TRAINING REQUIREMENTS ANALYSIS

452X2

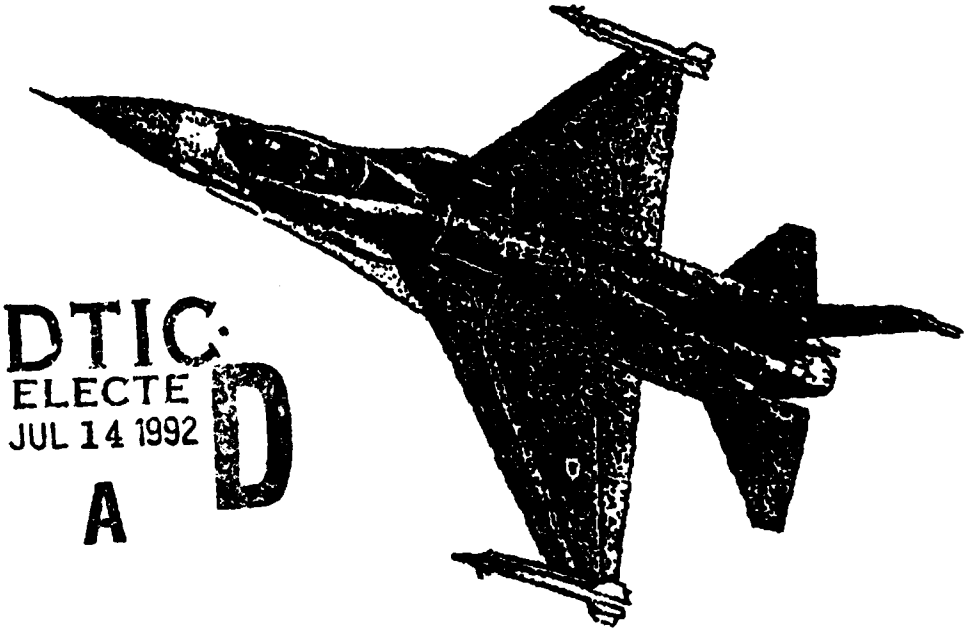
(1)

F-16 AVIONIC SYSTEMS

ATTACK CONTROL

INSTRUMENT AND FLIGHT CONTROL

COMMUNICATION, NAVIGATION, AND PENETRATION AIDS



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APO AE		86 AGS	4
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Hill AFB	UT	388 AGS	4
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Homestead AFB	FL	307 FS/MA	3
Homestead AFB	FL	308 FS/MA	3
Homestead AFB	FL	309 FS/MA	3
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Lowry AFB	CO	3450 TCHTS/TTOT/TTMYF	1/6
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Luke AFB	AZ	310 FS/MAAAC	3
Luke AFB	AZ	311 FS/MAABC	3
Luke AFB	AZ	314 FS/MAADC	3
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MacDill AFB	FL	56 TTW/MA	1
MacDill AFB	FL	56 AGS	4
Nellis AFB	NV	37 TFW/MA	1
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Nellis AFB	NV	57 FWW/MA	1
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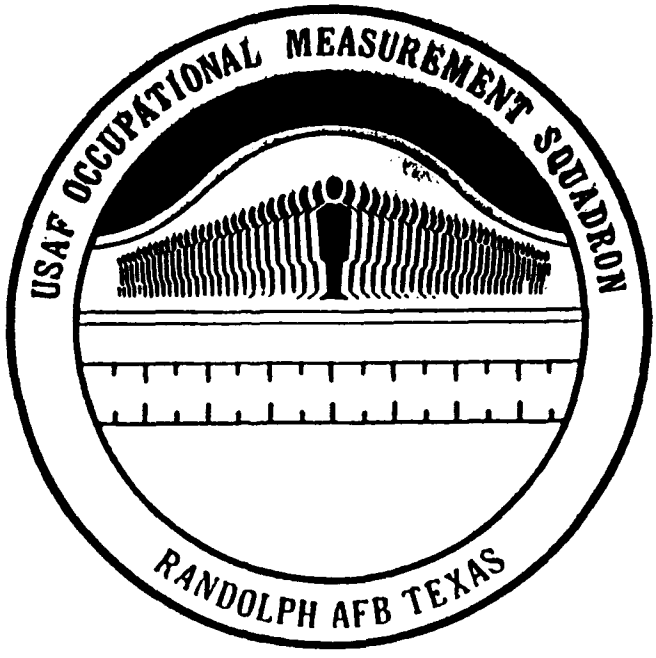
A SPECIAL THANKS TO THE MANY HARD-WORKING F-16 AVIONICS SYSTEMS PERSONNEL AND SUPERVISORS FOR THEIR EXPERTISE AND OUTSTANDING SUPPORT ON THIS PROJECT.



F-16 AVIONICS SYSTEMS SPECIALIST/TECHNICIAN (AFSC 452X2)

TRAINING REQUIREMENTS ANALYSIS

PREPARED BY

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PREFACE

The United States Air Force Occupational Measurement Squadron (USAFOMS), Occupational Analysis Flight (OMY), is assigned primary responsibility for developing occupational survey reports (OSRs) and training requirements analyses (TRAs) for Air Force specialties. OSRs summarize the results of occupational surveys and identify the structure of the career ladder in terms of jobs performed. TRAs identify the activity, skill, and knowledge requirements needed to perform those jobs, as well as specific training needs for each specialty. Together, OSRs and TRAs provide a basis for revision or development of specialty training standards (STSs), course training standards (CTSs), initial skills training, on-the-job training (OJT), and career development courses (CDCs). TRAs fulfill most requirements of steps 1 and 2 of the Instructional System Development (ISD) model prescribed in AFR 50-8, Policy and Guidance for Instructional System Development (ISD).

The Air Training Command Training Staff Officer (HQ ATC/TTOA) requested this TRA, in conjunction with an OSR, to provide task analysis data for use in updating initial skills and follow-on courses for the 452X2 career ladder. Copies of this report are available to Air Staff sections, MAJCOMs, the OJT community, and other interested training and management officials upon request. Address requests to USAFOMS/OMY, Randolph AFB TX 78150-5000 or 3400 TSS/OMS, Lowry AFB CO 80230-5000.

This volume consists of three sections: Specialty Overview, TRA Development Procedures, and Results. In addition, the task analysis volume contains a detailed examination of all AFSC 452X2 specialty-unique tasks.

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EXECUTIVE SUMMARY

Purpose

The purpose of this training requirements analysis (TRA) is to assist in determining training requirements for F-16 Avionics Systems personnel in light of recent RIVET WORKFORCE (RWF) restructuring efforts. The information may be used to evaluate the adequacy, feasibility, and efficiency of the training provided within this rapidly changing specialty.

Procedures

Data for this TRA were gathered by means of field interviews with F-16 Avionics Systems personnel. The TRA task list was extracted from the March 1989 452X2 USAF Job Inventory (JI). A total of 21 subject-matter experts (SMEs) at 2 TAC bases and 1 ATC base were interviewed to gather task data and other training decision data. In addition, system overview information was gathered from HQ USAF, the TAC functional manager, and members of Lowry Technical Training Center (LTTC).

Results

The analysis of collected data resulted in both general and specific training recommendations. These recommendations are designed to create the best possible training environment, given realistic constraints in the areas of manpower and resources. The general recommendations are:

1. Consider the common skill and knowledge requirements identified in the task analysis when designing or revising training. Training should emphasize the similarities within and across the AFSC shreds. This approach may help graduates understand the broader applicability of their skills and knowledge.

2. Evaluate the need to increase emphasis on using TOs in resident training. Analysis reveals the ability to apply information contained in TOs is critical to job performance. Since all job requirements are TO driven, successful task accomplishment depends on how well technicians can locate, cross-reference, and apply the information.

3. Consider restructuring the F-16 Avionics Systems initial skills courses to shift emphasis from "performing operational checkouts" to "isolating basic malfunctions" by following procedures in technical data.

4. Consider using career development courses (CDCs) to cover the knowledge requirements that differ among aircraft systems for 5-skill-level upgrade. Because of the experience gained by this point in an airman's career, CDCs can cover system differences.

Specific training recommendations are presented in STS format in Appendix C. They include numerous proposals for content and proficiency code changes, which indicate what to train, where to train, and to what level. For correlation purposes, TRA tasks are cross-referenced with applicable STS items. These specific training recommendations can assist training managers and curriculum developers in revising the STS at the next utilization and training workshop (U&TW).

SPECIALTY OVERVIEW

Background

The 452X2 specialty was created on 1 May 1987 as a result of RWF restructures. Prior to May 1987, the career field was structured as follows:

326X6C - Integrated Avionics Attack Control Systems Specialty
326X7C - Integrated Avionics Instrument and Flight Control Specialty
326X8C - Integrated Avionics Communications, Navigation, and Penetration Aids Specialty

The AFSCs were shredded by aircraft through the 5-skill level and merged at the 7-skill level. For example, F-16 "A shop" 7-skill-level personnel were also responsible for "A shop" duties on the F-15s and F-111s, as well.

After RWF initiatives, the AFSC structure is as follows:

452X2A - Integrated Avionics Attack Control Systems Specialty
452X2B - Integrated Avionics Instrument and Flight Control Specialty
452X2C - Integrated Avionics Communications, Navigation, and Penetration Aids Specialty

The AFSC is still shredded through the 5-skill level, but at the 7-skill level, personnel assume the responsibilities of all shreds only on the F-16.

