled aircraft on a runway are clear, flight standards and airport management or military operations office personnel will normally treat the situation the same as any obstruction; for example, construction equipment.

a. Relay the information to the airport manager or military operations office concerned.
b. Copy verbatim any information received and record the name of the person submitting it.
c. Confirm any information you receive that is from other than authorized airport or FAA personnel unless this function is the responsibility of the military operations office.

NOTE: Civil airport managers must provide a list of airport employees who are authorized to issue information concerning conditions affecting the safe use of the airport.

d. Issue only factual information (as reported by airport management) concerning the condition of the runway surface and describing the accumulation of precipitation. An example of the phraseology to use is shown below.

Example: "All runways covered by compacted snow six inches deep."

2. Issue Closed/Unsafe Runway Information.
   a. If a pilot requests to takeoff, land, or perform a touch-and-go on a closed or unsafe runway, inform the him that the runway is closed or unsafe. If the pilot persists in his request, quote him the appropriate parts of the notice to airmen that apply to the runway and inform him that clearance cannot be issued. If the pilot insists and, in your opinion, the intended operation would not adversely affect other traffic, inform him that the operation will be at his own risk. The phraseology to use is shown below.

Phraseology: "Runway (runway number) closed/unsafe."

If appropriate,

"(Quote Notice to Airmen information), unable to issue departure/landing/touch-and-go clearance."
"Departure/landing/touch-and-go will be at your own risk."

b. Except as permitted where parallel runways are served by separate ILS/MLS systems and one of the runways is closed, the ILS/MLS associated with the closed runway should not be used for approaches unless not using the ILS/MLS would have an adverse impact on the operational efficiency of the airport.

3. Issue Timely Information. Issue timely airport condition information necessary for the safe operation of an aircraft. Include the information described below, as appropriate:
   a. Construction work on or adjacent to the movement area.
   b. Rough portions of the movement area.
   c. Braking conditions caused by ice, snow, slush, or water.
   d. Snowdrifts or piles of snow on or along the edges of the area and the extent of any plowed area.
   e. Parked aircraft on the movement area.
   f. Irregular operation of part or all of the airport lighting system.
   g. Other pertinent airport conditions.

4. Issue Braking Action. Issue the quality of braking action as received from pilots or airport management to all aircraft.
   a. Describe the quality of braking action using the terms "good," "fair," "poor," "nil," or a combination. If the pilot or airport management reports braking action in other than the foregoing terms, ask that braking action be categorized using the terms stated above.

NOTE: The term "nil" is used to indicate bad or no braking action.

   b. Include the type of aircraft or vehicle from which the report is received. Examples of the terminology to use are shown below.

Examples: "Braking action fair to poor, reported by a D-C Ten."

"Braking action poor, reported Boeing Seven Twenty-Seven."

   c. If the braking action report affects only a portion of a runway, obtain enough information from the pilot or airport management to describe the braking action in terms that the pilot can easily understand. Examples of the terminology to use are shown below.

Examples: "Braking action poor first half of runway, reported by Lockheed Ten Eleven."

"Braking action poor beyond the intersection of Runway Two Seven, reported by Boeing Seven Twenty-Seven."

NOTE: Descriptive terms, such as the first or the last half of the runway, should normally be used rather than landmark descriptions such as opposite the fire station, south of a taxi-way, and so on. Landmarks extraneous to the landing runway are difficult to distinguish during periods of low visibility, at night, or anytime a pilot is busy landing an aircraft.

5. Issue Braking Action Advisories.
   a. Include on the ATIS broadcast the statement "braking action advisories are in effect" when runway braking action reports include the terms "poor" or "nil" or weather conditions are conducive to deteriorating or rapidly changing runway conditions.
   b. Take the actions described below when braking action advisories are in effect.

(1) Issue the latest braking action report for the runway in use to each arriving and departing aircraft early enough to be of benefit to the pilot. When possible, include reports from heavy jet aircraft when the arriving or departing aircraft is a heavy jet.
(2) If no report has been received for the runway of intended use, issue an advisory to that effect. The phraseology to use is shown below.

Phraseology: "No braking action reports received for runway (runway number)."

(3) Advise airport management that runway braking action reports of poor or nil have been received.
(4) Solicit PIREPs of runway braking action.

Evaluation Preparation: Setup: This task may be simulated by the supervisor. Tell the soldier the airport conditions. Have the soldier issue those airport conditions that could have an adverse effect on the safe operation of aircraft.

Brief Soldier: Tell the soldier he will be evaluated on issuing airport conditions that will have an adverse effect on the safe operation of aircraft. The soldier will give only factual information pertaining to runway surface and braking conditions.

Performance Measures	**GO**	**NO GO**
1. Advises aircraft of airfield conditions. a. Construction work on or immediately adjacent to the movement area. b. Rough portions of the movement area. c. Braking conditions caused by ice, snow, slush, or water. d. Snowdrifts or piles of snow on or along the edges of the area and any plowed area. e. Parked aircraft on the movement area. f. Irregular operation of the airport lighting system. g. Vehicles, equipment, or personnel on or near the movement area. h. Any other pertinent airport conditions.	____	____
2. Issues braking action information. a. Describes the quality of braking action using the terms "good," "fair," "poor," or "nil" or using a combination of these terms. b. Includes the type of aircraft or vehicle from which the report is received.	____	____
3. Forwards airfield condition information.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
FAA Order 7110.65	FM 3-04.303(FM 1-303)

Perform Assumption of Duty Requirements
011-143-0024

Conditions: As an ATC operator in a field environment, given an ATC facility and DA Form 3502-R, you prepare to assume your duty responsibility.

Standards: Preview, receive briefing, assume responsibility for, and review, the position according to FAA Order 7110.65.

Performance Steps

1. Preview the Position.
   a. Follow the checklist and review the status information areas. Receive an authorized preposition briefing when the equivalent review of the checklist items is completed.
   b. Observe the position equipment, operational situation, and work environment.
   c. Listen to voice communications and observe other operational actions.
   d. Observe current and pending aircraft and vehicular traffic and correlate traffic with flight and other movement information.
   e. Indicate to the specialist being relieved that the position has been previewed and the verbal briefing may begin.

2. Receive Verbal Briefing.
   a. Read the recent information file, DA Form 3502-R, and any other operational data that may be specified by the ATC/facility chief or SS/CIC.
   b. Obtain a briefing on communications, traffic conditions, equipment outages, current and forecast weather, and airfield conditions.

3. Assume Position Responsibility.
   a. Accept responsibility for the position only after ensuring that the briefing is complete and that no unresolved questions about the operation of the position remain.
   b. The relieving controller and the controller being relieved shall share equal responsibility for the completeness and accuracy of the position-relief briefing.

4. Review the Position.
   a. Sign on the position unless a facility directive authorizes step h below.
   b. Check, verify, and update the information obtained in performance measures 1 and 2.
   c. Check the position equipment according to existing directives.
   d. Review the checklist, status information areas, written notes, and other prescribed sources of information. Advise the relieving specialist of known omissions, updates, or inaccuracies.
   e. Observe overall position operation to determine if assistance is needed.
   f. Provide assistance.
   g. Advise the appropriate position regarding the known status information areas, omissions, updates, or inaccuracies.
   h. Sign on the relieving specialist.
   i. Sign off the position according to existing directives or otherwise indicate that the relief process is complete.

