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Performance Evaluation of Apprentice Aircraft ECM Surveillance Equipment Repairmen

Graduates of ATC Course ABR30133A

by John F. Blumer, Capt, USAF

APGC Technical Documentary Report No. APGC-TDR-63-36

JULY 1963 ● APGC Project No. 0034Q-29

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FOREWORD

This evaluation, APGC Project 0034Q-29, was conducted in accordance with paragraph 3c, AFR 50-10. The 21st Strategic Aerospace Division, Forbes AFB, Kansas, and the 301st Strategic Bomber Wing, Lockbourne AFB, Ohio, were used as test sites. This evaluation was started 2 January 1963 and was completed 19 April 1963.

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ABSTRACT

This evaluation was conducted to determine the ability of apprentices graduated from Air Training Command Course No. ABR30133A, aircraft ECM surveillance equipment repairman to perform the duties of their specialty. The evaluation was made by rating the performance of 11 apprentices for 12 weeks following their graduation from the course.

The course graduates reflected excellent course instruction and possessed sufficient knowledge of electronic principles, circuit theory and the specialty requirements to develop 5-skill-level capability within the apprenticeship period. The apprentices' capability would be more closely aligned with the job requirements if they had more knowledge and practical ability regarding the soldering of electronic circuits and the procedural steps used in the alignment of ECM sets and subassemblies.

The on-the-job training program can be made less burdensome to the supervisors and apprentices and more realistically aligned with the job requirements if the on-the-job-training requirements were reduced to include technical knowledge of only the ECM sets with which the individual apprentice is associated.

At a project site where most of ECM equipment used was unique to this particular site, the supervisors felt that certain preselected students should be graduated from the course after receiving course instruction on electronic principles and circuit theory and assigned to an organization. There, they would receive Field Training Detachment and on-the-job-training on the ECM sets used by that organization. This training sequence will eliminate the course training on ECM sets which the apprentices will never use.

The inclusion of this specialty in the Strategic Air Command Job Oriented Training Standards program is presently being considered; therefore, before any revisions to the course training and the Job Training Standards become final, it is recommended that coordination be accomplished between The Strategic Air Command and The Air Training Command.

PUBLICATION REVIEW

This technical documentary report has been reviewed and is approved.

A. T. CULBERTSON
Brigadier General, USAF
Vice Commander

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SECTION 1 - INTRODUCTION

This evaluation was conducted to determine the ability of technical personnel trained by the Air Training Command to fulfill the requirements of their specialty. The subjects of this evaluation were apprentice aircraft electronic countermeasures (ECM) surveillance equipment repairmen who had been trained in Course No. ABR30133A at Keesler AFB, Mississippi.

Specific objectives of this evaluation were to:

1. Determine the ability of apprentices graduated from this course to perform the duties of their specialty.

2. Obtain information that will assist in preparing better qualified ECM surveillance equipment repairmen and in promoting the efficient use of their capabilities.

A previous evaluation of the performance of apprentice ECM repairmen was conducted in 1957 and 1958, and the results published in the report APGC-TR-58-14, Employment and Suitability Test of Apprentice ECM Repairmen, Graduates of TTAF Courses ABR30133A and ABR30133B, dated February 1958.

SECTION 2 - DESCRIPTION

COURSE

Air Training Command Course No. ABR30133A is designed to train airmen in the tuning, operation, inspection, and organizational maintenance and repair of airborne electronic countermeasures receivers, panoramic adapters, pulse analyzers, direction finders, recorders, transmitters, and associated test equipment. The areas of instruction include the development and application of electronic principles, circuit theory, shop practices, performance logs and maintenance records, Air Force Technical Orders, manuals and other maintenance directives and publications. The course is 32 weeks in duration and includes academic instruction in the following major subjects for the number of weeks indicated.

Subject	Duration of Instruction (Weeks)
DC and AC Current Circuits	4
Reactive Circuits	2
Principles of Vacuum Tubes and Transistors	2
Special Purpose Tubes	1
Amplifiers and Oscillators	3
Special Circuits	3
Motors and Servo Mechanisms	1
Multivibrators and Sweep Circuits	2
Microwave Principles	1
Security, Safety, Publications and Supply	$\frac{1}{2}$
Principles, Theory, and Analysis of ECM Surveillance Sets	$8\frac{1}{2}$
Transmitter Principles	2
Troubleshooting and Shop Procedures	2

APPRENTICES

Typical apprentices graduated from this course are approximately 21 years old, and have had about one year of military service, which has consisted entirely of basic military training and the technical training provided by this course. An ACB or AQE Electronics Aptitude Cluster Percentile of 80 is considered desirable, and a percentile of 50 is mandatory, for entrance into the course. This criterion provides the initial basis for their selection for training. Upon completion of the course the apprentices should be capable of performing the duties of apprentice aircraft ECM repairmen (surveillance equipment) as defined in AFM 35-1 (Appendix I), at the course level (3) indicated in Column (B) of the Job Training Standard (Appendix II). They should

also be capable of progressing to the 5-skill level of their specialty without additional formal training.

The apprentices participating in the evaluation were selected from three different graduating classes. The average academic standing for these apprentices, converted to a class size of 10 students, is 5.4, slightly better than the median of 5.5 for a group of any 10 students.

SECTION 3 - EVALUATION PROCEDURES

Eleven apprentices were evaluated during the initial 12 weeks of their first assignment. Five of the apprentices were evaluated in the 301st Bomb Wing, Lockborne AFB, Ohio; and six of the apprentices were evaluated in the 21st Strategic Aerospace Division, Forbes AFB, Kansas. The evaluation was conducted by grading the actual work performance of these apprentices as they performed the duties required of their specialty.

At the start of the evaluation the apprentices were informed of the purpose of the evaluation and the usage planned for the information which was to be derived. This was done to eliminate any uncertainty concerning the evaluation that might otherwise have developed and to enlist the apprentices' cooperation in obtaining the desired information.

During the evaluation, no special situations were created. Apprentices were assigned only the duties that normally occurred and that were the responsibility of their specialty. This procedure permitted indentification of the duties performed in the specialty as compared to those outlined in the Job Description and the Job Training Standard (JTS).

Supervisors were instructed to assume that the apprentices understood the tasks assigned until their performance indicated otherwise. When correction or additional instruction was required, the nature and extent of such assistance were recorded along with performance ratings. Annotations were also made concerning tasks for which the course did not provide instruction. Two ratings were given for each task assigned. One indicated the apprentices' performance knowledge using a scale similar to that on the JTS. The other showed the comparative time required for them to perform the task, using the time required by a qualified 5-skill-level worker as the standard of comparison. This rating system permitted distinction between apprentices who understood the

job but required practice and those who lacked sufficient knowledge to perform the work properly.

At the end of the evaluation period, final critiques were held with apprentices and supervisors to discuss and analyze the data developed and determine any corrective actions required.

SECTION 4 - REPORTING OF EVALUATION DATA

The data presented in this report are concerned primarily with those areas of the specialty in which there is an indication of misalignment between the JTS requirements, course training, job requirements, and on-the-job training (OJT). The information is based on the findings obtained at the operating level in the field and was derived from the performance ratings which the apprentices received for performing the required tasks and from the opinions and comments of the supervisors and apprentices who participated in the evaluation. In cases of contradictions between the performance ratings and apprentices' and supervisors' comments, the basic data are included together with the evaluator's appraisal of the data so that all aspects of these cases will be available.