The RWF restructuring initiatives caused numerous changes in the duties and responsibilities of F-16 Avionics personnel. Changes in training requirements for resident, CDC, and OJT programs have also occurred.

Mission Description

F-16 Avionics Systems personnel perform a variety of tasks based upon the missions of their major command. They identify and analyze malfunctions. They remove, install, align, calibrate, boresight, and operationally check avionics systems at the organizational level. Personnel also inspect, service, and perform general aircraft-handling procedures. Finally, they are responsible for maintaining inspection and maintenance records.

Manning

As of 31 May 1991, the F-16 Avionics Systems specialty had 1,672 personnel authorized and 1,595 assigned. Table 1 contains data on the number authorized versus the number assigned by shred.

TABLE 1
AFSC 452X2 MANNING

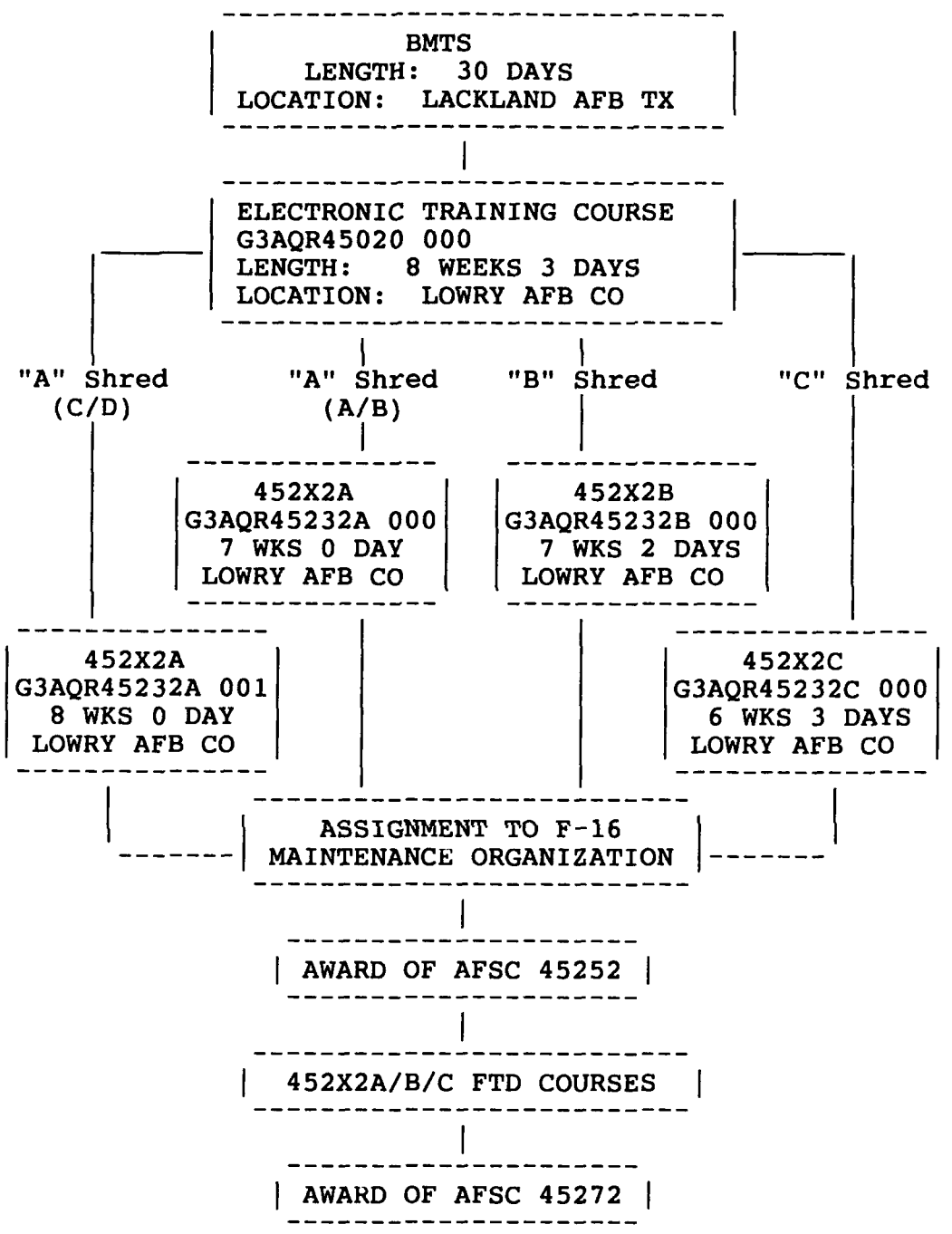
AFSC	45272	452X2A	452X2B	452X2C	TOTAL
AUTHORIZED	375	468	399	430	1672
ASSIGNED	395	472	351	377	1595
PERCENTAGE	105%	101%	88%	88%	95%

The manning situation is not stable. According to HQ TAC/LGMF, the cuts projected by RWF restructuring efforts have not yet been made. Part of the agreement under RWF was to make no reductions until completion of the 3-year transition period. Since the transition period was completed in October 1990, manning levels are being reevaluated, and additional cuts are anticipated. It is unknown at this time whether the anticipated cuts will be sufficient to meet overall Air Force manning requirements. Since every unit visited during TRA development felt "undermanned," these future cuts emphasize the need for effective training.

Training Currently Available

Formal courses for AFSC 452X2 are currently offered by the 3450th Technical Training Squadron, Lowry AFB CO, and 3751st Field Training Squadron, Sheppard AFB TX. A complete description of course prerequisites and content can be found in AFR 50-5, USAF Formal Schools.

All enlisted personnel assigned to the F-16 Avionics Systems Specialty must attend and complete the Electronic Training Course after graduation from Basic Military Training School (BMTS). The next step is the appropriate F-16 Avionics Systems Course for award of the AFSC (with shred). Once personnel obtain a 7-skill level, the shred is dropped. Completion of Field Training Detachment (FTD) courses is mandatory for award of AFSC 45272. The following illustration describes AFSC 452X2 training from BMTS to the 7-skill level.



Specialty Concerns

This section provides a summary of specialty concerns identified during task analysis. These concerns were consolidated during months of interviews with technicians at all levels. A few of these concerns are also addressed indirectly in the Results section.

1. Loss of expertise. Personnel feel the RWF initiatives are having a negative impact upon morale and job satisfaction. The most common complaint is that technicians are required to work on too many different systems and cannot become proficient on all.

2. CDC requirements. The volume of material required for upgrade training is too great. Material in the AFSC 45250 volume seems beyond the scope of current job requirements. Because the CDCs are written primarily for 5-skill-level upgrade, a technician in 7-skill-level upgrade training is forced to repeat a lot of material gained from job experience. In addition, each shredded volume of the CDCs contains duplicated material from other shreds.

3. Electronic Fundamentals. The majority of technicians interviewed felt the amount and depth of electronic fundamentals taught in basic courses and CDCs are not required for job accomplishment. There is a need for electronic fundamentals, but not to the degree currently being provided.

4. FTD. Many people feel with the advent of Interactive Video Disks (IVD), FTD courses could be revised, reduced, or eliminated.

5. Maintenance Trainers. Several technicians felt the maintenance trainers used to teach aircraft system troubleshooting should be upgraded to allow more flexibility with scenarios.

Advanced Technology Training Delivery (ATTD) Systems

During the initiation of the 452X2 TRA, the TSO asked USAFOMS to analyze the possibility of satisfying training with some form of ATTD such as IVD or computer-based training. HQ ATC/TTOA was specifically interested in determining if a job requirement coded "2b" (partially proficient on step-by-step procedures) could be satisfied with media other than face-to-face and hands-on instruction.

Because there is currently no validated training delivery system employing ATTD in ATC for the 45XXX career field, it was not possible to do a systematic analysis. A previous "4-skill-level" study in the 451XX arena showed graduates who used trainers were more proficient upon completion of initial skills training and required less time for 5-skill-level upgrade than the graduates that did not use trainers. In addition, the "Manager's Guide to New Training Technologies," published in August 1989, showed all ATTD systems have greater potential than conventional training for characteristics such as interactivity, standardization of instruction, and fewer instructor requirements. Other benefits of ATTD include greater range of instructional strategies, long-term reduced costs, and increased reliability.

Having looked at several applications of IVD for weapons systems, there is no reason why IVD or another form of ATTD cannot be used to teach certain job requirements. Good job candidates to use for implementing an ATTD system are the troubleshooting tasks, because the branching or logic process used during troubleshooting is well suited to ATTD systems.

A major problem facing resident training is the inability to insert malfunctions in equipment, because this practice often involves "breaking" operational equipment. This restriction makes the use of operational equipment to teach troubleshooting virtually impossible. ATTD systems can fill the gap. It can give graduates an increased understanding of troubleshooting logic and better prepare them to tackle troubleshooting situations in an OJT environment. Although using this approach is not the same as troubleshooting on an actual aircraft, the multitude of scenarios and level of difficulty that can be achieved far exceed the current training capabilities.