Evaluation Preparation: Setup: Require the soldier to become completely familiar with a position in an ATC facility before he accepts responsibility for that position. Having another

controller act as the person responsible for a predetermined position may simulate requirements for this task. Provide the assisting controller with information representing an actual position, a recent information file, and weather information.

Brief Soldier: Tell the soldier that he will be evaluated on how he assumes duty requirements. If the task is to be simulated, tell him that another soldier will operate in the assumed position. The soldier should assume duty as though a real situation exists.

Performance Measures	**GO**	**NO GO**
1. Previews the position. a. Follows the checklist and reviews the status information areas. Receives an authorized pre-position briefing when the equivalent review of checklist items is accomplished. b. Observes the position equipment, operational situation, and work environment. c. Listens to voice communications and observes other operational actions. d. Observes current and pending aircraft and vehicular traffic and correlates traffic with flight and other movement information. e. Indicates to the specialist being relieved that the position has been previewed and the verbal briefing may begin.	____	____
2. Receives the verbal briefing.	____	____
3. Assumes the responsibility of the position.	____	____
4. Reviews the position. a. Signs on the position, unless a facility directive authorizes step h below. b. Checks, verifies, and updates information obtained in performance measures 1 and 2. c. Checks the position equipment according to existing directives. d. Reviews the checklist, status information areas, written notes, and other prescribed sources of information. Advises the relieving specialist of known omissions, updates, or inaccuracies. e. Observes overall position operation to determine if assistance is needed. f. Provides assistance. g. Advises the appropriate position regarding known status information areas, omissions, updates, or inaccuracies. h. Signs on the relieving specialist. i. Signs off the position according to existing directives or otherwise indicates the relief process is complete.	____	____

Evaluation Guidance: Score the soldier GO if all performance steps are passed. Score the soldier NO-GO if any performance steps are failed. In case of a NO-GO, brief the soldier on the deficiency, retrain the soldier to perform the step correctly, and reevaluate the task.

References

Required	Related
DA Form 3502-R	None
FAA Order 7110.65	
FM 3-04.303(FM 1-303)	

Establish a Helicopter Landing Point
071-334-4002

Conditions: You have been given an area to be prepared for a landing site; smoke grenades; strobe lights, flashlights, or vehicle lights; marker panels; and the equipment and personnel to clear the site when required.

Standards: You will ensure that the site is large enough for a helicopter to land and take off, all obstacles that cannot be removed are marked or identified, and the touch down point on the landing site is identified.

Performance Steps

1. Select a Landing Site. The factors that should be considered are the following:
   a. The size of the landing site.
      (1) A helicopter requires a relatively level landing area 30 meters in diameter. This does not mean that a loaded helicopter can land and take off from an area of that size. Most helicopters cannot go straight up or down when fully loaded. Therefore, a larger landing site and better approach and departure routes are required.
      (2) When obstacles are in the approach or departure routes, a 10 to 1 ratio must be used to lay out the landing site. For example, during the approach and departure, if the helicopter must fly over trees that are 15 meters high, the landing site must be at least 150 meters long (10x15=150 meters).
   b. The ground slope of the landing site. When selecting the landing site, the ground slope must be no more than 15 degrees. Helicopters cannot safely land on a slope of more than 15 degrees.
      (1) When the ground slope is under 7 degrees, the helicopter should land up slope.
      (2) When the ground slope is 7 to 15 degrees, the helicopter must make a side-slope landing.
   c. Surface conditions.
      (1) The ground must be firm enough that the helicopter does not bog down during loading or unloading. If firm ground cannot be found, the pilot must be told. He can hover at the landing site during the loading or unloading.
      (2) Rotor wash on dusty, sandy, or snow covered surfaces may cause loss of visual contact with the ground. Therefore, these areas should be avoided.
      (3) Loose debris that can be kicked up by the rotor wash must be removed from the landing site. Loose debris can cause damage to the blades or engines.
   d. Obstacles.
      (1) Landing sites should be free of tall trees, telephone lines, power lines or poles, and similar obstructions on the approach or departure ends of the landing site.
      (2) Obstructions that cannot be removed (such as large rocks, stumps, or holes) must be marked clearly within the landing site.

2. Establish Security for the Landing Site. Two points to think about are—
   a. Landing sites should offer some security from enemy observation and direct fire. Good landing sites will allow the helicopter to land and depart without exposing it to unnecessary risks.
   b. Security is normally established around the entire landing site.

3. Mark the Landing Site and Touchdown Point.
   a. When and how the landing site should be marked is based on the mission, capabilities, and situation of the unit concerned. Normally, the only mark or signals required are smoke (colored) and a signalman. VS-17 marker panels may be used to mark the landing site, but must not be used any closer than 50 feet to the touchdown point. In addition to identifying the landing site, smoke will give the pilot information on the wind direction and speed.
   b. At night, an inverted "Y" composed of four lights marks the landing site and touchdown point. Strobe lights, flashlights, or vehicle lights may also be used to mark the landing site. The marking system used will be fully explained to the pilot when contact is made.

Performance Measures

	GO	NO GO
1. Select a site large enough to permit the helicopter to land and take off.	____	____
2. Remove or mark all obstacles and debris.	____	____
3. Mark or identify the landing site and the touchdown point.	____	____

References

Required	Related
None	None

APPENDIX A

AVIATION SCHOOL RECOMMENDED PROFESSIONAL READING LIST

This recommended professional reading list is designed for reading by all CMF 93, Aviation Operations soldiers and noncommissioned officers.

SKILL LEVEL 10

The Enlisted Soldier's Guide, Perez, 1st Ed., Stackpole Books.
The NCO Guide, Cragg and Perez, 3rd Ed., 1989.
Soldier's Study Guide How to Prepare for Promotion Boards, Jackson, Stackpole Books.

SKILL LEVEL 20

Rules for Leadership: Improving Unit Performance, Blade, National Defense University Press, 1986, 88-28556.
FM 6-22(FM 22-100), Army Leadership.
FM 7-10(FM 25-101), Battle Focused Training.
TC 22-6, The Army Noncommissioned Officer Guide.
Guide to Effective Military Writing, McIntosh, Stackpole Books.
Readings on famous military leaders, i.e., Napoleon, Grant, Lee, Pershing, Patton, Bradley, Ridgeway, Westmoreland, Schwartzkopf.
The Story of the Noncommissioned Officers Corps, Center for Military History, 70-38.

SKILL LEVEL 30

Small Unit Administration (Manual or ADP Systems), Stackpole Books.
Common Sense Training, Collins, Presidio Press, 1980, ISBN 0-89141-046-5.
The Noncommissioned Officers' Family Guide, Gross, Beau Lac Pub., 1985, ISBN 0911980-13-X.
FM 7-0(FM 25-100), Training the Force.

SKILL LEVEL 40

Readings about world politics and tensions issues.
Battle-Focused Doctrine (FM 3-01[FM 44-100] and related FMs).
Combat Leader's Field Guide (l0th Ed., Stackpole Books).
Roots of Strategy. Book 2 (Picq, Clausewitz, Jomini, Stackpole Books).