The comments as to the suitability of the JTS, course instruction, and OJT requirements, together with the suggestions for making alterations, were made by the supervisors and apprentices during this evaluation only. They are included in the report so that those having the responsibility for planning the training for personnel in the specialty will have available, for planning considerations, the opinions of specialists at a representative operational organization.

This report was coordinated with the supervisors who participated in the evaluation and their superiors at the project site, and their concurrences were obtained prior to publication.

SECTION 5 - RESULTS AND DISCUSSION

APPRENTICE ASSIGNMENT AND JOB REQUIREMENTS

The 11 apprentices who participated in this evaluation were rotated between the flight line and the ECM equipment repair shop in order to determine their capabilities to perform the tasks in each area. Rotating the apprentices between the flight line and the repair shop was the usual procedure at one of the project sites. The apprentices at the other site were rotated for the evaluation, but are usually assigned either to the repair shop or to the flight line and remain in their assignment indefinitely. Also, the apprentices at this latter site usually work only on one or two complex ECM systems which are peculiar to this site.

The tasks on the flight line included performance checks, trouble analysis, adjustment of aircraft reconnaissance-type electronic warfare subsystem equipment installed in the aircraft, and removal and replacement of components.

Tasks performed in the repair shops included benchchecks of ECM assemblies and subassemblies and assembly, disassembly, cleaning, lubrication, and minor repairs of these items of equipment. In addition, the apprentices were required to find technical and parts information in T.O.'s and prepare forms used in the specialty.

At both of the project sites, the apprentices were scheduled to receive additional formal training on the unique organizational ECM equipment by attending classes conducted by the Field Training Detachment (FTD). The FTD training is considered necessary by the supervisors because changes are made constantly to the ECM equipment as a result of technological improvement and because training equipment used at the technical school often differs from that equipment used by organizations with different missions.

APPRENTICE PERFORMANCE

GENERAL. During the period of this evaluation, the apprentices participating in the project impressed their supervisors as being well motivated, mentally competent, and sufficiently trained in electronic principles, circuit theory, and specialty equipment and general requirements to meet most of the requirements of the specialty. All of the apprentices were making satisfactory OJT progress at the close of this evaluation.

OBSERVANCE OF SAFETY PROCEDURES (JTS Task 3d). Overall, the apprentices are cognizant of safety measures associated with the specialty, and the performance ratings reflected course training which meets most of the JTS criteria and job requirements. However, some of the apprentices failed to remove rings and watches before starting to work on electronic components. The offenders stated that this precautionary practice had been taught in the course and that their own carelessness was the cause of the violation.

OBSERVANCE OF SECURITY PROCEDURES (JTS Task 3a). Performance ratings for the observance of security procedures met the JTS criteria from the start of the evaluation. The supervisors stated that the course training on security was adequate for the job requirements.

USE OF TECHNICAL ORDERS AND SUPPLY MANUALS (JTS Task 3d and 3e). A continuous requirement existed at the project sites for the apprentices to locate technical and parts information in technical orders. The initial performance ratings for most of the apprentices failed to meet the JTS performance level of "2b", and the supervisors at both sites suggested that additional course instruction be given on the research of T. O. indexes and on the cross-reference procedure used when the federal stock number is different than the Air Force stock number. The performance ratings for the tasks rapidly increased to levels which met the JTS criterion, and by the fourth week most of the apprentices were performing the tasks at the 3-level of proficiency (competent). The apprentices stated that course instruction in this area had been conducted well and had included the procedures used on the job. They attributed the low initial ratings to the fact that it was necessary for them to refresh their memories with the procedures which they forgot during the delay between course instruction and work performance. In view of the disclosures, it is the opinion of the project officer that course instruction is adequate in this area.

PREPARATION OF FORMS(JTS Task 3f). Apprentices were rated continuously on their ability to prepare AFTO Forms 210 and 211, Maintenance Discrepancy Production Credit Records; AFTO Form 212, Time Compliance T. O. Work Record, and AF Form 50-series, Supply Status Tags. The performance ratings failed to meet the JTS requirement, and the supervisors at both project sites suggested that the course include more instruction on Chapters 8 and 9 of AFM 66-1 and T. O. 00-20A-1 pertaining to the preparation of the above forms. The apprentices felt that the course training adequately covered the tasks which they had been required to perform, but that the delay between course instruction and work performance resulted in their having to perform the tasks a few times to refresh their memories.

USE OF HAND TOOLS AND SOLDERING EQUIPMENT (JTS Task 3h). The apprentices had adequate ability to care for and use most of the hand tools, but they encountered difficulty making correct soldering connections on electronic circuits. They stated that the course training on soldering electronic circuits was accomplished mainly by using training films. Some of the apprentices received a limited amount of practical training on soldering boards. The supervisors conceded that practice and experience were the best ways to attain proficiency in the technique, but maintained that the course should provide students with more training concerning the correct techniques for performing low-heat soldering, being neat and making correct solder joints. They also suggested that during this instruction emphasis be placed on the effect of cold solder joints upon the noise output of ECM equipment.

PERFORMANCE OF MISCELLANEOUS GENERAL TASKS. During the evaluation, the apprentices at both sites were rated on their ability to clean and lubricate mechanical parts, fabricate and assemble cables, and install hollow waveguide, radomes, and antennas. Proficiency levels for the performance of all these tasks reflected adequate course instruction.

ACCOMPLISHMENT OF EQUIPMENT PERFORMANCE CHECKS. During the evaluation, the apprentices performed operational checks on all types of ECM sets included in the Job Training Standard except for the AN/ALA 5 electronic pulse analyzer and the AN/GLH-1 data reproducer. They also performed operational checks of several sets not included in the JTS. These performance checks consisted of bench checks of components as well as operational checks of entire sets of ECM equipment installed in the aircraft.

In the accomplishment of these checks the apprentices were rated on their ability to measure voltage, current, resistance, and frequencies; check continuity, antenna control frequencies and cables; and compare equipment performance against the minimum performance standards specified in the appropriate technical orders.

The performance ratings recorded at one of the sites were low initially, but increased to 2 and 3 levels of proficiency within one or two weeks. Performance levels of 1 (extremely limited) were recorded more frequently at the other test site, but in most cases, when consecutive ratings of 1 were recorded for a task listed in the JTS, it was found that the task had been performed on unfamiliar types of equipment.

The supervisors at both sites suggested that more practical training be provided in the course on the performance of these checks using the appropriate test equipment. However, those at one site conceded that

OJT was probably the most feasible solution for providing additional training, although they felt that more emphasis should be placed on the necessity for comparing the performance of the equipment with technical order standards. The supervisors at the other site maintained their opinion that additional practical training on bench checks should be given in the course if apprentices were to meet the job requirements for performing equipment checks. The apprentices' consensus was that the course instruction had adequately covered the procedures; the low initial ratings were caused by their unfamiliarity with new types of equipment and because they had forgotten some of the knowledge during the delay between course instruction and work performance. In view of these opinions, the project officer is inclined to agree that course training adequately meets the training requirements in this area, and that additional performance ability is the responsibility of OJT.