Future Plans

In October 1991, Phase II FTD training was consolidated with Phase I training at Lowry AFB. In addition to this major change, technological innovations such as updates and modifications are constantly occurring, but the job requirements of AFSC 452X2 are not impacted. The only program expected to impact this specialty involves the implementation of Deployed Aircraft Repair Techniques (DART). Under DART, a technician will be responsible for certain aspects of line replaceable unit (LRU) repair when avionics intermediate repair is not available. The amount and extent of repair to be accomplished is uncertain at this time. With an increase in job requirements, the amount of electronic fundamentals required may increase. The increasing demands on job performance will require innovation, flexibility, and above all, quality in all areas of training design and delivery.

TRA DEVELOPMENT PROCEDURES

Planning

Training analysts from 3400 TSS/OMS formed the project team for this TRA. Work began with a thorough review of the specialty documentation, including duties in AFR 39-1, the existing STS, course descriptions in AFR 50-5, resident course documents, and CDCs. The analysts interviewed functional managers, shop chiefs, and course management personnel for help in determining bases to visit and existing training issues. This information gave the team a solid foundation for planning the project.

TRA Task List Development

Analysis of any specialty starts with a task list which describes each separate work function performed by technicians in the career ladder. The March 1989 452X2 USAF Job Inventory (JI) was used as the starting point for development of the TRA Task List. Supervisory, additional duty, and nonspecialty-specific tasks were removed, and the remaining JI statements were clustered into TRA tasks to be analyzed. During interviews with SMEs, many of these tasks were deleted or revised, and several tasks were added to better define duties performed. This process resulted in 147 TRA tasks; 44 for the "A" shred, 56 for the "B" shred, 39 for the "C" shred, and 8 tasks common to all shreds.

Data Collection

Interviews were conducted with well-qualified SMEs selected by branch and shop chiefs at Luke and Nellis AFBs, and LTTC. The interviews matched qualified personnel with the tasks identified for analysis. The support provided by MAJCOM representatives was essential to the success of task analysis.

The task-level information provided by SMEs formed the basis of the TRA descriptive data base. SME interviews continued until project analysts received consistently duplicate information. Although the number of SMEs needed to analyze a task varied, careful SME selection for interview, followed by validation with SMEs assigned to different MAJCOMs and weapons systems, helped assure a thorough, reliable data base.

The data were recorded on task analysis worksheets (TAWs). The following is an explanation of the TAW headings.

TASK NUMBER: TRA task number.

TASK STATEMENT: The task to be performed.

TASK NOTES: Contains brief comments or explanations to enhance understanding of the task statement.

EQUIPMENT, TOOLS, SUPPLIES: Equipment, tools, supplies, etc., required to perform the task.

REFERENCES: Lists the TOs, AFOSH Standards, Regulations, and any other references required to perform the task.

CONDITIONS: Environment in which a task is performed. Includes consideration of the actual physical environment. A condition for all tasks is "On the flightline." If no condition is listed, it is understood that this is the only condition for that task.

CUES: Actions or directives that initiate, signal, or prompt the performance of the task.

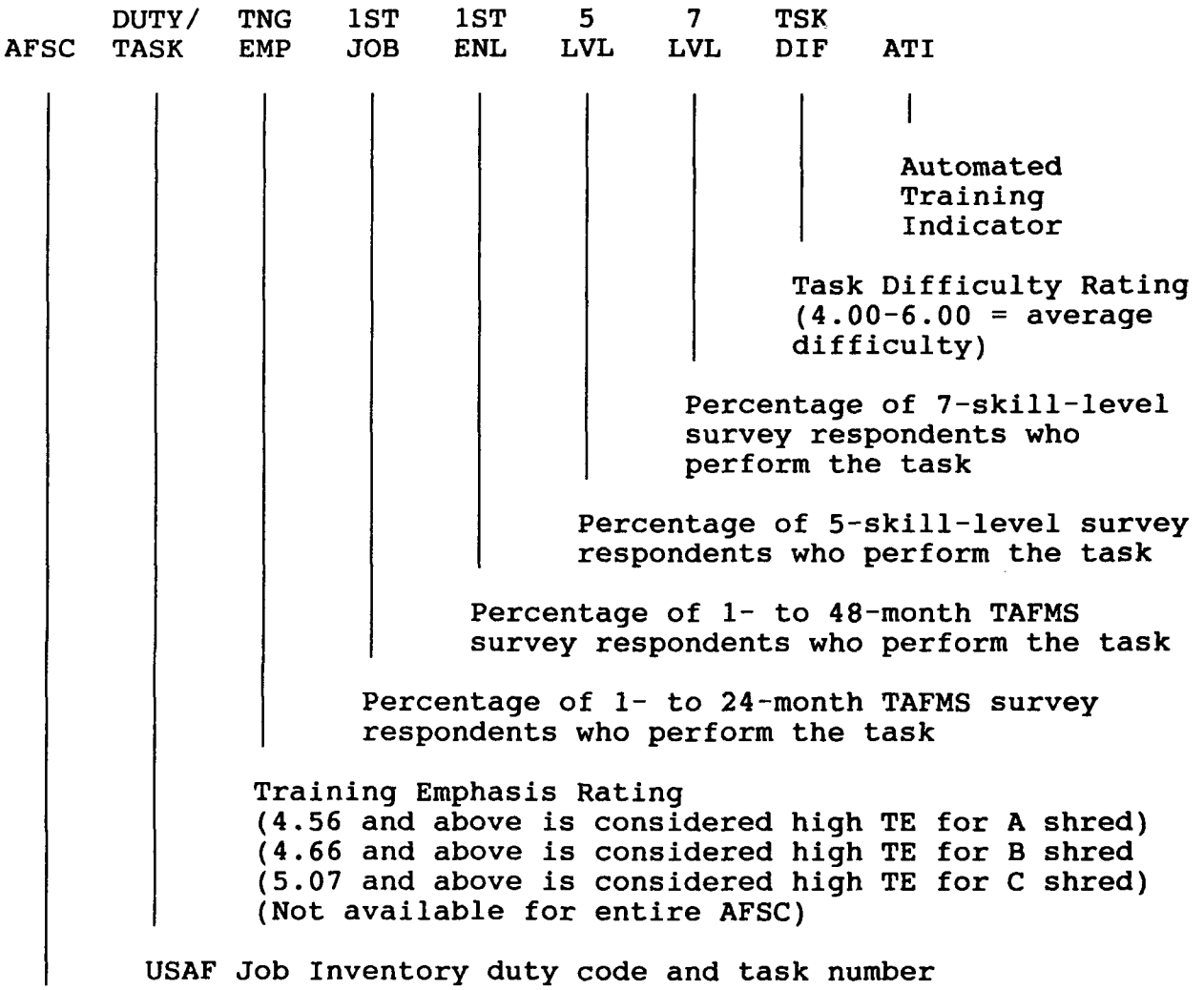
STANDARDS: Specifies the job performance evaluation standards for performing the task accurately and expediently.

ACTIVITIES: Significant steps required to perform the task.

SKILLS: Skills involve physical or manipulative activities often requiring knowledge and special requirements for speed, accuracy, or coordination for task execution.

KNOWLEDGE: Knowledge, not directly observable, involves the use of mental processes enabling recall of facts, identification of concepts, application of rules or principles, solving of problems, or creative thinking, etc.

RELATED OCCUPATIONAL SURVEY DATA: Occupational survey data are used with the Training Decisions Logic Table (ATCR 52-22, Occupational Analysis Progam, Attachment 1) to determine where tasks should be trained and to what level. The following explains the data columns listed within this report.



USAF JOB INVENTORY TASK STATEMENTS: A listing of job inventory statements applicable to the task. Some job inventory tasks are related to TRA tasks, but they cannot be classified as activity, skill, or knowledge behaviors. These are normally equipment-specific statements and are included because they will provide additional information about the task.

RESULTS

This section consists of common skills and knowledge, general recommendations for specialty training, and specific training content recommendations. The recommendations are designed to create the best possible training environment, given realistic constraints in the areas of manpower and resources. The priority and feasibility for implementation of the recommendations will be determined by Air Staff, MAJCOM, and the F-16 Avionics Systems School personnel.

Common Skills and Knowledge

Once the task data were collected from SMEs, they were analyzed by USAFOMS training analysts. Skills and knowledge required to perform each of the tasks were identified. A complete listing of these skill and knowledge requirements is presented in Volume II of this TRA in the form of task analysis worksheets.

After identification of the skills and knowledge required to perform each task was completed, training analysts then compared the requirements across the AFSC shreds. This comparison showed the number of times a skill or knowledge was required for each shred (see Appendix A).

All skill and knowledge requirements were then grouped into five categories: 1) those which apply to all functions; 2) those which apply to performing operational checkouts; 3) those which apply to isolating malfunctions; 4) those which apply to repair of systems; and 5) those which apply to maintaining systems. From this list, the common skill and knowledge requirements were identified. For an item to have been considered common, it had to appear in 10 perce or more of the tasks within one of the five major areas. Appendix B lists all the common skill and knowledge requirements identified in this manner.

General Training Recommendations

1. Consider the common skill and knowledge requirements identified in the task analysis when designing or revising training.

Training should enable personnel to transfer what they know about one piece of equipment to the next. Analysis results indicate areas of commonality in the skill and knowledge requirements within and across the AFSC shreds. Training could emphasize these commonalitie by teaching technicians how to perform operational checkouts, troubleshoot malfunctions, and make repairs independent of specific systems. Although training must be conducted using specific systems, it should be approached in a manner that points out the broader applicability of their skills and knowledge.