MILITARY JOURNALS

Army Aviation
Aviation Digest (Army)
Soldiers
Army (AUSA)
Jane's Defense Weekly
Air Force Magazine
Aerospace & Defense Science
National Defense
Military Technology
NCO Journal

Civilian Journals

Aviation Week and Space Technology
Aviation
Flying
Aviation & Space
Aviation Digest
Aviation Equipment Maintenance
Air Safety Weekly
Aviation Monthly
Aviation International News
Flight Safety Digest

FAA PUBLICATIONS

FAA World
ATC Procedures

APPENDIX B

DA FORM 5164-R (HANDS-ON EVALUATION)

This appendix provides a sample of DA Form 5164-R (Figure B-1) for the tasks in this STP.

The DA Form 5164-R allows the trainer to keep a record of the performance measures a soldier passes or fails on each task. Trainers should use the following instructions when completing DA Form 5164-R:

Prior to Evaluating the Soldier.

Obtain a blank copy of DA Form 5164-R, which you may locally reproduce on 8 x 11-inch paper. AR 350-57 contains a reproducible copy of this form. The form also can be downloaded from the U.S. Army Publishing Agency web site (www.usapa.army.mil/forms).

Enter the task title and 10-digit number for the task from the evaluation guide of the **SM** task summary.

In column (a), enter the number of each performance measure from the evaluation guide.

In column (b), enter the performance measure corresponding to the performance measure number in column (a). (You may abbreviate this information if necessary.)

Enter the feedback statement from the evaluation guide just below the last performance measure.

Locally reproduce the partially completed form if you are evaluating more than one soldier on the task or the same soldier on more than one task.

During the Evaluation.

Enter the date just before evaluating the soldier's task performance.

Enter the evaluator's name and the soldier's name and unit.

For each performance measure in column (b), enter a check in column (c) PASS or column (d) FAIL as appropriate.

Compare the number of performance measures the soldier passes (and if applicable, which ones) against the task standard shown in the feedback statement. If the standard is met or exceeded, check the GO block under STATUS; otherwise, check the NO-GO block.

HANDS-ON EVALUATION For use of this form, see AR 350-57; the proponent agency is ODCSOPS		DATE 10 OCT 01	
TASK TITLE	OPERATE THE LANDING CONTROL CENTRAL AN/TSQ-71B	TASK NUMBER 011-143-5006	
ITEM a	PERFORMANCE STEP TITLE b	SCORE (Circle One) PASS c	 FAIL d
1	Performs starting procedures	☒ P	☐ F
2	Sets circuit breakers in priority order	☐ P	☒ F
3	Turns on radar and IFF equipment	☐ P	☒ F
4	Applies power to radar equipment	☒ P	☐ F
5	Turns on radios (UHF, VHF,	☒ P	☐ F
6	Operates the radar s[illegible]	☒ P	☐ F
7	Operates the [illegible]dios	☒ P	☐ F
8	Perf[illegible]norm[illegible]s[illegible]poin[illegible]or[illegible]d[illegible]es	☐ P	☒ F
9	Perfo[illegible]rg[illegible]o[illegible] procedures	☒ P	☐ F
10	Performs [illegible]M[illegible]	☒ P	☐ F
11	Cleans the equipment	☒ P	☐ F
12	Performs operator troubleshooting	☒ P	☐ F
		☐ P	☐ F
		☐ P	☐ F
EVALUATOR'S NAME *SSG Jones*		UNIT A CO 1/58th AVN REGT	
SOLDIER'S NAME *PFC Smith*		STATUS ☐ GO ☒ NO GO	

DA FORM 5164-R, SEP 85 EDITION OF DEC 82 IS OBSOLETE USAPPC V2.00

Figure B-1. Sample of a completed DA Form 5164-R.

APPENDIX C
DA FORM 5165-R (FIELD EXPEDIENT SQUAD BOOK)

This appendix provides a sample of DA Form 5165-R (Figure C-1) for the tasks in this STP.

The DA Form 5165-R allows the trainer to keep a record of task proficiency for a group of soldiers. Trainers should use the following instructions when completing DA Form 5165-R:

Prior to Evaluating the Soldier.

Obtain a blank copy of DA Form 5165-R, which you may locally reproduce on 8 x 11 paper. AR 350-57 contains a reproducible copy of this form. The form also can be downloaded from the U.S. Army Publishing Agency web site (www.usapa.army.mil/forms).

Enter the SM task number and abbreviated task title for the evaluated tasks in the appropriate column. Use additional sheets as necessary. Locally reproduce the partially completed form if you are evaluating more than nine soldiers.

During the Evaluation.

Enter the names of the soldiers you are evaluating, one name per column, at the top of the form. You may add the names of newly assigned soldiers if there are blank columns.

Under STATUS, record (*in pencil*) the date in the GO block if the soldier demonstrated task proficiency to soldier's manual standards. Keep this information current by always recording the most recent date on which the soldier demonstrated task proficiency.

Record the date in the NO-GO block if the soldier failed to demonstrate task proficiency to soldier's manual standards. Soldiers who failed to perform the task should be retrained and reevaluated until they can meet the standards. When that occurs, enter the date in the appropriate GO block and erase the previous entry from the NO-GO block.

After the Evaluation.

Read down each column (GO/NO-GO) to determine the training status of that individual. This will give you a quick indication on which tasks a soldier needs training.

Read across the rows for each task to determine the training status of all soldiers. You can readily see on which tasks to focus training. Line through the training status column of any soldier who departs from the unit.

FIELD EXPEDIENT SQUAD BOOK
For use of this form, see AR 350-57; the proponent agency is ODCSOPS

SHEET 1 OF 1

USER APPLICATION	SOLDIER'S NAME				
	PVT SMITH, JOHN	SPC BROWN, JANE	SGT JONES, CHRIS		

TASK NUMBER AND SHORT TITLE	STATUS									
	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO	GO	NO-GO
011-143-0010 INTERPRET CRASH GRID MAP	X		X		X					
011-143-0012 PROCESS PILOT REPORTS (PIREPS)		X	X		X					
011-143-0022 PROVIDE EMERGENCY ASSISTANCE	X		X		X					
011-143-0023 ISSUE AIRPORT CONDITION INFORMATION	X		X		X					

DA FORM 5165-R, SEP 85 (MODIFIED) EDITION OF DEC 82 IS OBSOLETE **USAPPC V1.00**

Figure C-1. Sample copy of a completed DA Form 5165-R (modified).

APPENDIX D

NONCOMMISSIONED OFFICER CAREER PROGRESSION

THE LIFE CYCLE OF CAREER MANAGEMENT FIELD 93, AVIATION OPERATIONS, SOLDIERS STRUCTURE

Military occupational specialty 93C (ATC Operator) must score a minimum of 105 on the skilled technical portion of the armed services vocational aptitude battery, successfully pass a Class IV flight physical, and agree to the current active duty service obligation.

Military occupational specialty 93P (Aviation Operations Specialist) must score a minimum of 95 on the ST portion of the ASVAB, agree to the current ADSO, and have a secret security clearance.