ALIGNMENT OF ECM EQUIPMENT. Six of the eleven apprentices were rated on the performance of alignment tasks, but only one of these apprentices was rated continuously throughout the evaluation. The other five apprentices were rated one to three times on the performance of different alignment tasks; however, the samples gave a good representation of initial ability for performance of all of the normal alignment tasks except for the alignment of the mixer amplifier of the AN/APR-9 intercept receiver. Performance levels indicated that the apprentices' knowledge met the appropriate levels specified in the JTS, but the supervisors stated that to meet the job requirements they had to provide OJT for every step of each alignment procedure. In order to meet the job requirements, the apprentices need more understanding of the specific purposes of individual alignments, where the subassemblies are located within the block diagrams, and the effect of one stage in an ECM set upon another. The supervisors conceded that an apprentice can usually perform a specific alignment after performing it one or two times with close supervision, and that because of the difference in equipment used throughout the Air Force, it is normal to provide information peculiar to organizational equipment by OJT or FTD instruction. Nevertheless, they felt that more practical training should be given in the course in which the students use the test equipment in the performance of tasks associated with alignments and performance checks of representative items of ECM equipment.

The apprentices felt that course training on alignments, conducted by demonstrations before groups of students, was too brief and too perfunctory to be effective. As a result, they stated that they had not absorbed the instruction adequately.

The suggestion was made by the supervisors and apprentices to provide course instruction in which individual students would be required to

perform the various types of alignment on a completely assembled ECM set. In accomplishing the training sequence, the students would be required to select the appropriate test equipment, attach it to the proper section in the set, and perform the procedures for making the alignment, using the proper block diagrams. It would not be necessary for students to complete the alignments in accordance with the technical order standards, but only that they perform enough of the procedural steps to provide them with an understanding of the relationship of one stage upon another in a complete ECM set. It was recommended that a course training level of "2b" be provided in the JTS for alignment.

The alignment of ECM equipment was considered by the supervisors at both sites to be the most serious performance deficiency revealed by the apprentices during this evaluation.

SELECTION AND USE OF TEST EQUIPMENT (JTS Task 4). With the exception of the crystal checker, all of the items of test equipment listed in the JTS were in use at the project sites, but the makes and models differed. The initial performance ratings for apprentices on the use of most of the test equipment failed to meet the JTS levels of proficiency, but this was attributed to the differences between the makes and models of equipment used in training and those used on the job, inability of apprentices to select substitute test equipment to perform a specific check on alignment, and to the apprentices' forgetfulness caused by the delay between course instruction and work performance.

The supervisors and apprentices generally felt that adequate course instruction was given on the purpose, operation of controls, and the reading of meters and scopes of the different items of test equipment. As previously mentioned, however, suggestions were made to increase the practical training on equipment performance checks and alignments, using the appropriate test equipment.

CALIBRATION AND ADJUSTMENT OF ECM EQUIPMENT. General. As in some of the other areas, initial performance ratings for the calibration and adjustment of the ECM equipment were generally below the appropriate specifications in the JTS. Apprentices stated the training was generally adequate for the tasks which they performed on the job, and the supervisors indicated that except for adjustment of the cavity resonator additional proficiency was the responsibility of OJT.

Adjustment of the Resonant Cavity. The apprentices knew of the resonant cavity, but did not recall any training in the course for setting the resonant frequency, except being told that changing the size of the cavity would result in a frequency change. The supervisors felt that the

course instruction should include some training on the methods and procedures for tuning resonant cavities in order to meet the specialty requirement for performing the task.

INTERPRETATION OF DIAGRAMS AND SCHEMATICS. Continuous evaluation ratings on the apprentices' ability to interpret schematic diagrams met the JTS criteria and job requirements in nearly every case. The apprentices had some minor difficulties in reading schematic diagrams on new and unfamiliar equipment, but they and the supervisors generally were satisfied with the level of course training.

Although no specific ratings were recorded on the apprentices' ability to interpret block diagrams, several of the supervisors stated that additional practical instruction should be given in the course on alignments using the block diagrams. The additional instruction was recommended to improve the apprentices' knowledge of the effect of one electronic component on another component in an electronic circuit.

LOCALIZATION OF MALFUNCTIONS. The apprentices' ability to localize malfunctions using trouble analysis charts was demonstrated continuously throughout the evaluation on 12 different ECM sets, and reflected the excellent instruction which, the apprentices stated, was given in the course.

REMOVAL, REPAIR, AND REPLACEMENT OF DEFECTIVE UNITS. Performance ratings and discussion at the evaluation critiques revealed that course instruction on the removal, repair, and replacement of ECM subassemblies is adequate. The attainment of increased proficiency in the repair of these units is considered by the supervisors to be the result of experience and training on the job.

GENERAL EVALUATION OF THE SUITABILITY OF THE COURSE TRAINING, OJT, AND JTS

During the final critiques, the project officer asked the supervisors and apprentices for constructive comments and suggestions which had not been made during the appraisal of performance of individual tasks and which they felt would be useful in planning the training of future apprentices. The following general appraisals are made as a result of the responses received.

COURSE TRAINING. The supervisors at Forbes AFB, Kansas, stated that a considerable amount of unique equipment was used within their organization. Many of the specialists assigned to Forbes AFB seldom or never see the equipment used during the course training after

they graduate because they normally work only on one or two ECM sets, becoming highly proficient in the tasks associated with these sets. Before being allowed to perform tasks on these unique sets, the apprentices are trained thoroughly in classes conducted by an FTD. In view of this, the supervisors felt that the time and cost utilization for training would be more efficient if certain students were selected for assignment to Forbes AFB after completing the course instruction on fundamental electronics and there receive their training on sets in FTD classes.

With the exception of the AN/GLH-1 data reproducing set, all of the 10 items of ECM equipment used for the course training are used by the organizations participating in the evaluation. Only two of the items of equipment, the AN/APS-54 radar receiving set and the AN/ALT 6B airborne countermeasure transmitter, were used by both of the test sites. In addition, the project organizations used several different items of equipment which were not taught in the course. The apprentices received instruction on this equipment by attending FTD classes and by OJT. The supervisors in both of the project organizations used equipment which they considered to be peculiar to their specific organizations because of their unique mission requirements. They stated that the only feasible method for providing instruction on the unique equipment was by FTD instruction and OJT.

ON-THE-JOB TRAINING AND THE JOB TRAINING STANDARD. At the present time, the supervisors regard the OJT program as excessive and unrealistic because of the JTS requirements for training on sets which many of the apprentices will never see. Therefore, they suggested that the JTS and OJT packages be revised so that OJT and career upgrading can be attained principally on the basis of fundamental knowledge of ECM electronics. If testing on specific sets is to be continued, they suggest separate examinations be prepared for each type of equipment and that personnel be tested on the sets within their specialty area.

SECTION 6 - SUMMARY AND ANALYSIS

The apprentices graduated from ATC Course No. ABR30133A reflect excellent course instruction and have sufficient knowledge of electronic principles, circuit theory, specialty equipment, and general requirements to enable them to develop 5-skill-level capability satisfactorily. Their capability would be more closely aligned with the job requirements if they possessed knowledge and practical ability regarding the soldering of electronic circuits and the procedural steps used in the alignment of

ECM sets and subassemblies. In the accomplishment of alignments, the apprentices require additional knowledge of the hookup of test equipment to ECM sets and subassemblies and of the effect of one stage in an electronic circuit upon another as shown in the block diagrams.