2. Evaluate the need to increase emphasis on using TOs in resident training.

Analysis shows that the ability to apply TO information is critical to job performance. Since all job requirements are TO driven, successful completion depends upon how well a technician can locate, cross-reference, and apply the information. Although the types of TOs and their uses are covered in current courses, analysis has shown that graduates could benefit substantially from an increase in "hands-on" TO usage. This will not be an easy job, since this will require increased course time and larger TO libraries. Suggestions for improving the "hands-on" time include having students find the actual TOs they will need, making students research TOs to solve problems, and eliminating the use of extracts. No matter how TO usage is approached, this knowledge should be reinforced throughout the course.

3. Consider restructuring the F-16 Avionics Systems courses to shift training emphasis from "performing operational checkouts" to "isolating basic malfunctions."

Although aircraft systems may differ in their function and operational characteristics, analysis results have proven that the steps a technician must take to operationally test a system are virtually the same. The systems and test equipment involved may vary, but the same skills and knowledge are required for each one. Operational checkout is considered by technicians to be the "easy" task of this specialty, and training time could be reduced considerably. The more difficult task is troubleshooting. The ability to determine the cause of a malfunction is the most valuable skill technicians need to master. Troubleshooting, however, has distinct levels. One level involves following the procedures outlined in technical data to find the problem or at least narrow it to several alternatives. A more difficult level is encountered when the technical data incorrectly identify or fail to identify the cause of the problem. At this point, technicians must be extremely skilled in troubleshooting techniques to isolate the problem. Although these in-depth procedures should not be taught to 3-skill-level personnel, there is a definite need to teach basic troubleshooting to apprentices. They need experience in finding malfunctions through automated testing. They also need to understand why the TO procedures are not always effective. The earlier personnel learn the essential logic of troubleshooting, the more productive they are going to be. Going beyond this understanding and actually finding the cause of the malfunction should be reserved for advanced skill levels. The more sophisticated application of troubleshooting requires a greater experience base than an apprentice can be expected to achieve.

4. Consider using CDCs to cover the knowledge requirements that differ among aircraft systems for 5-skill-level upgrade.

Because of the experience being gained during upgrade training to the 5-skill level, CDCs can cover the material, such as theory of operation and differences in characteristics among various aircraft

systems. Teaching this detailed knowledge in an initial skills course is unnecessary, since it will not be required until advanced skill levels. The areas recommended for inclusion are annotated as specific training recommendations in the CDC column of the STS.

Specific Training Recommendations

Specific training recommendations are provided in the form of recommended STS changes (Appendix C). These recommended changes are based primarily on the task analysis data, guidelines set forth in AFR 8-13, Air Force Specialty Training Standards and Air Force Job Qualification Standards, and ATCR 52-22, Occupational Analysis Program.

APPENDIX A
COMPARISON OF SKILL AND KNOWLEDGE REQUIREMENTS

Listed below are all the skill and knowledge requirements for all shreds. The numbers shown under each column are the number of times that skill or knowledge appeared in the task analysis for that shred.

A	B	C		SKILLS
31	22	17	S	APPLY EXTERNAL COOLING AIR TO THE AIRCRAFT
22	24	26	S	APPLY EXTERNAL ELECTRICAL POWER TO THE AIRCRAFT
11	20	10	S	APPLY EXTERNAL HYDRAULIC POWER TO THE AIRCRAFT
15	15	11	S	INSPECT AIRCRAFT WIRING
2	-	-	S	INSTALL DTC
1	-	-	S	INSTALL VIDEO TAPE CARTRIDGE
12	15	11	S	ISOLATE AIRCRAFT WIRING MALFUNCTIONS
2	1	-	S	LOAD COMPUTER PROGRAMS
2	-	-	S	OPERATE TV MONITOR
2	-	-	S	OPERATE VCR
33	42	29	S	PERFORM AIRCRAFT SAFE FOR MAINTENANCE CHECKS
3	-	-	S	SET UP BORESIGHT EQUIPMENT
11	14	12	S	USE AIR COMPRESSOR
-	1	-	S	USE CAPACITANCE TEST SET
-	-	2	S	USE CHAFF/FLARE TEST SET
26	33	24	S	USE COMMON HANDTOOLS
-	1	-	S	USE CSFDR TESTER
1	-	-	S	USE DATA TRANSFER CARTRIDGE READER
1	-	-	S	USE DEEU ADAPTER KIT
-	-	2	S	USE DTE
11	14	12	S	USE ELECTRICAL CONNECTOR/AIRCRAFT WIRING REPAIR TOOL KIT
1	-	-	S	USE FCC INTERFACE ADAPTER KIT
-	3	-	S	USE FLIGHT CONTROL SELF-TESTER/WORD READER
-	1	-	S	USE FUEL QUANTITY TEST SET
1	-	-	S	USE HANDLING FIXTURE
-	-	6	S	USE HEAD SET
11	14	12	S	USE HEAT GUN
-	-	2	S	USE IFF TEST SET
-	-	2	S	USE ILS TEST SET
2	15	8	S	USE INTERCOM
-	-	2	S	USE KIK
2	-	-	S	USE MAINTENANCE PLATFORM
1	-	-	S	USE MFD ADAPTER KIT
5	2	1	S	USE MLV
5	2	1	S	USE MLV I/O ACCESSORY KIT
11	23	10	S	USE MULTIMETER
11	14	12	S	USE NF-2
-	-	2	S	USE O-BAND TEST SET
1	-	-	S	USE PRESSURIZATION TEST SET
-	-	2	S	USE RADAR SIGNAL SIMULATOR TEST SET
11	14	10	S	USE REFLECTOMETER
1	-	-	S	USE REO ADAPTER KIT
11	14	14	S	USE RF TRANSMISSION LINE TEST SET
11	14	12	S	USE SOLDERING KIT

A	B	C		SKILLS
-	-	2	S	USE TACAN TEST SET
-	7	-	S	USE TTU-205 ADAPTER KIT
-	7	-	S	USE TTU-205 TESTER
-	-	2	S	USE WATTMETER

A	B	C		KNOWLEDGE
1	-	-	K	ANALYZE AIRCREW VIDEO TAPE
12	14	10	K	APPLY AC CIRCUIT THEORY OF OPERATION
3	-	-	K	APPLY ANTENNA THEORY OF OPERATION
2	-	-	K	APPLY BASIC MATH PRINCIPLES
1	-	-	K	APPLY CONTINUOUS WAVE RECEIVER THEORY OF OPERATION
1	-	-	K	APPLY CONTINUOUS WAVE TRANSMITTER THEORY OF OPERATIO
1	-	-	K	APPLY CRT THEORY OF OPERATION
12	14	10	K	APPLY DC CIRCUIT THEORY OF OPERATION
11	-	-	K	APPLY ESD PRECAUTIONS
11	14	10	K	APPLY FLIGHTLINE SAFETY PROCEDURES
11	14	10	K	APPLY OPSEC, COMSEC, AND PHYSICAL SECURITY PRECAUTIO
1	-	-	K	APPLY PHOTOSENSITIVE DEVICE THEORY OF OPERATION
3	1	-	K	APPLY RELAY THEORY OF OPERATION
-	1	-	K	APPLY RESISTOR THEORY OF OPERATION
-	6	-	K	APPLY SYNCHRO-SERVO THEORY OF OPERATION
12	15	9	K	APPLY SYSTEM THEORY OF OPERATION
52	64	47	K	APPLY TECHNICAL DATA
3	-	-	K	APPLY THREE-PHASE TRANSFORMER THEORY OF OPERATION
-	1	-	K	APPLY TRANSDUCER THEORY OF OPERATION
-	1	-	K	APPLY TRANSFORMER THEORY OF OPERATION
5	-	-	K	APPLY TRANSMISSION LINE THEORY OF OPERATION
1	-	-	K	APPLY WAVEGUIDE THEORY OF OPERATION
11	14	10	K	IDENTIFY CHAFFING CHARACTERISTICS
11	14	10	K	ISOLATE FAULTY AC CIRCUITS
3	-	-	K	ISOLATE FAULTY ANTENNAS
1	-	-	K	ISOLATE FAULTY CRTs
11	14	10	K	ISOLATE FAULTY DC CIRCUITS
1	-	-	K	ISOLATE FAULTY PHOTOSENSITIVE DEVICES
1	-	-	K	ISOLATE FAULTY RCL CIRCUITS
3	1	-	K	ISOLATE FAULTY RELAYS
3	-	-	K	ISOLATE FAULTY THREE-PHASE TRANSFORMERS
-	1	-	K	ISOLATE FAULTY TRANSDUCERS
-	1	-	K	ISOLATE FAULTY TRANSFORMERS
5	-	-	K	ISOLATE FAULTY TRANSMISSION LINES
1	-	-	K	ISOLATE FAULTY WAVEGUIDES
12	14	10	K	TROUBLESHOOT AC CIRCUITS
12	14	10	K	TROUBLESHOOT DC CIRCUITS
-	1	-	K	TROUBLESHOOT RELAYS
-	1	-	K	TROUBLESHOOT TRANSDUCERS
-	1	-	K	TROUBLESHOOT TRANSFORMERS

APPENDIX B
COMMON SKILL AND KNOWLEDGE REQUIREMENTS

All of the following skill and knowledge requirements are grouped into one of the five major areas and meet the established cutoff for commonality of 10 percent. The actual number of times the requirement was listed is the total of all shreds. These numbers correspond with the totals in Appendix A.