The following Additional Skill Identifiers are applicable to CMF 93:

A2 - Aviation Safety.
F7 - Pathfinder.
F8 - Flight Simulator (UH-1FS) Console Operations.
2S - Battle Staff Operations NCO.
4A - Reclassification Training.
P5 - Master Fitness Trainer.
Q2 - Aviation Life Support Equipment.
Q8 - Tactical Air Operations.

PROFESSIONAL DEVELOPMENT

Professional development is the sum of all of the training, education, and experience gained by the enlisted soldier. The development process produces soldiers capable of carrying out their missions in a technically and tactically efficient manner. All the components of professional development must complement each other. The professional development process should train, promote, and then use soldiers in challenging careers. The soldier must be given the tools to achieve the personnel development goals. The primary key to professional development in NCOs is the noncommissioned officers education system.

Goal. The professional development goal is to provide every soldier with the opportunity to obtain the requisite skills and experience to become an NCO. All training, education, and experience constitutes professional development. Professional development enhances unit readiness and is an investment in the future of Army Aviation. The Aviation Branch's long-range goal for professional development is a tactically and technically proficient NCO.

Advance Individual Training.

The goal of AIT is to produce a soldier technically proficient at the novice level. The increase in the complexity and capabilities of aircraft and support systems, combined with the

increasingly complex and technical skills required for their maintenance, mandates a continuous education process. AIT is the first step in this process. Soldiers are trained in their MOS-specific technical tasks after they have mastered basic soldiering skills. Specific MOS training is conducted in each aviation specialty. The school prior to an initial utilization tour completes technical certification. Individual unit training programs coupled with on-the-job experience continue the technical education of each soldier.

Resident training ensures that a sufficient supply of trained personnel are available. This must be accomplished while tailoring the resident training courses to each individual professional development pattern. Training covers systems operation and maintenance, leadership skills, management skills, and current doctrinal tenets. Aviation enlisted soldier training is progressive and task oriented. It concentrates on the specific skills required by rank. The only exceptions are those soldiers accessed into an MOS through the civilian acquired skill program. See AR 601-210 for MOSs currently in the CASP.

Primary Leadership. The primary leadership development course is the first step in preparing the soldier for the initial challenges of leadership and is a prerequisite for promotion to sergeant. PLDC concentrates on building the basic skills required of the sergeant to perform as a trainer and leader.

Basic Noncommissioned Officers Course. The BNCOC is designed to prepare a soldier to perform at the staff sergeant level. SSGs are trained on leadership skills, weapons systems, MOS peculiar equipment, and tactics. BNCOC builds on the skills learned in PLDC to train subordinates to maintain, operate, and employ weapons and equipment in a combat environment. Completion of the BNCOC is required for promotion to SSG.

Advanced Noncommissioned Officers Course. The ANCOC is designed to prepare soldiers to perform the duties of platoon sergeant. ANCOC stresses MOS-related tasks, emphasizing advanced technical, tactical, leadership skills and knowledge of the subjects required for training and leading soldiers at the platoon level. Completion of the ANCOC is required for promotion to SFC.

First Sergeant Course. The first sergeant course is designed to prepare a SFC(P) or MSG to perform the duties required of a 1SG. The course stresses training, administration, leadership, and tactical skills. As the senior enlisted soldier at company level, the 1SG must be proficient in all areas. The course attendees must be 1SG designees or incumbents, SFC(P)s and MSGs who have less than 18 months in a 1SG position.

Sergeants Major Course.

The SMC is the capstone of the NCO education system. The SMC trains selected soldiers to be the senior enlisted leaders throughout the Army. These positions entail the highest levels of responsibility throughout the Army and DOD, in both troop and senior staff assignments. Eligible MSGs are selected to attend the SMC by a Department of the Army selection board and is required for promotion to SGM.

As soldiers gain experience and rank, they begin to occupy leadership positions. The increase in their job experience combined with their selection for promotion leads to their return

to the resident training system. At every level throughout their careers, aviation enlisted soldiers are trained, promoted, and used to assume more challenging leadership positions.

Long-Range Sequence for Professional Development. Advanced individual training includes:

- Unit Experience
- PLDC
- Unit Experience
- BNCOC
- Unit Experience
- ANCOC = Tactically and technically proficient NCO

Reserve Component Progression.

Reserve component career progression is comprised of individual unit training programs coupled with on-the-job experience. Experience coupled with the appropriate level NCO educational courses qualifies a soldier for promotion. A troop program unit, individual mobilization augmentee, or individual ready reserve soldier must complete or receive constructive credit from the following accredited Active Army or Reserve Component NCOES courses for promotion to:

- Staff Sergeant - BNCOC
- Sergeant First Class or Platoon Sergeant - ANCOC
- Master Sergeant or 1SG - ANCOC
- Sergeant Major - SMC

The key component of professional development is NCOES. The NCOES is sequential and progressive and provides mandatory training prior to promotion. This applies equally to combined arms, combat support, and combat service support soldiers. It does not include functional courses such as the 1SG course or the battle staff course. By linking promotions to NCOES, the program increases the education level of the NCO Corps.

NCOES	**LINK**
PLDC	SGT
BNCOC	SSG
ANCOC	SFC
Sergeant's Major Academy	CSM/SGM

Soldiers are ultimately responsible for their individual development.

CAREER MANAGEMENT

The career management concept for the enlisted aviation soldier is designed to provide systematic opportunities for each soldier to obtain the proper balance of experience and professional education. Experience opportunities occur through a series of progressive

assignments, which require increasing responsibility, while developing the full range of duties required by aviation enlisted soldiers. Professional education opportunities occur through civilian and military training, using the NCOES, Army Correspondence Course Program, on-the-job experience, and individual study.

Promotions.

Promotions have a direct bearing on the sustainment of aviation soldiers. A favorable opportunity for promotion increases the sustainment rate of a particular MOS, although the actual promotion might shift a soldier into a new specialty. Personnel management goals, current authorizations, and future force structure must all be carefully evaluated when allocating promotions among different specialties. The Army promotion program is composed of three subsystems—decentralized, semicentralized, and centralized.

The decentralized system allows local commanders to promote soldiers according to DA policies to the rank of PVT through SPC.

The semicentralized promotion allows field grade commanders to promote soldiers in the rank of SGT and SSG based on the soldier making the DA posted cut off score. Eligible aviation enlisted soldiers compete on a standardized point system composed of points awarded for past achievements and by the promotion board. Soldiers recommended for promotion to SGT and SSG must appear before a local selection board and are awarded promotion points based upon board appraisal. If a soldier has enough points, he is placed on the recommended list and total points are reported to DA. If after 90 days the total points meet or exceed the DA published cutoff score for the MOS, the soldier is promoted. Otherwise, the soldier remains in a promotable status until either he obtains sufficient promotion points or DA lowers promotion cutoff scores. The DCSPER determines the needs of the Army by rank and specialty, based on this need, PERSCOM publishes promotion point cutoff scores for the primary and secondary zones for promotion to both SGT and SSG

As an incentive to reward exceptional soldiers, waivers are authorized for time in service and time in grade. Soldiers with waivers are placed in the secondary zone. Outstanding soldiers have the opportunity for early advancement. This serves as a motivating factor for continued outstanding service and assists in the sustainment of a quality force.