At one of the project sites a general opinion existed among the supervisors that certain preselected students, after receiving course instruction on electronic principles and circuit theory, should be graduated from the course and assigned to an organization to receive practical training on ECM sets used by the organizations. This training sequence will eliminate the course training on ECM sets which the apprentices will never use.

The OJT program can be made less burdensome and more realistic if the criteria for upgrade training and the Skill Knowledge Test questions are based essentially on ECM electronics and general specialty job requirements. The requirement for technical knowledge of ECM sets should be limited to sets with which an individual works.

During the coordination of this report a reply was received from one of the project bases mentioning that the Strategic Air Command is considering the inclusion of this specialty into the SAC Job Oriented Training Standard (JOTS) program. A suggestion was implied that further coordination be accomplished between ATC and SAC before any revisions to the JTS and the OJT program for the specialty become final.

SECTION 7 - CONCLUSIONS

1. The apprentices are well trained as ECM surveillance equipment repairmen, easily developing the 5-skill-level capability within the apprenticeship period.

2. To meet the job requirements, a level of "2b" is desirable for course training on the alignment of ECM sets and for soldering electronic circuits.

3. The OJT program should be revised to require OJT on only the equipment which the specialists use on the job in their specific organizations.

4. Further investigation should be made of the feasibility of providing course instruction on only electronic principles and theory for

preselected students who are to be assigned to organizations with ECM equipment which is totally different than equipment used in the course.

5. The SAC JOTS program should be taken into consideration when revisions are being planned for the JTS, the resident course, and OJT.

SECTION 8 - RECOMMENDATIONS

It is recommended that:

1. The JTS be revised to provide a "2b" level of course training for all alignments performed on at least one adequately representative item of equipment and for soldering electronic circuits.

2. Headquarters ATC consider Conclusions 3, 4, and 5, and determine if it is feasible to revise the course training, and if so, to what extent.

APPENDIX I
JOB DESCRIPTION

AIRMAN AIR FORCE SPECIALTY

★AIRCRAFT ELECTRONIC COUNTERMEASURES REPAIRMAN

1. SPECIALTY SUMMARY

Installs, maintains, and repairs airborne electronic countermeasures equipment, and passive electronic intercept and analysis equipment.

2. DUTIES AND RESPONSIBILITIES

a. *Performs preventive maintenance on airborne and ground electronic countermeasures equipment:* Inspects and tests electronic countermeasures equipment at specified intervals to locate defects such as discolored or cracked resistors, loose mountings, poor connections, faulty tubes, sluggish relays, or overheated bearings and transformers. Adjusts or replaces defective components. Turns on equipment, sets controls in various operating positions, and evaluates equipment performance, using applicable test equipment.

b. *Installs electronic countermeasures equipment:* Checks equipment visually and by use of tools and test equipment for serviceability prior to installation. Assembles, connects, and interwires equipment such as antennae, transmitters, surveillance receivers, panoramic adapters, pulse analyzers and related equipment, director-finding units, and inverters. Conducts detailed tests of installed equipment for proper assembly of components and compliance with technical orders. Places in operation, tunes, adjusts, and aligns components to obtain maximum operating efficiency.

c. *Repairs airborne and ground electronic countermeasures equipment:* Isolates malfunctions by standard system-checking procedures or visual inspections, static voltage checks, resistance measurements, and other tests, using specialized equipment. Repairs equipment, including intercept receivers, jamming transmitters, pulse analyzers, chaff dispensers, panoramic adapters, recording devices, direction-finding equipment, and associated test equipment using small hand-tools, soldering irons, and specialized test equipment. Tunes, adjusts, calibrates, and aligns electronic countermeasures components in accordance with technical orders, manufacturers' handbooks, and local procedures. Performs progressively more difficult repair duties as specifically directed by maintenance chief.

d. *Maintains inspection and maintenance records:* Posts entries on applicable maintenance and inspection records. Records meter readings and other pertinent data in equipment performance logs. Furnishes information required for unsatisfactory reports and recommends changes to correct defective equipment or to improve existing operating procedures.

e. *Supervises electronic countermeasures maintenance personnel:* Assigns work and reviews completed repairs to insure compliance with local procedures and applicable technical publications. Instructs subordinates in techniques of installation, maintenance, and repair of airborne electronic countermeasures equipment and ground passive electronic intercept analysis and related equipment.

3. SPECIALTY QUALIFICATIONS

a. *Education:*

(1) Knowledge of electronic principles as applied to electronic countermeasures maintenance; and interpretation of technical

orders, blueprints, wiring diagrams, and schematic drawings is *mandatory*. Attaining a qualifying score on the APT applicable to the specialty described herein satisfies these mandatory knowledge qualifications.

(2) High-school-level courses in physics, electricity, and mathematics, are desirable.

b. *Experience:* Experience in functions such as testing, calibrating, aligning, maintaining, or repairing electronic countermeasures equipment, and use of electronic test equipment, is *mandatory*.

c. *Training:* Completion of course in aircraft electronic countermeasures maintenance is desirable.

d. *Other:*

(1) Physical profile serial 222221 is desirable for field or base assignment.

(2) Normal color vision as defined in AFM 160-1 is *mandatory*.

4. SPECIALTY DATA

a. *Grade Spread:* Airman second class through staff sergeant.

b. *Source Jobs (D.O.T.):*

Radio Repairman I	5-83.411
Radio Mechanic II	5-83.447

APPENDIX II
JOB TRAINING STANDARD

*JTS 30133A/53A

JOB TRAINING STANDARD
NUMBER 30133A/53A

DEPARTMENT OF THE AIR FORCE
WASHINGTON, 19 June 1961

AIRCRAFT ELECTRONIC COUNTERMEASURES REPAIRMAN (SURVEILLANCE EQUIPMENT)

1. Purpose. This JTS, prepared IAW AFR 50-26:

a. States the knowledges or tasks necessary for an airman to perform duties in the Aircraft Electronic Countermeasures Repairman ladder of the Airman Radio-Radar Systems career field (Column A). These knowledges and tasks are based on the Specialty Description outlined in AFM 35-1C, 1 August 1960.

b. Shows the proficiency attained in Course Number ABR30133A as outlined in the USAF Training Prospectus (Column B). The asterisk shown in this column indicates that the scope and extent of training is commensurate with the proficiency levels required to support specific knowledges and tasks listed in this JTS.

c. Indicates the proficiency recommended for each job element for qualification at the three level AFSC (Column C).

d. Indicates the proficiency recommended for each job element for qualification at the five level AFSC as provided by OJT Packages JP30153A, Volume I and JP30153A, Volume II.

e. Provides the basis on which supervisors can plan and conduct individual OJT programs.

f. Provides a convenient record of on-the-job training completed.

NOTE: OJT Packages may be obtained in accordance with procedures outlined in AFM 5-4.

2. Qualitative Requirements. Attachment 1 contains the listing of knowledges and tasks referenced in paragraph 1. The numbers and letters appearing in appropriate columns of the Proficiency Level and Progress Record are the scale values of the code key shown in Figure 1.

3. Applying the JTS to AF Form 623. The Job Training Standard will be inserted in AF Form 623, Formal On-The-Job Training Record, to provide a convenient record of on-the-job training completed.