KNOWLEDGE APPLICABLE TO ALL TASKS	# OF TIMES
K APPLY TECHNICAL DATA	163
K APPLY FLIGHTLINE SAFETY PROCEDURES	35

KNOWLEDGE FOR ISOLATING MALFUNCTIONS	# OF TIMES
K APPLY AC CIRCUIT THEORY OF OPERATION	36
K APPLY DC CIRCUIT THEORY OF OPERATION	36
K APPLY SYSTEM THEORY OF OPERATION	36
K TROUBLESHOOT AC CIRCUITS	36
K TROUBLESHOOT DC CIRCUITS	36
K IDENTIFY CHAFFING CHARACTERISTICS	35
K ISOLATE FAULTY AC CIRCUITS	35
K ISOLATE FAULTY DC CIRCUITS	35
K APPLY SYNCHRO-SERVO THEORY OF OPERATION	6
K APPLY TRANSMISSION LINE THEORY OF OPERATION	5
K ISOLATE FAULTY TRANSMISSION LINES	5
K APPLY RELAY THEORY OF OPERATION	4
K ISOLATE FAULTY RELAYS	4
K APPLY ANTENNA THEORY OF OPERATION	3
K APPLY THREE-PHASE TRANSFORMER THEORY OF OPERATION	3
K ISOLATE FAULTY ANTENNAS	3
K ISOLATE FAULTY THREE-PHASE TRANSFORMERS	3

KNOWLEDGE FOR MAINTAIN	# OF TIMES
K APPLY OPSEC, COMSEC, AND PHYSICAL SECURITY PRECAUTIONS	35

KNOWLEDGE FOR REPAIR	# OF TIMES
K APPLY ESD PRECAUTIONS	11

SKILLS APPLICABLE TO ALL TASKS		# OF TIMES
S	PERFORM AIRCRAFT SAFE FOR MAINTENANCE CHECKS	104
S	USE COMMON HANDTOOLS	83
S	APPLY EXTERNAL ELECTRICAL POWER TO THE AIRCRAFT	72
S	APPLY EXTERNAL COOLING AIR TO THE AIRCRAFT	70
S	USE MULTIMETER	44
S	APPLY EXTERNAL HYDRAULIC POWER TO THE AIRCRAFT	41
S	INSPECT AIRCRAFT WIRING	41
S	USE RF TRANSMISSION LINE TEST SET	39
S	USE INTERCOM	25

SKILLS FOR ISOLATING MALFUNCTIONS		# OF TIMES
S	ISOLATE AIRCRAFT WIRING MALFUNCTIONS	38

SKILLS FOR REPAIR		# OF TIMES
S	USE AIR COMPRESSOR	37
S	USE ELECTRICAL CONNECTOR/AIRCRAFT WIRING REPAIR TOOL KIT	37
S	USE HEAT GUN	37
S	USE NF-2	37
S	USE SOLDERING KIT	37
S	USE REFLECTOMETER	35
S	LOAD COMPUTER PROGRAMS	3

APPENDIX C
SPECIFIC TRAINING RECOMMENDATIONS

Many of the recommended changes are proficiency code changes. There are three major reasons these codes were changed. The first reason deals with current guidance provided in AFR 8-13, Air Force Specialty Training Standards and Air Force Job Qualification Standards. AFR 8-13 states that a CDC requirement can exist only when there is an upgrade requirement (e.g., from "A" to "B" or a "2b" to "B") or a need to review material to support an upgrade requirement. As a result, many CDC requirements were changed or eliminated entirely. Several STS elements were also changed to align with recommended entries outlined in the same regulation. All changes made as a result of guidance in AFR 8-13 are marked by a single asterisk (*).

The second major reason for proficiency code changes results from the need to reflect STS elements that do not depend on psychomotor skills as subject knowledge. This means that numerous items previously coded as tasks (2b) or task knowledge (b) have been changed to subject knowledge (B). Also, elements that fall into this category, but were previously dashed (-), have been coded as subject knowledge. Many of these items may have performance skills inherent in their accomplishment, but the final result is concerned strictly with cognitive application. The completed analysis supports coding these items as subject knowledge. Such changes in the specific recommendations are identified with double asterisks (**).

The last major reason the proficiency codes were changed is the need to code representative systems. Proficiency codes may have been added or deleted to allow the recommended representative system to be identified. These changes are marked with triple asterisks (***). This code is also used to show the inclusion of "theory of operation" in the CDC.

Additional changes to the STS are recommended for standardization. These include rewording elements and reformatting paragraphs to make them standard throughout the STS. These changes are identified with triple dollar signs ($$$).

All remaining changes are identified using triple plus signs (+++). The specific reasons for each of these changes are explained in the Summary of Proposed Changes which follows the specific training recommendations.

The format for the specific recommendations is based on the current STS, but only the recommended changes are included. Because recommendations have been made for the 3-skill-level course and a 5-skill-level CDC only, the other columns usually seen in an STS have been deleted. A column has been added to cross-reference STS elements with TRA tasks. For ease of understanding, only the coded STS elements have been referenced to specific TRA task(s). Several TRA TASK references are too lengthy to include in the body of the STS and are provided as notes following the STS.

These recommendations were developed with assistance from the 3450th Technical Training Squadron.

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
3.	AF OCCUPATIONAL SAFETY AND HEALTH (AFOSH) PROGRAM			
* a.	Hazards of AFSC 452XX		A	B
* b.	AFOSH standards for AFSC 452XX		A	B
* d.	Hazards of RF energy		A	B
+++ f.	Use safety practices when working with or in the vicinity of:		-	-
	(1) Compressed gases		2b	B
	(2) RF sources		2b	B
	(3) Electrical power		2b	B
	(4) Hydraulic power		2b	B
	(5) Hazardous liquids		2b	B
	(6) Portable fire extinguishers		2b	B
	(7) High intensity sound		2b	B
* h.	Hydrazine hazards		A	B
4.	TECHNICAL PUBLICATIONS			
a.	Function and application		A	B
** b.	Use technical order indexes		B	-
c.	Use technical orders to perform			
** (1)	Maintenance		B	-
** (2)	Inspections		B	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
5.	SUPPLY DISCIPLINE			
* a.	Property accountability and responsibility		A	B
** c.	Use condition tags		B	-
8.	MAINTENANCE MANAGEMENT			
* b.	Processing and controlling materiel		A	B
9.	MAINTENANCE, INSPECTION SYSTEMS AND FORMS			
* a.	Levels of maintenance		A	B
* b.	Inspection systems		-	-
10.	GENERAL AIRCRAFT TASKS			
a.	Aircraft General			
(3)	Aircraft communication equipment			
+++ (b)	Use interphone		2b	-
j.	Aircraft Support Equipment			
(3)	Portable hyd test stand			
** (a)	Perform pre-use inspection		B	-
+++ (b)	Use		2b	-
(4)	Air conditioning units			
** (a)	Perform pre-use inspection		B	-
+++ (b)	Use		2b	-
(5)	Gas turbine compressors (-60A)			
** (a)	Perform pre-use inspection		B	-
+++ (b)	Use		2b	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
10.	GENERAL AIRCRAFT TASKS (continued)			
	+++ (10) Air compressors			
	(a) Perform pre-use inspection		B	-
	(b) Use		2b	-
	+++ (11) Portable lighting equipment			
	(a) Perform pre-use inspection		B	-
	(b) Use		2b	-
12.	FUNDAMENTALS OF AVIONICS SYSTEMS MAINTENANCE			
	* a. Aircraft familiarization			
	(1) Major structural areas		A	B
	(2) Major systems		A	B
	(3) Danger areas		A	B
	* d. Corrosion control		A	B
	j. Chafing		-	-
	* (1) Definition		A	B
	* (2) Causes		A	B
***17.	FIRE CONTROL COMPUTER (FCC), F-16 A/B AIRCRAFT			
	* a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
	c. Perform operational checkout		-	-
	d. Isolate malfunctions		-	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
***18.	INERTIAL NAVIGATION SYSTEM (INS) AND INDICATORS, F-16 A/B AIRCRAFT			
*	a. Theory of operation		A	B
*	b. Trace signal/data flow		B	-
**	d. Isolate malfunctions		B	-
	e. Remove system LRU(s)		2b	-
	f. Install system LRU(s)		2b	-
***19.	STORES MANAGEMENT SYSTEMS (SMS), F-16 A/B AIRCRAFT			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
***20.	FIRE CONTROL RADAR (FCR), F-16 A/B AIRCRAFT			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
	c. Perform operational checkout and BIT		-	-
	d. Isolate malfunctions		-	-
	e. Remove system LRU(s)		-	-
	f. Install system LRU(s)		-	-
***21.	RADAR ELECTRO-OPTICAL (REO) DISPLAY System F-16 A/B AIRCRAFT			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
	c. Perform operational checkout and BIT		-	-
	d. Isolate malfunctions		-	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
***22.	HEAD UP DISPLAY (HUD) SYSTEM, F-16 A/B AIRCRAFT			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
	c. Perform operational checkout and BIT		-	-
	d. Isolate malfunctions		-	-
***25.	FIRE CONTROL INTEGRATION			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
	c. Perform integrated system checkout		-	-
	d. Isolate malfunction to subsystem		-	-
***27.	ENHANCED FIRE CONTROL COMPUTER (EFCC), F-16 C/D AIRCRAFT			
*	a. Theory of operation	20020	A	B
*	b. Trace signal/data flow	20020	B	-
**	d. Isolate malfunctions	20020	B	-
	e. Remove system LRU(s)	20030	2b	-
	f. Install system LRU(s)	20030	2b	-
***28.	STANDARD INERTIAL NAVIGATION SYSTEM (SINS) AND INDICATORS, F-16C/D AIRCRAFT			
*	a. Theory of operation	20060	A	B
*	b. Trace signal/data flow	20060	B	-
**	d. Isolate malfunctions	20060	B	-
	e. Remove system LRU(s)	20070	2b	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
28.	STANDARD INERTIAL NAVIGATION SYSTEM (SINS) AND INDICATORS (continued)			
	f. Install system LRU(s)	20070	2b	-
***29.	ADVANCED STORES MANAGEMENT SYSTEM (ASMS), F-16C/D AIRCRAFT			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
***30.	FIRE CONTROL RADAR (FCR), F-16C/D AIRCRAFT F-16C/D AIRCRAFT			
*	a. Theory of operation	20100	A	B
*	b. Trace signal/data flow	20100	B	-
**	d. Isolate malfunctions	20100	B	-
	e. Remove system LRU(s)	20110	2b	-
	f. Install system LRU(s)	20110	2b	-
***31.	WIDE ANGLE CONVENTIONAL HEAD UP DISPLAY (HUD) SYSTEM, F-16 C/D AIRCRAFT			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
	c. Perform operational checkout and BIT		-	-
	d. Isolate malfunctions		-	-
***32.	UPFRONT CONTROL SYSTEM (UFC), F-16C/D AIRCRAFT			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
	c. Perform operational checkout and BIT		-	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
32.	UPFRONT CONTROL SYSTEM (UFC) (continued)			
	d. Isolate malfunctions		-	-
***33.	MULTI-FUNCTION DISPLAY SET (MFDS), F-16C/D AIRCRAFT			
	* a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
	c. Perform operational checkout and BIT		-	-
	d. Isolate malfunctions		-	-
***34.	DATA TRANSFER EQUIPMENT (DTE), F-16C/D AIRCRAFT			
	* a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
***52.	NOZZLE POSITION INDICATING SYSTEM			
	* a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
***53.	PRESSURE INDICATING SYSTEMS			
	a. Oil		-	-
	* (1) Theory of operation		A	B
	(2) Trace signal/data flow		-	-
	b. Hydraulic		-	-
	* (1) Theory of operation	20540	A	B
	* (2) Trace signal/data flow	20540	B	-
	(3) Perform operational check	20530	2b	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
53.	PRESSURE INDICATING SYSTEMS (continued)			
	(4) Isolate malfunctions	20540	B	-
	(5) Remove system LRU(s)	20550	2b	-
	(6) Install system LRU(s)	20550	2b	
***54.	FUEL FLOW INDICATING SYSTEM			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
***55.	TACHOMETER SYSTEM			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
***56.	TEMPERATURE INDICATING SYSTEM			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
***57.	FUEL QUANTITY INDICATING SYSTEM			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
	c. Perform operational and confidence checkout		-	-
	d. Calibrate system		-	-
	e. Isolate malfunctions		-	-
58.	DIRECT READING (STANDBY) COMPASS			
*	a. Theory of operation		A	B