The centralized system is used for promotion to the grade of SFC, MSG, and SGM. Three different boards convened annually at DA level make selections. Aviation Proponency develops a briefing for all promotion board members. The briefing familiarizes board members with soldiers' duties and responsibilities within aviation CMFs 67 and 93 and their typical career progressions.

Nonresident Training. Nonresident training affords aviation enlisted soldiers an opportunity to increase their professional proficiency. Because of the continual changes and complexity of aviation systems and missions, it is vital that soldiers take advantage of the various available nonresident training sources. Some of the programs are civilian schooling, correspondence courses, and learning center computer-assisted training programs.

Civilian Education.

There is no formal civilian education requirement in enlisted aviation CMFs beyond high school. However, for promotions above the rank of SSG, civilian education is an increasingly significant discriminator. Department of the Army policy stresses that, prior to the fifteenth year of service, enlisted soldiers should earn an associate degree, license, or professional certification in a field related to their MOS.

Under the tuition assistance program, active duty aviation enlisted soldiers can take courses at accredited civilian colleges and academic institutions. After approval of tuition assistance, individuals receive financial aid to cover up to 75 percent of tuition. Approval is at the local level. This program is being linked with the CMF NCO self-development career map. (See figure D-1).

Soldiers qualifying for the Montgomery GI Bill education entitlement may receive Veterans Administrative financial assistance. The following restrictions apply:

- Local unit commanders must approve duty time to engage in studies.
- In-service participants will only receive money for tuition.
- Individuals in fully funded programs are not authorized to receive VA financial assistance normally available under the GI Bill.

Servicemembers Opportunity College. SOC is a network of affiliated schools within the continental United States and meets the soldier's need for continued civilian education. These schools have liberal entrance requirements and provide several alternatives for obtaining readily transferable college credits. This flexible method of instruction is adaptable to the mobile lifestyle of a soldier.

Exportable training.

Exportable training publications contain essential and specialty critical tasks. These include common task training and MOS-related soldiers manuals. These manuals define the scope and performance standards of the varied tasks in the career field. The strength of individual basic skills is measured by the common task test. This serves to highlight deficiencies in unit individual training programs and can be used to focus unit training.

Individual training is a continuous process to attain and sustain proficiency in mission essential tasks. As new soldiers arrive in the unit, they are evaluated for individual skill proficiency and then integrated into the unit training program. New personnel should be integrated into the unit training program and be functioning members within 90 days of their arrival. All of their technical skills are maintained by continuous sustainment training.

Total Army Schools System. TASS establishes an effective and efficient school system of fully accredited and integrated Active Component\ARNG\USAR schools. TASS provides standard individual training and education for the army's three components. This system also establishes a tricomponent partnership, develops efficient use of resources, and functionally aligns Active Component\Reserve Component schools.

TITLE OF CAREER MANAGEMENT FIELD:

AVIATION OPERATIONS

CMF NUMBER: 93

THE FOLLOWING ARE ONLY RECOMMENDATIONS. It may not be feasible to complete all recommended courses since assignments may preclude off-duty education. Alternate methods of achieving CMF course recommendations are possible (examinations, correspondence courses, and ACE-recommended credits). See an education counselor for recommended courses/goals.

DEVELOPMENTAL ASSIGNMENTS

	PVT, PFC, SPC/CPL Skill Level 10	SGT Skill Level 20	SSG Skill Level 30	SFC Skill Level 40	MSG SGM/CSM Skill Level 50
RANKS, SKILL LEVELS, & DUTY ASSIGNMENTS	→	Recruiter/Retention/Drill SGT → Shift/Repr Supervisor TAC Team Leader	SEC/OPS SGT Platoon SGT	Facility Chief ATC Chief	First Sergeant

INSTITUTIONAL TRAINING

INSTITUTIONAL TRAINING	BCT	AIT	PLDC		BNCOC		ANCOC		SERGEANT MAJOR COURSE	

SELF DEVELOPMENT

RECOMMENDED NCOES-RELATED COURSES	**PRIOR TO PLDC:** 1. English Composition 2. Basic Mathematics 3. Computer Literacy	**PRIOR TO BNCOC:** 1. Communication Skills 2. Personal Supervision 3. Behavioral Science 4. Speech	**PRIOR TO ANCOC:** 1. Principles of Management 2. Organizational Behavior 3. Information Mgt Systems 4. Technical Writing 5. College Math/Geometry Emphasis	**PRIOR TO SMC:** 1. Research Techniques (Statistics) 2. Human Resource Mgt ***Battle Staff Course*** ***1SG Course***
RECOMMENDED CMF-RELATED COURSES AND ACTIVITIES	**Skill Level 10** 1. ControlTwr Oper Prep (ACCP) (93C) 2. Avn Opr Spec (ACCP) (93P) 3. Begin taking TEC, IAVD & CYBISAvn Lessons for MOS in LC. For catalog of lessons write Cdr, US Army Avn Ctr, ATTN: ATZQ-TDI-D.Tng Spt Br, Bldg 3409. Ft Rucker, AL 36362	**Skill Level 20** 1. Aviation Law (93C) 2. Aviation Regulations (93C) 3. Safety Mgt (Basic) (ACCP) 4. Records Management	**Skill Level 30** 1. Army Accident Prevention Course 2. Avn Accident Prevention Management (ACCP) 3. Methods of Instruction 4. Performance Appraisals 5. Aviation Management 6. Stress Management	**Skill Level 40 50** 1. Policy & Decision Making 2. Airport Management
RECOMMENDED CMF-RELATED CERTIFICATION OR DEGREE GOAL	**NATIONAL TRADE/PROFESSIONAL CERTIFICATE IN:** (93C) FAA Facility Rating Prior to 3rd Yr of Service ASSOCIATE OF APPLIED SCIENCE IN: ATC Facilities Mgt; Aviation Opns Mgt BY THE 15TH YEAR OF SERVICE		**BACHELORS OF APPLIED SCIENCE IN:** ATC Facilities Management, Aviation Operations Management, Business Management, or Interdisciplinary Studies BY THE 20TH YEAR OF SERVICE	
LEGEND	ACCP -Army Correspondence Course Program LC - Course found in Learning Center		CYBIS - Network Computer Instruction (Where Available)	

Figure D-1. NCO leader self-development career map.

GLOSSARY

SECTION I. ABBREVIATIONS

A^2C^2	Army Airspace Command and Control
AA	Avenue of Approach; Assembly Area
AAF	Army airfield
ABCCC	airborne battlefield command and control center
AAR	after-action reveiw
AC	alternating current
ACA	airspace control authority
ACARS	aircraft communications addressing and reporting system
ACC	airspace control center
ACCP	Army Correspondence Course Program
acft	aircraft
ACL	allowable cargo load
ACofS	Assistant Chief of Staff
ACP	Airspace Control Plan
AD	air defense
ADA	air defense artillery
ADCOORD	air defense coordinator
ADF	automatic direction finder
ADJ	adjust
ADOLT	air defense operations liaison team
ADSO	active duty service obligation