4. Recommendations. Comments and recommendations are invited concerning quality of ATC training and graduates. Use this training standard as frame of reference to delineate problem areas. Correspondence should be addressed direct to Headquarters ATC (ATTDC), Randolph AFB, Texas.

5. Distribution. This publication is distributed and issued in accordance with AFR 0-8.

BY ORDER OF THE SECRETARY OF THE AIR FORCE:

THOMAS D. WHITE
Chief of Staff

OFFICIAL:

R. J. PUGH
Colonel, USAF
Director of Administrative Services

1 Attachment
Qualitative Requirements

*This Standard supersedes JTS 30133A/53A, 20 December 1957.
OPI: ATC
DISTRIBUTION: F

CODE KEY

Scale Value	Performance Definition	Scale Value	Knowledge Definition
1	*Extremely Limited.* Requires detailed guidance and close supervision in using correct procedures and techniques.	a	*Introductory Knowledge.* Possesses knowledge of nomenclature and/or facts.
2	*Partially Proficient.* Requires some guidance and supervision, mainly on involved and complicated steps of the operation.	b	*Basic Understanding.* Possesses an understanding of basic principles and procedures.
3	*Competent.* Can perform "on his own" unless special problems are encountered; only a general check of the work is required by the supervisor.	c	*Working Knowledge.* Thoroughly understands the application of principles and procedures to operational situations.
4	*Highly Skilled.* Performs skillfully and efficiently; considered capable of supervising others and applying correct procedures and techniques to new and related tasks.		

No training offered because of lack of equipment or facilities: X

No training required at this level: —

The code key for a job element (knowledge or performance task) consists of a number or letter scale value, or an appropriate number/letter combination thereof.

Figure 1.

QUALITATIVE REQUIREMENTS

JTS 30133A/53A

(A) REQUIRED KNOWLEDGE OR TASK	(B) Crs (8) Lvl	(C) AFSC (8) Lvl	Date OJT Started	Date Compl & Trainer's Trainee's Initials	(D) AFSC (4) Lvl	Date OJT Started	Date Compl & Trainer's Trainee's Initials	(E) Crs (7) Lvl	(F) AFSC (7) Lvl	Date OJT Started	Date Compl & Trainer's Trainee's Initials
1. ELECTRONIC PRINCIPLES											
Demonstrates and applies an understanding of:											
a. Direct Current	•										
b. Alternating Current	•										
c. Reactive Circuits	•										
d. Principles of vacuum tubes and transistors	•										
e. Special purpose tubes	•										
f. Amplifiers and oscillators	•										
g. Special circuits	•										
h. Motors and servo mechanisms	•										
i. Multivibrators and sweep circuits	•										
j. Microwave principles	•										
2. AIRMAN RADIO-RADAR SYSTEMS CAREER FIELD								See JTS 30173	See JTS 30173		
a. Is familiar with the entire career field	a	a			b						
b. Understands the progression steps in AFSC 30133A/53A/73 ladder of the Air Electronics subdivision	b	b			c						
c. Understands the specialty description and duties of Aircraft Electronic Countermeasures Repairman, AFSC 30133A/53A	b	b			c						
3. AIRCRAFT RECONNAISSANCE-TYPE ELECTRONIC WARFARE (EW) SUBSYSTEM MAINTENANCE, GENERAL											
a. Employs proper security measures to protect classified equipment and publications	3c	3c			4c						
b. Practices proper ground safety procedures	2b	4c			4c						
c. Knows the organizational structure of maintenance unit to which assigned	–	b			c						
d. Uses technical orders and other authorized maintenance publications	2b	3c			4c						
e. Uses supply catalogs when securing ware maintenance parts	2b	2b			3c						

JTS 30133A/53A

(A) REQUIRED KNOWLEDGE OR TASK	(B) Crs (8) Lvl	(C) AFSC (8) Lvl	Date OJT Started	Date Compl & Trainer's Trainee's Initials	(D) AFSC (4) Lvl	Date OJT Started	Date Compl & Trainer's Trainee's Initials	(E) Crs (7) Lvl	(F) AFSC (7) Lvl	Date OJT Started	Date Compl & Trainer's Trainee's Initials
3f. Maintains equipment maintenance and inspection forms and tags	2b	2b			3c						
g. Participates in the USAF Product Improvement Program	1b	2b			4c						
h. Applies proper techniques in the care and use of hand tools	2b	2b			3c						
4. EW SUBSYSTEM TEST EQUIPMENT											
a. Selects proper test equipment and repair tools when maintaining EW equipment	2b	2b			3c						
b. Knows when test equipment is functioning properly	2b	2b			4c						
c. Uses multimeters to measure voltage, current, and/or resistance	2b	3c			4c						
d. Uses tube tester to check conditions of vacuum tubes	2b	2b			3c						
e. Uses test oscilloscopes to observe waveforms, compare frequencies, and measure peak-to-peak voltages	2b	3c			4c						
f. Uses suitable signal generators throughout the electromagnetic spectrum to perform operational checks and alignment procedures	2b	2b			3c			See JTS 30173	See JTS 30173		
g. Uses suitable frequency meters throughout the electromagnetic spectrum to measure frequency during operational checks and alignment procedures	2b	2b			3c						
h. Uses vacuum tube voltmeter to measure voltage in sensitive electrical circuits	2b	2b			3c						
i. Uses simple ammeter to measure current	2b	2b			3c						
j. Uses pulse generator when checking performance and aligning EW subsystems	2b	2b			4c						
k. Uses crystal checker to determine condition of rectifying crystals	2b	2b			4c						
l. Uses specialized flight line "subsystems confidence checking" test equipment	–	–			3c						
m. Uses specialized line replaceable unit bench test equipment	–	–			3c						
5. RECONNAISSANCE-TYPE EW EQUIPMENT INSTALLATIONS											
a. Knows location of EW subsystem components in representative aircraft	b	2b			3c						
b. Unpacks and inspects all new and replacement components	a	a			2b						
c. Performs complete bench check on all new and replacement components	1b	1b			3c						

(A)	(B)	(C)			(D)			(E)	(F)		
	PROFICIENCY LEVEL AND PROGRESS RECORD										
REQUIRED KNOWLEDGE OR TASK	Crs (6) Lvl	AFSC (6) Lvl	Date OJT Started	Date Compl & Trainee's, Trainee's Initials	AFSC (6) Lvl	Date OJT Started	Date Compl & Trainee's, Trainee's Initials	Crs (7) Lvl	AFSC (7) Lvl	Date OJT Started	Date Compl & Trainee's, Trainee's Initials
5d. Fabricates and installs coaxial and multi-lead interconnecting cables	2b	2b			4c						
e. Installs rigid and flexible hollow waveguide	1b	1b			4c						
f. Installs and removes sub-system units, radomes, and antennas	1b	1b			4c						
g. Mounts and safety wires units and attaches bonding straps	2b	2b			4c						
h. Checks for proper performance of completed installations	2b	2b			4c						
6. ORGANIZATIONAL AND FIELD MAINTENANCE											
Performs Organizational and Field Maintenance on the Following Aircraft EW Subsystems:											
a. Intercept Receiver, AN/APR-9											
(1) Understands principles of operation	b	b			c			See JTS 30173	See JTS 30173		
(2) Locates and identifies components	2b	2b			4c						
(3) Checks and performs cabling of an ECM Receiver	2b	3c			4c						
(4) Operates equipment for maintenance purposes	3c	3c			4c						
(5) Performs preflight inspections	2b	2b			4c						
(6) Checks performance against technical order minimum performance standards	2b	2b			4c						
(7) Localizes faults, using system trouble analysis chart	2b	2b			3c						
(8) Removes and replaces subassemblies	2b	2b			4c						
(9) Checks and replaces:											
(a) Fuses	2b	2b			4c						
(b) Panel lamps	2b	2b			4c						
(c) Electron tubes	2b	2b			4c						
(10) Checks, protects, and replaces crystal diodes	2b	2b			4c						
(11) Checks and adjusts power supply voltages	2b	2b			4c						
(12) Checks and replaces local oscillator in RF tuner	1b	1b			3c						
(13) Performs IF alignment	1b	1b			3c						
(14) Aligns beat frequency oscillator	1b	1b			3c						
(15) Performs mixer-amplifier alignment and adjustment	1b	1b			3c						