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
59.	STANDBY ATTITUDE INDICATOR (SAI)			
* a.	Theory of operation		A	B
***60.	PITOT STATIC SYSTEM INSTRUMENTS			
* a.	Theory of operation		A	B
b.	Trace signal/data flow		-	-
c.	Perform operational checkouts		-	-
f.	Use test equipment		-	-
***61.	CENTRAL AIR DATA COMPUTER (CADC) SYSTEM			
* a.	Theory of operation	20820	A	B
* b.	Trace signal/data flow	20820	B	-
c.	Perform operational checkout and BIT	20810	2b	-
** d.	Isolate malfunctions	20820	B	-
***62.	LEADING EDGE FLAP SYSTEM			
* a.	Theory of operation		A	B
b.	Trace signal/data flow		-	-
c.	Perform operational checkout		-	-
***63.	FLIGHT CONTROL SYSTEM (CONVENTIONAL)			
* a.	Theory of operation	20900		
(1)	Stability and command augmentation		A	B
(2)	Trim		A	B
(3)	Autopilot		A	B
(4)	Self-test		A	B

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
63.	FLIGHT CONTROL SYSTEM (continued)			
	(5) Air data scheduling		A	B
	(6) Electrical power (primary/alternate)		A	B
	(7) Terrain following radar (TFR)		A	B
*	b. Trace signal/data flow	20900	-	-
**	e. Isolate malfunctions	20900	-	-
	g. Remove system LRU(s)	20910	-	-
	h. Install system LRU(s)	20910	-	-
65.	FLCS (SEAT) DATA RECORDING SYSTEM			
*	a. Theory of operation		A	B
***71.	INTERPHONE SYSTEM			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
	c. Perform operational checkout		-	-
73.	ULTRA-HIGH FREQUENCY (UHF) COMMUNICATIONS			
*	a. Theory of operation	21060	A	B
*	b. Trace signal/data flow	21060	B	-
**	d. Isolate malfunctions	21060	B	-
***74.	VERY-HIGH-FREQUENCY (VHF) COMMUNICATIONS			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
***76.	INSTRUMENT LANDING SYSTEM (ILS)			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
77.	TACTICAL AIR NAVIGATION (TACAN) SYSTEM			
*	a. Theory of operation	21180	A	B
	b. Trace signal/data flow	21180	B	-
	d. Isolate malfunctions	21180	B	-
***78.	AIR-TO-GROUND IFF (A/G IFF) TRANSPONDER SYSTEM			
*	a. Theory of operation	21230	A	B
	b. Trace signal/data flow	21230	B	-
	c. Perform operational checkout and BIT	21220	2b	-
	d. Isolate malfunctions	21230	B	-
	e. Use test equipment	21220 21230	2b	-
	f. Remove system LRU(s)	21240	2b	-
	g. Install system LRU(s)	21240	2b	-
	h. Mode 4		-	-
	(1) Theory of operation	21230	A	B
	(2) Trace signal/data flow		-	-
***80.	RADAR THREAT WARNING SYSTEM (RTWS)			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
	d. Perform BIT		-	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
80.	RADAR THREAT WARNING SYSTEM (continued)			
	e. Isolate malfunctions		-	-
***81.	INTERFERENCE BLANKER SYSTEM			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
***82.	CHAFF-FLARE DISPENSER SYSTEM			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-
	f. Remove system LRU(s)		-	-
	g. Install system LRU(s)		-	-
	h. Perform 90 day check		-	-
***83.	EXTERNAL COUNTERMEASURES SYSTEM (PODS)			
*	a. Theory of operation		A	B
	b. Trace signal/data flow		-	-

ELECTRONIC FUNDAMENTALS/APPLICATIONS (EFA)

TRA TASK and 5-LVL CDC columns are not coded. The EFA/TRA TASK correlation is too lengthy to be included in the body of the STS and has been provided in Appendix B. There are no 5-skill-level CDC requirements.

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
1.	BASIC TERMS			
+++	a. Metric notation		-	-
+++	b. DC terms		-	-
+++	c. AC terms		-	-
3.	BASIC CIRCUIT CALCULATIONS			
+++	a. DC		-	-
+++	b. AC		-	-
4.	RESISTORS			
+++	b. Isolate faulty resistors		-	-
+++	c. Color code		-	-
5.	RELAYS/SOLENOIDS			
*	a. Relay theory of operation		B	-
6.	INDUCTORS			
+++	a. Theory of operation		-	-
7.	CAPACITORS			
+++	a. Theory of operation		-	-
+++	c. Calculations		-	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
8.	TRANSFORMERS			
*	a. Theory of operation		B	-
9.	THREE PHASE TRANSFORMERS			
+++	a. Theory of operation		B	-
+++	b. Isolate faulty three phase transformers		2b	-
10.	DC MOTORS			
+++	a. Theory of operation		-	-
11.	AC MOTORS			
+++	a. Theory of operation		-	-
12.	DC GENERATORS			
+++	a. Theory of operation		-	-
13.	AC GENERATORS			
+++	a. Theory of operation		-	-
15.	SYNCHROS/SERVOS			
*	a. Theory of operation		B	-
17.	TRANSDUCERS			
+++	b. Isolate faulty transducers		2b	-
18.	METER MOVEMENTS			
+++	a. Theory of operation		-	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
19.	SOLID STATE DIODES			
+++	a. Theory of operation		-	-
20.	BIPOLAR JUNCTION TRANSISTORS			
+++	a. Theory of operation		-	-
21.	INTEGRATED CIRCUITS			
+++	a. Familiarization		-	-
22.	SOLID STATE SPECIAL PURPOSE DEVICES			
+++	a. Theory of operation		-	-
24.	CATHODE RAY TUBES (CRTS)			
+++	b. Isolate faulty CRTs		2b	-
27.	USE TEST EQUIPMENT			
+++	b. Oscilloscope		-	-
+++	i. Capacitor tester		-	-
28.	TRANSISTOR AMPLIFIER CIRCUITS			
	a. Theory of operation			
+++	(1) Amplifier circuits		-	-
33.	POWER SUPPLY CIRCUITS			
	a. Theory of operation			
+++	(1) Rectifiers (half-wave, full-wave,		-	-
+++	(2) Filters		-	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
34.	Voltage Regulators (Shunt, Series EVR, IC EVR)			
+++	a. Theory of operation		-	-
35.	RESISTIVE/CAPACITIVE/INDUCTIVE (RCL) CIRCUITS			
+++	a. Basic operation		-	-
+++	b. Resonant operation		-	-
+++	d. Calculations		-	-
36.	FREQUENCY SENSITIVE FILTERS			
+++	a. Theory of operation		-	-
37.	WAVE GENERATING CIRCUITS			
	a. Theory of operation			
+++	(1) Oscillators		-	-
+++	(2) Multivibrators		-	-
+++	(3) Waveshaping Circuits		-	-
40.	DIGITAL NUMBERING SYSTEMS			
+++	a. Conversions		-	-
+++	b. Math operations		-	-
+++	c. Binary Code Systems		-	-
41.	DIGITAL LOGIC FUNCTIONS			
+++	a. Theory of operation		-	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
42.	BOOLEAN EQUATIONS			
+++	a. Diagram to equation		-	-
+++	b. Equation to diagram		-	-
43.	COMPUTERS			
+++	a. Operation principles		-	-
+++	b. Load programs		2b	-
+++	f. Types of memories		-	-
+++	g. Peripheral devices		-	-
46.	D/A, A/D CONVERTERS			
+++	a. Theory of operation		-	-
48.	WAVEGUIDES			
+++	b. Isolate faulty waveguides		2b	-
49.	MICROWAVE OSCILLATORS & AMPLIFIERS			
+++	a. Theory of operation		-	-
50.	RESONANT CAVITIES			
+++	a. Theory of operation		-	-
51.	TRANSMITTERS			
	a. Theory of operation			
	+++ (1) Amplitude modulation		-	-
	+++ (2) Frequency modulation		-	-
	+++ (4) Pulse modulation		-	-