ADTL	Army doctrinal and training literature
AF	audio frequency
AGC	automatic gain control
AGL	above ground level
AIM	Airman's Information Manual
AIT	advanced individual training
AL	Alabama
ALNOT	alert notice
ALO	air liaison officer
AR	Army Regulation; Army Reserve
AM	amplitude modulation
ANCD	automated net control devices
ANCOC	Advanced Noncommissioned Officers' Course
ANGLICO	air and naval gunfire liaison company
ANSI	American National Standards Institute
ANT	antenna
AOR	area of responsibility
AR	Army regulation
ARAC	Army radar approach control
ARINC	Aeronautical Radio, Incorporated
ARLO	air reconnaissance liaison officer
ARNG	Army National Guard
ARSA	airport radar service area
ARTCC	Air Route Traffic Control Center

ARTEP	Army Training and Evaluation Program
ARTS	automated radar terminal system
ASAT	automated systems approach to training
ASDE	airport surface detection system
ASM	airspace management
ASOC	air support operations center
ASR	airport surveillance radar
ASVAB	armed services vocational aptitude battery
ATCS	air traffic control specialist
ATC	air traffic control
ATCAA	air traffic control assigned airspace
ATCRBS	Air Traffic Control Radar Beacon System
ATIS	Automated Terminal Information Service
ATTN	attention
ASRT	air support radar team
atk	attack
attn	attention
ATS	air traffic services
AUD	audio
AUTO	automatic
AVAIL	available
avn	aviation
AWACS	airborne warning and control system
AZ	azimuth

BIT	built-in-test
BKR	breaker
BNCOC	Basic Noncommissioned Officers' Course
BRT	bright
CAL	calibrated
CAS	close air support
CASP	civilian acquired skill program
CAT	clear air turbulence
cbt	combat
C^2	command and control
CCW	counterclockwise
CDB	course deviation bar
C-E	communications-electronics
CEOI	Communications-Electronics Operations Instructions
CEWI	combat electronic warfare intelligence
CHAN	channel
CIC	controller in charge
CIR	circular
CKT	circuit
CKP	checkpoint
CL	centerline
CLR	clear
CM&D	collection management and dissemination
CMF	Corps maneuver formations

COMMZ	communications zone
COMM	communications
COMSEC	Communication Security
COND	condition
CONUS	Continental United States
CONV	conversion
CP	command post
CPX	command post exercise
CRC	control and reporting center
CRP	control and reporting post
CRT	cathode ray tube
crypto	cryptographic
CSC	consecant
CTO	control tower operator
CTOC	corps tactical operations center
CTT	Common Task Test
CW	continuous wave
CWA	Center Weather Advisory
DA	Department of the Army
DARR	Department of the Army regional representative
DASC	direct air support center
DC	direct current
DCA	Defense Communications Agency
DCSPER	Deputy Chief of Staff, Personnel

DD	Department of Defense
DF	direction finding
DH	decision height
DIS	disable
DISTR	distribution
D/L	direct line
DL	delay line
DME	distance measuring equipment
DMM	digital map marks
DOD	Department of Defense
DOTDS	Directorate of Training, Doctrine, and Simulation
DR	Data Repository
DSA	division support area
DSN	Defense Switching Network
DTG	date-time group
DTOC	division tactical operations center
DZ	drop zone
E	enlisted; east
ECCM	Electronic Counter-Countermeasures
ECM	Electronic Countermeasures
ECU	electronic control unit
EEFI	essential elements of friendly information
EFC	expect further clearance
eff	effective

EFTO	encrypted for transmission only
EL	elevation
ELT	emergency locator transmitter
EMER	emergency
ENSCE	enemy situation correlation element
EOD	explosive ordnance disposal
EP	externally powered
EPW	enemy prisoner of war
equip	equipment
ESM	Electronic Support Measure
ETA	Estimated Time of Arrival
EW	Electronic Warfare
EXP	expansion
FAA	Federal Aviation Administration
FAAO	Federal Aviation Administration Order
FAC-A	forward air controller--airborne
FACP	forward air control post
FAF	final approach fix
FAR	Federal Aviation Regulations
FARP	forward arming and refueling point
FCC	Flight Coordination Center
FCTN	function
FEBA	forward edge of the battle area
FG	fiscal guidance

FH	frequency hopping
FLIP	Flight Information Publication
FLOT	forward line of own troops
FM	field manual; frequency modulation (radio)
FOC	Flight Operations Center
freq	frequency
FS	fire support
FSE	forward security element
FSN	federal stock number
FSS	Flight Service Station
ft	foot
FTC	fuel time constant
FTM	Facility Training Manual
FTP	Facility Training Program
FY	fiscal year
G1	Assistant Chief of Staff, G1 (Personnel)
G2	Assistant Chief of Staff, G2 (Intelligence)
G3	Assistant Chief of Staff, G3 (Operations and Plans)
G4	Assistant Chief of Staff, G4 (Logistics)
GCA	ground-controlled approach
GD	guard
GED	gasoline engine driven
GI	government issue
GEN	generator

GLO	ground liaison officer
GND	ground
GP	glide path
GS	general schedule
HAT	height above touchdown
HF	high frequency
HF/SSB	high frequency/single sideband
HI	high
HIWAS	hazardous in-flight weather advisory service
HQ	Headquarters
HIDACZ	high-density airspace control zone
HIWAS	hazardous in-flight weather advisory service
HOM	homing
HORIZ	horizontal
HQ	headquarters
HV	high voltage
Hz	hertz
ICAO	International Civil Aviation Organization
ICOM	integrated communications security
ID	identification
IDP	initial delay position
IF	intermediate frequency
IFF	identification, friend or foe
IFM	improved frequency modulation

IFR	instrument flight rules
IET	initial entry training
IFF	Identification, Friend or Foe
ILS	Integrated Logistics Support
IMC	instrument meteorological conditions
IND	indicator
INREQ	Information Request
INT	internal
intel	intelligence
INTSUM	intelligence summary
ITEP	Individual Training Evaluation Program
JB	Job Book
JOGA	Joint Operations Graphic (air)
KC	kilocycle
KHz	kilohertz
KTC	Dryad Numeral Cypher/Authentication System (Training)
KW	kilowatt
L	left
LA	low approach
LB	local battery
LC	line of contact
LCC	land component commander
LD	line of departure
Ldr	leader

LD-V	loaded data variable
LF	low frequency
LIN	linear
LL	landline
LLTR	low-level transit route
LNO	liaison officer
LO	liaison officer
LOA	letter of agreement
loc	location
LOG	logarithm
LOI	letter of instruction
LOP	letter of procedure
LSB	lower sideband
LZ	landing zone
MA	minimum altitude
MACOM	major Army command
MAN	manual
MAP	missed approach point
MAX	maximum
MC	megacycle
MCO	movement control officer
MCW	modulated continuous wave
MDA	minimum descent altitude
MEA	minimum en route altitude

mech	mechanized
MED	medium
MEM	memory
METAR	Meteorological Terminal Aviation Report
METL	mission-essential task list
MHz	megahertz
MIA	minimum IFR altitude
MIC	microphone
MIJI	Meaconing, Interference, Jamming, and Intrusion
MIRL	medium intensity runway lights
MLS	microwave landing system
MMA	minimum maneuver altitude
MMS	meteorological measuring system
MN	main
MOA	military operations center
MOCA	minimum obstruction clearance altitude
MON	monitor
MOPP	mission-oriented protective posture
MOS	military occupational specialty
MOSC	military occupational specialty code
MPC	message processing center
MRR	minimum risk route
MSAW	minimum safe altitude warning
MSL	mean sea level