(A)	(B)	(C)			(D)			(E)	(F)		
	PROFICIENCY LEVEL AND PROGRESS RECORD										
REQUIRED KNOWLEDGE OR TASK	Crs (6) Lvl	AFSC (6) Lvl	Date OJT Started	Date Compl & Trainee's, Trainee's Initials	AFSC (6) Lvl	Date OJT Started	Date Compl & Trainee's, Trainee's Initials	Crs (7) Lvl	AFSC (7) Lvl	Date OJT Started	Date Compl & Trainee's, Trainee's Initials
6a.(16) Performs RF tuner adjustments and alignments	a	1b			3c			See JTS 30173	See JTS 30173		
(17) Cleans and lubricates mechanical parts	1b	1b			3c						
(18) Performs system trouble analysis, using system trouble analysis chart	2b	2b			4c						
(19) Performs voltage, resistance, and continuity checks, using appropriate technical order charts	2b	2b			4c						
(20) Accomplishes bench check of serviced units to insure proper operation	2b	2b			4c						
(21) Performs periodic inspections	2b	2b			4c						
b. Panoramic Search Receiver AN/APR-14											
(1) Understands the principles of operation	b	b			3c						
(2) Locates and identifies components	2b	2b			4c						
(3) Operates the equipment for maintenance purposes	2b	3c			4c						
(4) Performs preflight inspections	2b	2b			4c						
(5) Checks performance against technical order minimum performance standards	2b	2b			4c						
(6) Localizes faults, using system trouble analysis chart	2b	2b			4c						
(7) Removes and replaces subassemblies	2b	2b			4c						
(8) Checks and replaces:											
(a) Fuses	2b	2b			4c						
(b) Panel lamps	2b	2b			4c						
(c) Electron tubes	2b	2b			4c						
(9) Adjusts trace centering and width	2b	3c			4c						
(10) Checks and restores high voltage supply	2b	2b			4c						
(11) Adjusts voltage regulator	2b	2b			4c						
(12) Checks and adjusts deflection chassis	2b	2b			3c						
(13) Adjusts sector limit switches	2b	2b			3c						
(14) Adjusts display tube lamp switch	2b	2b			3c						
(15) Adjusts antenna switch	2b	2b			3c						
(16) Cleans and lubricates mechanical parts	1b	1b			3c						

(A)	(B)	(C)			(D)			(E)	(F)		
	PROFICIENCY LEVEL AND PROGRESS RECORD										
REQUIRED KNOWLEDGE OR TASK	Crs (B) Lvl	AFSC (B) Lvl	Date OJT Started	Date Compl & Trainer's, Trainee's Initials	AFSC (A) Lvl	Date OJT Started	Date Compl & Trainer's, Trainee's Initials	Crs (T) Lvl	AFSC (T) Lvl	Date OJT Started	Date Compl & Trainer's, Trainee's Initials
6b.(17) Performs system trouble analysis, using system component trouble analysis chart	2b	2b			4c			See JTS 30173	See JTS 30173		
(18) Performs voltage, resistance, and continuity checks, using appropriate technical order charts	2b	2b			4c						
(19) Accomplishes bench check of serviced units to insure proper operation	2b	2b			4c						
(20) Performs periodic inspections	2b	2b			4c						
c. Radar Receiving Set (Warning) AN/APS-54											
(1) Understands the principles of operation	b	b			c						
(2) Locates and identifies components	2b	2b			4c						
(3) Operates equipment for maintenance purposes	2b	2c			4c						
(4) Performs preflight inspections	2b	2b			4c						
(5) Checks performance against technical order minimum performance standards	2b	2b			4c						
(6) Localizes faults, using system trouble analysis chart	2b	2b			4c						
(7) Removes and replaces subassemblies	2b	2b			4c						
(8) Checks and replaces:											
(a) Fuses	2b	2b			4c						
(b) Panel lamps	2b	2b			4c						
(c) Electron tubes	2b	2b			4c						
(9) Checks, protects, and replaces crystal diodes	2c	2c			4c						
(10) Performs dual antenna wiring adjustments	1b	1b			2c						
(11) Adjusts visual alarm sensitivity	2b	2b			4c						
(12) Accomplishes blanking polarity adjustment	2b	2b			4c						
(13) Adjusts audio output bias	2b	2b			4c						
(14) Recalibrates PRF lower limit discriminator	2b	2b			4c						
(15) Performs system trouble analysis, using system component trouble analysis chart	2b	2b			4c						
(16) Performs voltage, resistance, and continuity checks, using appropriate technical order charts	2b	2b			4c						

(A)	(B)	(C)			(D)			(E)	(F)		
	PROFICIENCY LEVEL AND PROGRESS RECORD										
REQUIRED KNOWLEDGE OR TASK	Crs (B) Lvl	AFSC (B) Lvl	Date OJT Started	Date Compl & Trainer's, Trainee's Initials	AFSC (A) Lvl	Date OJT Started	Date Compl & Trainer's, Trainee's Initials	Crs (T) Lvl	AFSC (T) Lvl	Date OJT Started	Date Compl & Trainer's, Trainee's Initials
6c.(17) Accomplishes bench test of serviced units to insure proper operation	2b	2b			4c			See JTS 30173	See JTS 30173		
(18) Performs periodic inspections	2b	2b			4c						
d. Panoramic Receiving Set AN/ARR-8B											
(1) Understands the principles of operation	–	2b			3b						
(2) Locates and identifies equipment	–	2b			3b						
(3) Operates equipment for maintenance purposes	–	2b			3b						
(4) Performs preflight inspections	–	2b			3c						
(5) Checks performance against technical order minimum performance standards	–	2b			3b						
(6) Localizes faults, using system trouble analysis chart	–	2b			3b						
(7) Removes and replaces subassemblies	–	2b			3c						
(8) Checks and replaces:											
(a) Fuses	–	2b			3c						
(b) Panel lamps	–	2b			3c						
(c) Electron tubes	–	2b			3c						
(9) Checks power supply voltages	–	2b			3c						
(10) Accomplishes maximum sensitivity setting of sweep display	–	2b			3b						
(11) Performs vertical position adjustment of sweep display	–	2b			3b						
(12) Aligns IF section	–	2b			3b						
(13) Performs local oscillator alignment	–	2b			3b						
(14) Aligns low-band RF section	–	2b			3b						
(15) Aligns high-band RF section	–	2b			3b						
(16) Aligns IF pre-amplifier	–	2b			3b						
(17) Performs horizontal sweep generator alignment	–	2b			3c						
(18) Performs system trouble analysis, using system component trouble analysis chart	–	3b			3c						
(19) Performs voltage, resistance, and continuity checks, using appropriate technical order charts	–	3b			3c						