STS #	STS ITEM	TRA TASK	3 LVL CRS	5 LVL CDC
52.	RECEIVERS			
	a. Theory of operation			
+++	(1) Amplitude modulation		-	-
+++	(2) Frequency modulation		-	-
+++	(4) Pulse modulation		-	-
54.	ANTENNAS			
+++	c. Isolate faulty antennas		2b	-
57.	PHOTOSENSITIVE DEVICES			
+++	a. Theory of operation		B	-
	b. Isolate faulty photosensitive devices		2b	
59.	SUPPORT SUBJECTS			
+++	a. Safety applicable to electronics		-	-
+++	b. First aid for electrical shock		-	-
*	c. Electrostatic sensitive device (ESD) control		-	-

Summary of Proposed Changes

STS

The following changes are recommended to the STS. STS items have been added, deleted, or revised. The STS element number is followed by the rationale for the change.

1. 3f(1)-(7) - added proficiency codes for task performance to allow hands-on training in the 3-level course.

2. 10a(3)(b) - added proficiency code to allow training on a common skill.

3. 10j(3)(a)&(b) - added proficiency codes to allow hands-on training of a common skill and knowledge in the 3-level course.

4. 10j(4)(a)&(b) - added proficiency codes to allow hands-on training of a common skill and knowledge in the 3-level course.

5. 10j(5)(a)&(b) - added proficiency codes to allow hands-on training of a common skill and knowledge in the 3-level course.

6. 10j(10)(a)&(b) - added items to allow training on a common skill and knowledge in the 3-level course.

7. 10j(11)(a)&(b) - added items to allow training on a common skill and knowledge in the 3-level course.

EFA

All changes, except those identified as AFR 8-13 changes, are proficiency code changes. These code changes reflect the difference in current training requirements and the requirements recommended by the analysis.

STS Notes for TRA Correlation

NOTE 1: 20040, 20080, 20120, 20160, 20200, 20240, 20280, 20320, 20360, 20400, 20440, 20480, 20520, 20560, 20600, 20640, 20680, 20720, 20760, 20800, 20840, 20880, 20920, 20960, 21000, 21040, 21080, 21120, 21160, 21200, 21240, 21280, 21310, 21350, 21390

NOTE 2: 20210, 20220, 20490, 20530, 20540, 20570, 20610, 20650, 20690, 20810, 20820, 20850, 20860, 20890, 20900, 21010, 21020, 21250, 21260, 21320, 21330, 21360, 21370

NOTE 3: 20530, 20540, 20850, 20860, 20890, 20900, 20930, 20940, 21440

NOTE 4: 20010, 20020, 20030, 20050, 20060, 20070, 20090, 20100, 20110, 20130, 20140, 20150, 20170, 20180, 20210, 20220, 20250, 20260, 20270, 20290, 20300, 20330, 20340, 20370, 20380, 20390, 20410, 20420, 20450, 20460, 20470, 20530, 20540, 20730, 20740, 20770, 20780, 20810, 20820, 20830, 20850, 20860, 20890, 20900, 20930, 20940, 20980, 21020, 21130, 21140, 21170, 21180, 21210, 21220, 21270, 21290, 21320, 21330, 21360, 21370, 21380, 21400, 21410, 21440,

NOTE 5: 20010, 20020, 20030, 20050, 20060, 20070, 20090, 20100, 20110, 20130, 20140, 20150, 20170, 20180, 20210, 20220, 20250, 20260, 20270, 20290, 20300, 20330, 20340, 20370, 20380, 20390, 20410, 20420, 20450, 20460, 20470, 20530, 20540, 20730, 20740, 20770, 20780, 20810, 20820, 20830, 20850, 20860, 20890, 20900, 20930, 20940, 20970, 20980, 21010, 21020, 21050, 21060, 21070, 21090, 21100, 21130, 21140, 21170, 21180, 21210, 21220, 21250, 21260, 21270, 21290, 21320, 21330, 21360, 21370, 21380, 21400, 21410, 21440, 21470

NOTE 6: 20030, 20070, 20110, 20150, 20190, 20230, 20270, 20310, 20350, 20390, 20430, 20470, 20510, 20550, 20590, 20630, 20670, 20710, 20750, 20790, 20830, 20870, 20910, 20950, 20990, 21030, 21070, 21110, 21150, 21190, 21230, 21270, 21300, 21340, 21380

NOTE 7: 20020, 20030, 20060, 20070, 20100, 20110, 20140, 20180, 20220, 20260, 20300, 20340, 20380, 20420, 20460, 20500, 20540, 20580, 20620, 20660, 20700, 20740, 20780, 20820, 20860, 20900, 20940, 20980, 21020, 21060, 21100, 21140, 21180, 21220, 21260, 21290, 21330, 21370, 24100

APPENDIX D
ELECTRONIC FUNDAMENTALS/APPLICATION (EFA) TRA TASK CORRELATION

The numbers in the EFA No. column, for the most part, relate to the element numbers in the EFA. In places, the numbers end in an "x," "y," or "z." On these occasions, the numbers do not relate directly to the EFA line items, but do relate to the EFA major fundamental requirements. Beside each EFA number is the activity (A), skill (S), or knowledge (K) statement used in the TRA. The numbers below the statements refer to the TRA tasks where the activity, skill, or knowledge is required.

EFA No.		TRA TASK STATEMENT AND NUMBERS
2A1	K	APPLY DC CIRCUIT THEORY OF OPERATION 20020, 20060, 20100, 20140, 20180, 20220, 20260, 20300, 20340, 20380, 20420, 20460, 20500, 20540, 20580, 20620, 20660, 20700, 20740, 20780, 20820, 20860, 20900, 20940, 20980, 21020, 21060, 21100, 21140, 21180, 21220, 21260, 21290, 21330, 21370, 21410, 21440
2A2	K	APPLY AC CIRCUIT THEORY OF OPERATION 20020, 20060, 20100, 20140, 20180, 20220, 20260, 20300, 20340, 20380, 20420, 20460, 20500, 20540, 20580, 20620, 20660, 20700, 20740, 20780, 20820, 20860, 20900, 20940, 20980, 21020, 21060, 21100, 21140, 21180, 21220, 21260, 21290, 21330, 21370, 21410, 21440
2B1	K	ISOLATE FAULTY DC CIRCUITS 20020, 20060, 20100, 20140, 20180, 20220, 20260, 20300, 20340, 20380, 20420, 20460, 20500, 20540, 20580, 20620, 20660, 20700, 20740, 20780, 20820, 20860, 20900, 20940, 20980, 21020, 21060, 21100, 21140, 21180, 21220, 21260, 21290, 21330, 21370, 21410, 21440
2B1	K	TROUBLESHOOT DC CIRCUITS 20020, 20060, 20100, 20140, 20180, 20220, 20260, 20300, 20340, 20380, 20420, 20460, 20500, 20540, 20580, 20620, 20660, 20700, 20740, 20780, 20820, 20860, 20900, 20940, 20980, 21020, 21060, 21100, 21140, 21180, 21220, 21260, 21290, 21330, 21370, 21410, 21440
2B2	K	ISOLATE FAULTY AC CIRCUITS 20020, 20060, 20100, 20140, 20180, 20220, 20260, 20300, 20340, 20380, 20420, 20460, 20500, 20540, 20580, 20620, 20660, 20700, 20740, 20780, 20820, 20860, 20900, 20940, 20980, 21020, 21060, 21100, 21140, 21180, 21220, 21260, 21290, 21330, 21370, 21410, 21440
2B2	K	TROUBLESHOOT AC CIRCUITS 20020, 20060, 20100, 20140, 20180, 20220, 20260, 20300, 20340, 20380, 20420, 20460, 20500, 20540, 20580, 20620, 20660, 20700, 20740, 20780, 20820, 20860, 20900, 20940, 20980, 21020, 21060, 21100, 21140, 21180, 21220, 21260, 21290, 21330, 21370, 21410, 21440