MSR	main supply route
MTI	moving target indicator
MTP	mission training plan
MVA	minimum vectoring altitude
MWO	modification work order
N	north
NA	not applicable
NAR	narrow
NAS	National Airspace System
NATO	North Atlantic Treaty Organization
NAV	navigation
NAVAID	navigational aid
NB	narrow band
NBC	nuclear, biological, and chemical
NCO	noncommissioned officer
NCOES	noncommissioned officer education system
NCS	net control system
NDB	nondirectional radio beacon
NE	northeast
NGB	National Guard Bureau
no	number
NOE	Nap of the Earth
NORM	normal
NOTAM	Notice to Airmen

NSN	national stock number
NVG	night vision goggles
NVIS	near vertical incidence skywave
NVS	night vision system
NW	northwest
NWS	National Weather Service
(O)	For Official Use Only
obj	objective
ODALS	omnidirectional approach lighting system
OPLAN	operation plan
OPORD	operation order
OPR	operator
ops	operations
OPSEC	operational security
OSUT	one station unit training
OVHD	overhead
pam	pamphlet
PAR	precision approach radar
PARA	paragraph
PDP	power distribution panel
PERSCOM	personnel command
PIREP	pilot report
PL	phase line
PLDC	primary leadership development course

PLS	pulse
PMCS	preventive maintenance checks and services
POL	polarity
POS	position
PP	passage point
ppi	planned position indicator
PRE	preset
PREC	precision
psi	pounds per square inch
PTT	push-to-talk
PWR	power
PZ	pickup zone
REIL	runway end identifier lights
R	right
RAPCON	radar approach control center
RC	reserve components
RCC	Regional Control Center
RCU	remote control unit
RCVR	receiver
REC	receive
reg	regulation
rep	representative
RF	radio frequency
ROC	Regional Operations Center

ROZ	restricted operations zone
RPI	runway point of intercept
RPV	remotely piloted vehicle
rqd	required
RSC	rescue control center
RT	receiver-transmitter
RTQC	real time quality check
RVR	runway visual range
RXMT	retransmit
S	south
S1	Adjutant (US Army)
S2	Intelligence Officer (US Army)
S3	Operations and Training Officer (US Army)
S4	Supply Officer (US Army)
SAR	search and rescue
SBW	selectivity band width
SC	single channel
SCATANA	security control of air traffic and air navigational aids
SCR	solineum controlled rectifier
SDT	self-development test
SE	southeast
SELADR	selective address
SELCAL	selective calling
SEMA	special electronic mission aircraft

SENS	sensitivity
SEQ	sequence
SHORAD	short-range air defense
SID	standard instrument departure
SIGMET	significant meteorological information
SIGSEC	signal security
SIMULT	simultaneous
SINCGARS	single-channel ground and air radio system
SL	skill level
SM	soldier's manual
SMC	sergeant major's course
SMCT	Soldier's Manual of Common Tasks
SOC	Service Member's Opportunity College
SOI	signal operation instructions
SOP	standing operating procedure
SP	start point
spt	support
SQ	squelch
SQ DIS	squelch disable
SQT	skill qualification test
SR	slow-speed, low-altitude training route
SRCU	securable remote control unit
SS	shift supervisor
SSB	single sideband

STAR	Systems Threat Assessment Report
STC	sensitivity time control
STOL	short takeoff and landing
STP	Soldier Training Publication
SUA	special-use airspace
SUPP	supplement
sust	sustainment
SVFR	special visual flight rules
SW	southwest
tac	tactical
TACAIR	tactical air
TACAN	tactical air navigation
TACC	tactical air control center
TACP	tactical air control party
TACS	tactical air control system
TB	technical bulletin
TC	training circular
TCA	terminal control area
TCAS	traffic alert and collision avoidance system
TD	transmitter distributor
TEC	Training Extension Course
TEL	telephone
TEMP	temperature
TF	task force

TG	Trainer's Guide
TLC	top loading coil
TM	technical manual
tng	training
TOC	tactical operations center
TOD	time of day
TOE	table(s) of organization and equipment
TON	tone
TOT	time over target
TPC	tactical pilotage chart
TR	transmitter
T/R	transmitter-receiver
TRADOC	U.S. Army Training and Doctrine Command
TRAN	transmit
TRANSEC	transmission security
TRSA	terminal radar service area
TST	test
TTCS	tactical terminal control system
TVOR	terminal VHF omnidirectional range
TWR	tower
UH	utility helicopter
UHF	ultra high frequency
US	United States
USAASA	United States Army Aeronautical Services Agency

USAASD	United States Army Aeronautical Services Detachment
USAAVNC	United States Army Aviation Center
USAR	United States Army Reserve
USB	upper side band
UTC	Coordinated Universal Time
UVU	UHF/VHF/UHF
V	volt
VA	Virginia
VASI	visual approach slope indicator
VAC	volts, alternating current
VDC	volts, direct current
VER	version
VERT	vertical
VFR	visual flight rules
VHF	very high frequency
VOL	volume
VOLT	voltage
VOR	VHF omnidirectional range
VORTAC	VHF omnidirectional range tactical air navigation
VRC	vehicular radio controlled
VRMS	volts root mean square
V/STOL	vertical short takeoff ad landing
VTOL	vertical takeoff and landing
VUV	VHF/UHF/VHF

W	west
WCS	weapons control status
WB	wideband
WD	wind direction
WOC	wing operations center
XCVR	transmitter-receiver
XMT	transmit
Z	Zulu (Greenwich mean time)

SECTION II. TERMS

ADDITIONAL SERVICES
Advisory information provided by air traffic control.

ADVISORY
Advice and information provided to assist pilots in the safe conduct of flight and aircraft movement.

AERODROME
A defined area on land or water (including any buildings, installations, and equipment) intended to be used either entirely or in part for the arrival, departure, and movement of aircraft.

AERONAUTICAL CHART
A map used in air navigation, containing all or part of the following: topographic features, hazards and obstructions, navigational aids, navigation routes, designated airspace, and airports.

AIRCRAFT
Devices used or intended to be used for flight in the air (When used in air traffic control, the terminology may include the flight crew.)

AIRFIELD
An area prepared for the accommodation (including any buildings, installations, and equipment) of arriving and departing aircraft.

AIRMAN'S INFORMATION MANUAL
A publication containing basic flight information and air traffic control procedures designated primarily as a pilot's instructional manual for use in the National Airspace System of the United States.

AIRPORT
An area of land or water, to include buildings and facilities (if any), used or intended to be used for the landing and takeoff of aircraft.

AIRPORT TRAFFIC CONTROL SERVICE
A service provided by a control tower for aircraft operating in the movement area and in the vicinity of an airport.

AIR ROUTE TRAFFIC CONTROL CENTER
A facility established to provide ATC services to IFR aircraft-controlled airspace and principally during the en route phase of flight.

AIR TRAFFIC
Aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

AIR TRAFFIC CLEARANCE
An authorization by ATC to prevent collisions between known aircraft and to allow aircraft to proceed under specified traffic conditions within controlled airspace.

AIR TRAFFIC CONTROL
A service operated by the appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.

AIR TRAFFIC CONTROL SPECIALIST/CONTROLLER
A person authorized to provide ATC services.