(A)	(B)	(C)			(D)			(E)	(F)		
	PROFICIENCY LEVEL AND PROGRESS RECORD										
REQUIRED KNOWLEDGE OR TASK	Crs (3) Lvl	AFSC (3) Lvl	Date OJT Started	Date Compl & Trainee's, Trainee's Initials	AFSC (4) Lvl	Date OJT Started	Date Compl & Trainee's, Trainee's Initials	Crs (7) Lvl	AFSC (7) Lvl	Date OJT Started	Date Compl & Trainee's, Trainee's Initials
6d.(20) Accomplishes bench check of serviced units to insure proper operation	–	2b			3b			See JTS 30173	See JTS 30173		
(21) Performs periodic inspections	–	2b			3b						
e. Signal Analyzer Equipment AN/APA-74											
(1) Understands the principles of operation	b	b			c						
(2) Locates and identifies components	3c	3c			4c						
(3) Operates equipment for maintenance purposes	2b	3c			4c						
(4) Performs preflight inspections	2b	2b			4c						
(5) Checks performance against technical order minimum performance standards	2b	2b			4c						
(6) Checks waveshapes at test points	2b	2b			4c						
(7) Localizes faults, using system trouble analysis chart	2b	2b			4c						
(8) Removes and replaces subassemblies	2b	2b			4c						
(9) Checks and replaces:											
(a) Fuses	2b	2b			4c						
(b) Electron tubes	2b	2b			4c						
(10) Checks operating voltages	2b	2b			3c						
(11) Checks and adjusts sweep accuracy and linearity	2b	2b			4c						
(12) Checks and adjusts stability	2b	2b			4c						
(13) Checks delay line performance	1b	1b			4c						
(14) Performs deflection chassis performance check	2b	2b			4c						
(15) Adjusts intensity, focus, and positioning	2b	3c			4c						
(16) Checks and adjusts lockout multivibrator	2b	2b			4c						
(17) Calibrates traces	2b	2b			4c						
(18) Performs system trouble analysis, using system trouble analysis chart	2b	2b			4c						
(19) Performs voltage, resistance and continuity checks, using appropriate technical order charts											
(20) Accomplishes bench check of serviced components to insure proper operation	2b	2b			4c						
	2b	2b			4c						

(A)	(B)	(C)			(D)			(E)	(F)		
	PROFICIENCY LEVEL AND PROGRESS RECORD										
REQUIRED KNOWLEDGE OR TASK	Crs (3) Lvl	AFSC (3) Lvl	Date OJT Started	Date Compl & Trainee's, Trainee's Initials	AFSC (4) Lvl	Date OJT Started	Date Compl & Trainee's, Trainee's Initials	Crs (7) Lvl	AFSC (7) Lvl	Date OJT Started	Date Compl & Trainee's, Trainee's Initials
6e.(21) Performs periodic inspections	2b	2b			4c						
f. Electrical Pulse Analyzer AN/ALA-5											
(1) Understands the principles of operation	b	b			c						
(2) Locates and identifies components	2b	2b			4c						
(3) Operates equipment for maintenance purposes	2b	3c			4c						
(4) Performs preflight inspections	2b	2b			4c						
(5) Checks performance against technical order minimum performance standards	2b	2b			4c						
(6) Localizes faults, using system trouble analysis chart	2b	2b			4c						
(7) Removes and replaces subassemblies	2b	2b			4c						
(8) Checks and replaces:											
(a) Fuses	2b	2b			4c						
(b) Panel lamps	2b	2b			4c						
(c) Electron tubes	2b	2b			4c						
(9) Checks power supply voltages	2b	2b			4c						
(10) Adjusts internal controls	2b	2b			3c			See JTS 30173	See JTS 30173		
(11) Performs system trouble analysis, using system trouble analysis chart	2b	2b			4c						
(12) Accomplishes bench check of serviced units to insure proper operation	2b	2b			4c						
g. Direction Finder Group AN/ALA-6											
(1) Understands the principles of operation	b	b			c						
(2) Locates and identifies components	2b	2b			4c						
(3) Operates equipment for maintenance purposes	2b	3c			4c						
(4) Performs preflight inspection	2b	2b			4c						
(5) Checks waveshapes in indicator unit	2b	2b			4c						
(6) Localizes faults, using system trouble analysis chart	2b	2b			4c						
(7) Removes and replaces subassemblies	2b	2b			4c						

(A)	(B)	(C)			(D)			(E)	(F)		
	PROFICIENCY LEVEL AND PROGRESS RECORD										
REQUIRED KNOWLEDGE OR TASK	Crs (2) Lvl	AFSC (3) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials	AFSC (4) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials	Crs (1) Lvl	AFSC (1) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials
6g.(8) Checks and replaces:											
(a) Fuses	2b	2b			4c			See JTS 30173	See JTS 30173		
(b) Panel lamps	2b	2b			4c						
(c) Electron tubes	2b	2b			4c						
(9) Checks power supply voltages	2b	2b			4c						
(10) Checks and adjusts performance of the following items against technical order minimum performance standards:											
(a) Controls	2b	2b			4c						
(b) Indicator response	2b	2b			4c						
(c) Receiver output	2b	2b			4c						
(d) Antenna control frequency accuracy	2b	2b			4c						
(e) Directional accuracy at zero	1b	1b			3c						
(f) Pulse-gain test	1b	1b			3c						
(g) Linearity check	1b	1b			3c						
(h) Expander test	1b	1b			3c						
(i) Heading-line test	1b	1b			3c						
(j) Amplifier frequency response	1b	1b			3c						
(k) Beam modulation test	1b	1b			3c						
(11) Checks, protects, and replaces crystal diodes	2b	2b			4c						
(12) Performs system trouble analysis, using system trouble analysis chart	2b	2b			4c						
(13) Cleans and lubricates mechanical parts	1b	1b			3c						
(14) Performs bench check of serviced components to insure proper operation	2b	2b			4c						
h. Aircraft Reconnaissance Receiver AN/APD-4											
(1) Understands the principles of operation	b	b			c						
(2) Locates and identifies components	b	2b			4c						
(3) Operates equipment for maintenance purposes	1b	2b			4c						
Performs preflight inspections	1b	2b			4c						