EFA No.		TRA TASK STATEMENT AND NUMBERS
4A	K	APPLY RESISTOR THEORY OF OPERATION 20860
5A	K	APPLY RELAY THEORY OF OPERATION 20020, 20060, 20100, 20900
5B	K	ISOLATE FAULTY RELAYS 20020, 20060, 20100, 20900
5Y1	K	TROUBLESHOOT RELAYS 20900
8A	K	APPLY TRANSFORMER THEORY OF OPERATION 20900
8B	K	ISOLATE FAULTY TRANSFORMERS 20900
8Y	K	TROUBLESHOOT TRANSFORMERS 20900
9A	K	APPLY THREE-PHASE TRANSFORMER THEORY OF OPERATION 20020, 20060, 20100
9B	K	ISOLATE FAULTY THREE-PHASE TRANSFORMERS 20020, 20060, 20100
15A	K	APPLY SYNCHRO/SERVO THEORY OF OPERATION 20500, 20540, 20580, 20620, 20660, 20700
17A	K	APPLY TRANSDUCER THEORY OF OPERATION 20980
17B	K	ISOLATE FAULTY TRANSDUCERS 20980
17Y	K	TROUBLESHOOT TRANSDUCERS 20980
24A	K	APPLY CATHODE-RAY TUBE THEORY OF OPERATION 20140
24B	K	ISOLATE FAULTY CATHODE-RAY TUBES 20140
27G	S	USE DIGITAL MULTIMETER 20020, 20060, 20100, 20140, 20180, 20220, 20260, 20300, 20340, 20380, 20420, 20460, 20500, 20540, 20580, 20620, 20660, 20700, 20740, 20780, 20810, 20820, 20860, 20900, 20940, 20980, 21020, 21060, 21100, 21140, 21180, 21220, 21260, 21290, 21330, 21370, 21410, 21440

EFA No.		TRA TASK STATEMENT AND NUMBERS
27I	S	USE CAPACITOR TESTER 20740
27J	S	USE ANALOG MULTIMETER 20020, 20060, 20100, 20140, 20180, 20220, 20260, 20300, 20340, 20380, 20420, 20460, 20500, 20540, 20580, 20620, 20660, 20700, 20740, 20780, 20810, 20820, 20860, 20900, 20940, 20980, 21020, 21060, 21100, 21140, 21180, 21220, 21260, 21290, 21330, 21370, 21410, 21440
27Q	S	USE REFLECTOMETER 20020, 20060, 20100, 20140, 20180, 20220, 20260, 20300, 20340, 20380, 20420, 20460, 20500, 20540, 20580, 20620, 20660, 20700, 20740, 20780, 20820, 20860, 20900, 20940, 20980, 21020, 21060, 21100, 21140, 21180, 21220, 21260, 21290, 21330, 21370, 21410, 21440
43B	S	LOAD COMPUTER PROGRAMS 20340, 21180, 21520, 22760, 23900, 24740
47A	K	APPLY TRANSMISSION LINE THEORY OF OPERATION 20100, 20140, 20180, 20290, 20300
47D	K	ISOLATE FAULTY TRANSMISSION LINES 20100, 20140, 20180, 20290, 20300
48A	K	APPLY WAVEGUIDE THEORY OF OPERATION 20100
48B	K	ISOLATE FAULTY WAVEGUIDES 20100
54A	K	APPLY ANTENNA THEORY OF OPERATION 20100, 20290, 20300
54C	K	ISOLATE FAULTY ANTENNAS 20100, 20290, 20300
57A	K	APPLY PHOTOSENSITIVE DEVICE THEORY OF OPERATION 20140
57B	K	ISOLATE FAULTY PHOTOSENSITIVE DEVICES 20180
59C	K	APPLY ELECTROSTATIC DISCHARGE CONTROL (ESD) PRECAUTIONS 20070, 20110, 20150, 20190, 20230, 20260, 20270, 20290, 20300, 20310, 20430

APPENDIX E
ACRONYM LIST

ACRONYM	DEFINITION
AC	ALTERNATING CURRENT
ADI	ATTITUDE DIRECTOR INDICATOR
AMS	ADVANCED MODE SWITCHES
AOA	ANGLE-OF-ATTACK
AMS	ADVANCED MODE SWITCHES
ARWR	ADVANCED RADAR WARNING RECEIVER
ATF	AUTO TERRAIN FOLLOWING
AVTR	AIRBORNE VIDEO TAPE RECORDER
BIT	BUILT IN TEST
CADC	CENTRAL AIR DATA COMPUTER
CARA	COMBINED ALTITUDE RADAR ALTIMETER
CDC	CAREER DEVELOPMENT COURSE
CEU	CENTRAL ELECTRONIC UNIT
CNI	COMMUNICATION NAVIGATIONAL INTEGRATION
COMSEC	COMMUNICATIONS SECURITY
CRT	CATHODE-RAY TUBE
CSFDR	CRASH SURVIVEABLE FLIGHT DATA RECORDER
CTK	CONSOLITATED TOOL KIT
CTVS	COCKPIT TELEVISION VIDEO SENSOR
D/A	DIGITAL/ANALOG
DC	DIRECT CURRENT
DEEU	DATA ENTRY ELECTRONIC UNIT
DFLCS	DIGITAL FLIGHT CONTROL SYSTEM
DTC	DATA TRANSFER CARTRIDGE
DTE	DATA TRANSFER EQUIPMENT
ECA	ELECTRONIC COMPONENT ASSEMBLY
ECM	ELECTRONIC COUNTERMEASURE
ECU	ENVIRONMENTAL CONTROL UNIT (USED WITH TARGETING PODS)
ECU	ENVIRONMENTAL COOLING UNIT (USED WITH NAVIGATION PODS)
EFCC	ENHANCED FIRE CONTROL COMPUTER
EMI	ELECTROMAGNETIC INTERFERENCE
EOR	END-OF-RUNWAY
ESD	ELECTROSTATIC DISCHARGE
EWCU	ENGINE WARNING CONTROL UNIT
FCC	FIRE CONTROL COMPUTER
FCNP	FIRE CONTROL NAVIGATION PANEL
FCR	FIRE CONTROL RADAR
FINS	FORWARD IMAGING NAVIGATIONAL SENSOR
FLCC	FLIGHT CONTROL COMPUTER
FLIR	FORWARD LOOKING INFRARED
FLSE	FLIGHTLINE SUPPORT EQUIPMENT
FSA	FORWARD SECTION ASSEMBLY
FTIT	FAN TURBINE INLET TEMPERATURE
GAC	GENERAL AVIONIC COMPUTER
GPS	GLOBAL POSITIONING SYSTEM
HQ	HAVE-QUICK
HSI	HORIZONTAL SITUATIONAL INDICATOR
HUD	HEAD UP DISPLAY
I/O	INPUT/OUTPUT
IFF	IDENTIFICATION FRIEND OR FOE

ACRONYM	DEFINITION
ILS	INSTRUMENT LANDING SYSTEM
IMSC	INSTRUMENT MODE SELECT COUPLER
INS	INERTIAL NAVIGATION SYSTEM
INU	INERTIAL NAVIGATION UNIT
ISA	INTEGRATED SERVO ACTUATOR
LANTIRN	LOW ALTITUDE NAVIGATION AND TARGETING INFARED FOR NIGHT
LRU	LINE REPLACEABLE UNIT
MFD	MULTIFUNCTION DISPLAY
MLV	MEMORY LOADER VERIFIER
MUXBUS	MULTIPLEX BUSS
NAV	NAVIGATION
OFP	OPERATIONAL FLIGHT PROGRAM
OJT	ON-THE-JOB TRAINING
OPSEC	OPERATIONS SECURITY
PCC	POD CONTROL COMPUTER
PDG	PROGRAM DISPLAY GENERATOR
PDU	PILOT DISPLAY UNIT
PFLD	PILOT FAULT LIST DISPLAY
PSS	POD POWER SUPPLY
R/T	RECEIVER/TRANSMITTER
REO	RADAR ELECTRO-OPTICAL
RF	RADIO FREQUENCY
RPM	REVOLUTIONS PER MINUTE
RTWS	RADAR THREAT WARNING SYSTEM
SDR	SEAT DATA RECORDER
SMLV	STANDARD MEMORY LOADER VERIFIER
SMS	STORAGE MANAGEMENT SYSTEM
TACAN	TACTICAL AIR NAVIGATION
TCTO	TIME COMPLIANCE TECHNICAL ORDER
TDR	TIME DELAY REFLECTOMETER
TFR	TERRAIN FOLLOWING RADAR
TGT	TARGETING
TLC	TRANSMISSION LINE COUPLER
TRA	TRAINING REQUIREMENTS ANALYSIS
TV	TELEVISION
UFC	UPFRONT CONTROL
UHF	ULTAR HIGH FREQUENCY
VCR	VIDEO CASSETTE RECORDER
VHF	VERY HIGH FREQUENCY
VVI	VERTICAL VELOCITY INDICATOR