AIRMAN'S INFORMATION MANUAL
A publication containing basic flight information and ATC procedures designated primarily as a pilot's instructional manual for use in the National Airspace System of the United States.

AIRPORT
An area of land or water, to include buildings and facilities (if any), used or intended to be used for the landing and takeoff of aircraft.

AIRPORT TRAFFIC CONTROL SERVICE
A service provided by a control tower for aircraft operating in the movement area and in the vicinity of an airport.

ALERT NOTICE
A message sent by an FSS or ARTCC that requests an extensive communications search for overdue, unreported, or missing aircraft.

APPROACH CLEARANCE
Authorization by ATC for a pilot to conduct an instrument approach.

ATC CHIEF
The person responsible for the supervision and management of all ATC facilities located at an airfield or a heliport; the ATC chief must supervise two or more ATC facilities or 24 or more personnel.

ATC FACILITY CHIEF
The person responsible for the administration, duty schedules, and operation within an ATC facility (control tower, approach control, GCA, FOC, or FCC).

AUTOMATIC TERMINAL INFORMATION SYSTEM
The continuous broadcast of recorded noncontrol information in selected terminal areas.

COORDINATES
The intersection of lines of reference, usually expressed in degrees/minutes/seconds of latitude and longitude, used to determine position or location.

DIRECT SUPERVISION
Supervision of a person on a one-to-one basis by the holder of a current rating for a specific facility.

DOD FLIGHT INFORMATION PUBLICATION
A publication used for flight planning and en route and terminal operations.

ELECTRONIC COUNTER-COUNTERMEASURES
Actions taken to ensure friendly use of the electromagnetic spectrum despite the enemy's use of electronic warfare.

ELECTRONIC COUNTERMEASURES
Actions taken to prevent or reduce an enemy's effective use of the electromagnetic spectrum, including electronic jamming and electronic deception.

ELECTRONIC WARFARE
Military action involving the use of electromagnetic energy to determine, exploit, reduce, or prevent hostile use of the electromagnetic spectrum.

ELECTRONIC WARFARE SUPPORT MEASURES
Actions taken to search for, intercept, locate, and immediately identify radiated electromagnetic energy (for immediate Threat recognition).

FACILITY
An ATC establishment that includes personnel, equipment, and structures and provides ATC services; for example, control tower, approach control (radar or nonradar), GCA, FOC, or FCC.

FACILITY RATING
A determination of competence, qualification, or quality after which a certificate and rating are issued to an applicant. This rating confirms such determination, grants certain privileges, and may prescribe certain limitations according to the Federal Aviation Act, Federal Aviation Regulations, and Army regulations.

FACILITY TRAINING MANUAL
A locally developed publication used as a training and reference manual in the FTP.

FACILITY TRAINING PROGRAM
An ATC program designed to develop and maintain proficiency and skills necessary to perform ATC duties.

FLIGHT INSPECTION OR FLIGHT CHECK
An in-flight investigation and evaluation of a NAVAID that determine whether the aid meets established tolerances.

FLIGHT SERVICE STATION
An air traffic facility that provides pilot briefings, en route communications, and VFR search and rescue services; assists lost aircraft and aircraft in emergency situations; relays ATC clearances; originates NOTAMs; broadcasts aviation weather; receives and processes IFR flight plans; and monitors NAVAIDs.

INFORMATION REQUEST
A request originated by an FSS to obtain information concerning an overdue VFR aircraft.

INSTRUMENT FLIGHT RULES
Rules governing the procedures for conducting instrument flight.

INTERNATIONAL CIVIL AVIATION ORGANIZATION
A specialized agency of the United Nations whose object is to develop the principles and techniques of international air navigation and to foster planning and development of international civil air transport.

INTERROGATOR
The ground-based transmitter/receiver associated with the ATCRBS.

JAMMING
Electronic or mechanical interference that may disrupt the display of aircraft on radar or the transmission or reception of radio communications or navigation.

LANDING SEQUENCE
The order in which aircraft are positioned for landing.

LIGHT GUN
A handheld, directional, light-signaling device that emits a brilliant narrow beam of white, green, or red light as selected by the controller. The light gun is used, in the absence of radio communications, for controlling air traffic operating near the airport and in the airport movement area.

MEACONING, INTRUSION, JAMMING, AND INTERFERENCE
A joint program that encompasses the reporting, evaluating, and issuing of information on suspected hostile EW activities.

MODE C
The altitude reporting portion of the ATCRBS.

MOVEMENT AREA
The runways, taxiways, and other areas of an airport that are used for taxiing, takeoff, and landing of aircraft, exclusive of the loading ramp and parking areas.

NO-GYRO APPROACH/VECTOR
A radar approach/vector provided in case of a malfunctioning gyrocompass or directional gyro.

NOTICE TO AIRMEN
A notice containing information (not known sufficiently in advance to publicize by other means) concerning the establishment of, condition of, or change in any component that is essential to personnel concerned with flight.

ohm
The practical meter-kilogram-second unit of electric resistance equal to the resistance of a circuit in which a potential difference of one volt produces a current of one ampere.

PILOT REPORT
A pilot's report of meteorological phenomena encountered by aircraft in flight.

POINT OUT
An action taken by a controller to transfer the radar identification of an aircraft to another controller if the aircraft will or might enter the airspace or protected airspace of another controller and radio communications will not be transferred.

QUALIFIED CONTROLLER
A facility-rated controller or one who is position-qualified in one or more controller positions.

STAGE SERVICE
A national program instituted to extend the terminal radar service provided for aircraft to VFR aircraft. Pilot participation in the program is urged but is not mandatory.

TRAFFIC ADVISORIES
Advisories issued to alert pilots to other known or observed air traffic that may be in such proximity to the position of the pilots' aircraft or their intended route of flight to warrant attention.

TRANSPONDER
The airborne radar beacon receiver/transmitter portion of the ATCRBS.

VFR AIRCRAFT OR VFR FLIGHT
An aircraft conducting flight according to visual flight rules.

VISUAL FLIGHT RULES
Rules governing the procedures for conducting visual flight.

SECTION III. SPECIAL ABBREVIATIONS AND TERMS

None

REFERENCES

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AV0905. Radar Identification Procedures.
AV0906. Airport Surveillance Radar.
AV0914. Terminal Radar Control Service.
AV0950. Flight Plans and Communications Procedures.
AV0961. DOD Flight Information Publications (FLIP).
AV1990. Install, Operate, and Maintain the Flight Coordination Central.
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AR 350-41. Training in Units. 19 March 1993.
AR 350-37. Self-Development Test. 17 June 1994.
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Flight Information Handbook.
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IFR Supplement.
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VFR Supplement.

NOTE: DOD FLIPs can be ordered through the Internet from the FAA website (http://www.naco.faa.gov/).

Federal Aviation Administration Forms

FAA Form 7210-8. ELT Incident.
FAA Form 7230-7. Flight Progress Strips.
FAA Form 7230-7.2. Flight Progress Strips
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Please list on a separate sheet of paper those task summaries that need improvement and the recommended changes to each.

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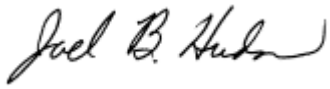

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