(A)	(B)	(C)			(D)			(E)	(F)		
	PROFICIENCY LEVEL AND PROGRESS RECORD										
REQUIRED KNOWLEDGE OR TASK	Crs (2) Lvl	AFSC (3) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials	AFSC (4) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials	Crs (1) Lvl	AFSC (1) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials
6h.(5) Checks performance against technical order minimum performance standards	1b	2b			4c			See JTS 30173	See JTS 30173		
(6) Localizes faults, using system trouble analysis chart	1b	2b			4c						
(7) Removes and replaces subassemblies	1b	2b			4c						
(8) Checks and replaces:											
(a) Fuses	2b	2b			4c						
(b) Panel lamps	2b	2b			4c						
(c) Electron tubes	2b	2b			4c						
(9) Checks, protects, and replaces crystal diodes	2b	2b			4c						
(10) Checks power supply voltages	2b	2b			4c						
(11) *Performs the following:*											
(a) Trigger sensitivity adjustment	1a	2b			4c						
(b) Channel A sensitivity and calibration	1a	2b			4c						
(c) Channel B sensitivity and calibration	1a	2b			4c						
(d) Channel C sensitivity and calibration	1a	2b			4c						
(e) Simultaneous channel calibration	1a	2b			4c						
(f) Monitor adapter calibration	1a	2b			4c						
(g) Sector equalizer procedure	1a	2b			4c						
(h) DF and PRF sweep circuit marker Z (frequency coincidence) sensitivity adjustment	1a	2b			4c						
(12) Performs test film exposure procedure	–	2b			4c						
(13) Performs test film analysis	–	2b			4c						
(14) *Services film magazine*	–	2b			4c						
(15) Protects unexposed and exposed film from physical and light damage	–	2b			3c						
(16) Removes and replaces camera motor brushes	–	2b			3c						
(17) Removes, checks, and replaces strobotron flasher	–	2b			3c						
(18) Cleans and lubricates mechanical parts	1a	2b			3c						
(19) Performs system trouble analysis, using system trouble analysis chart	1a	2b			4c						

(A)	(B)	(C)			(D)			(E)	(F)		
	PROFICIENCY LEVEL AND PROGRESS RECORD										
REQUIRED KNOWLEDGE OR TASK	Crs (S) Lvl	AFSC (S) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials	AFSC (S) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials	Crs (T) Lvl	AFSC (T) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials
6h.(20) Performs voltage, resistance, and continuity checks, using appropriate technical order charts	1a	2b			4c			See JTS 30178	See JTS 30178		
(21) Accomplishes bench check of serviced units to insure proper operation	1a	2b			4c						
(22) Performs periodic inspections	1a	2b			4c						
i. Electronic Reconnaissance Data Recorder Set AN/ALH-2											
(1) Understands the principles of operation	b	b			c						
(2) Locates and identifies components	2b	2b			4c						
(3) Operates equipment for maintenance purposes	2b	3c			4c						
(4) Performs preflight inspection	2b	2b			4c						
(5) Checks performance against technical order minimum performance standards	2b	2b			4c						
(6) Localizes faults, using system trouble analysis chart	2b	2b			4c						
(7) Removes and replaces subassemblies	2b	2b			4c						
(8) Checks and replaces:											
(a) Fuses	2b	2b			4c						
(b) Panel lamps	2b	2b			4c						
(9) Checks and replaces motor brushes	2b	2b			4c						
(10) Connects recorder to proper signal sources	2b	2b			4c						
(11) Loads tape reels in magazine	2b	2b			4c						
(12) Performs the following adjustments:											
(a) Motor speed	b	2b			3c						
(b) Clutch	b	2b			3c						
(c) Recording head	1b	1b			2b						
(d) Channel B recording level	1b	1b			2b						
(13) Cleans recording head and tape to insure satisfactory recordings	2b	2b			3c						
(14) Protects tapes from temperature, humidity, and magnetic damage	2b	2b			4c						
(15) Cleans and lubricates mechanical parts	1b	1b			3c						

(A)	(B)	(C)			(D)			(E)	(F)		
	PROFICIENCY LEVEL AND PROGRESS RECORD										
REQUIRED KNOWLEDGE OR TASK	Crs (S) Lvl	AFSC (S) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials	AFSC (S) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials	Crs (T) Lvl	AFSC (T) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials
6i.(16) Accomplishes bench check of serviced units to insure proper operation	2b	2b			4c			See JTS 30178	See JTS 30178		
(17) Performs periodic inspections	2b	2b			4c						
j. Electronic Reconnaissance Data Reproducing Set AN/GLH-1											
(1) Understands principles of operation	b	b			4c						
(2) Locates and identifies components	2b	2b			4c						
(3) Operates equipment to playback, degauss, and check recorder	2b	2b			4c						
(4) Checks performance against technical order minimum performance standards	1b	2b			4c						
(5) Performs periodic inspections	1b	2b			4c						
k. Airborne Countermeasure Transmitter AN/ALT-6B											
(1) Demonstrates a knowledge of transmitter principles by identifying components parts and solving problems pertinent to a representative transmitter schematic	b	b			4c						
(2) Understands data flow analysis of a typical ECM transmitter	b	b			4c						
(3) Operates an ECM transmitter for maintenance purposes	2b	3c			4c						
(4) Performs preflight inspections	2b	3c			4c						
(5) Identifies and locates major jamming transmitter components	3c	3c			4c						
(6) Checks cables and performs cabling of an ECM transmitter	2b	2b			4c						
(7) Localizes faults, using system trouble analysis chart	2b	2b			3c						
(8) Locates and identifies power distribution and control circuit components in an ECM transmitter	2b	2b			4c						
(9) Checks emergency reset of an ECM transmitter	2b	3c			4c						
(10) Checks low voltage power supplies	2b	2b			4c						
(11) Checks high voltage power supply and adjusts modulator current	2b	2b			4c						
(12) Adjusts magnetron filament voltage	2b	2b			4c						
(13) Adjusts noise amplitude output	2b	2b			4c						
(14) Adjusts clipper voltage	2b	2b			4c						

(A)	PROFICIENCY LEVEL AND PROGRESS RECORD (B)	(C)			(D)			(E)	(F)		
REQUIRED KNOWLEDGE OR TASK	Crs (6) Lvl	AFSC (6) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials	AFSC (6) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials	Crs (7) Lvl	AFSC (7) Lvl	Date OJT Started	Date Compl & Trainee's, Trainer's Initials
6k.(15) Operates typical ECM transmitter and typical ECM receiver for maintenance purposes	2b	2b			4c			See JTS 30173	See JTS 30173		
l. Performs organizational level maintenance on category I and II test equipment as defined in T.O. 33-1-14	1a	2b			3c						
7. AIRCRAFT ELECTRICAL SYSTEM											
a. Operates ground power units (GPU's)	–	2b			3c						
b. Performs operational and preventive maintenance checks on GPU equipment	–	2b			3c						
c. Applies power to ECM equipment	–	2b			3c						
d. Is familiar with the operation of the aircraft's d-c generators, alternators, inverters, d-c rectifiers, fixed and variable frequency a-c generators	a	1b			1b						
e. Understands the electrical power layout in the aircraft as it pertains to ECM ipment	–	1b			2b						
f. . ows location of principal electrical terminals, fuse panels, circuit breakers, and electrical sources in the aircraft	–	1b			3c						
8. SUPERVISORY FUNCTIONS											
a. Orients newly assigned personnel in their duties and the unit mission and organization	–	–			2b						
b. Assigns work and reviews completed jobs to insure compliance with local procedures and applicable technical publications	–	–			2b						
c. Instructs subordinates in the techniques of installation, maintenance, and repair of reconnaissance-type aircraft electronic countermeasures equipment	–	2b			3c						

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