DEPARTMENT OF THE AIR FORCE
Headquarters US Air Force
Washington DC 20330-1680

Air Force Job Qualification
Standard 2E1X3-206N
2E1X3-206.14
1 October 1999

AN/URC-119(V) HF COMMUNICATIONS SYSTEM
(Ground Radio Communications Journeyman/Craftsman)

SECTION A: GENERAL

1. This Air Force Job Qualification Standard (AFJQS) and attached Air Force Qualification Training Package (AFQTP) standardize on-the-job training (OJT) tasks and constitute an approved training program for the AN/URC-119(V). The AFJQS and AFQTP are used by unit training managers, supervisors, trainers, trainees, and other training functions to plan, conduct, and document OJT on this equipment.

2. Maintain the AFJQS IAW AFI 36-2201, AFI 36-2233, and AFMAN 36-2247. Routine changes will be accomplished via page changes and urgent changes will be disseminated via message. Enter additional local tasks in the blank areas on the AFJQS or add forms. Develop Task Training Guides for added tasks; they should be consistent in content and format with those in the AFQTP. Submit recommended AFJQS/AFQTP improvements/corrections to the 81 TRSS Qualification Training Flight (81 TRSS/TSQS), 601 D Street, Keesler AFB MS 39534-2229.

3. Review Air Force publishing bulletins and AFIND8 to identify available training materials. Use this AFJQS in conjunction with other applicable JQSs or the Career Field Education and Training Plan (CFETP) and locally assigned tasks to identify work center duty positions. Also, use this AFJQS along with other applicable JQSs and the CFETP to evaluate newly assigned personnel and identify individual training requirements.

4. Tasks listed on the AFJQS have been selected IAW the Instructional System Development (ISD) process and are the minimum, mandatory AF training requirements for this equipment/function. The "X" code in the Core Task column of the AF Form 797 is used to indicate that the individual must be trained and certified on that particular task. The "X*" code identifies tasks that may not be common to all equipment configurations; however, the task must be trained if it is assigned to the individual's duty position. The "—" code is used to indicate that training on this task is a local determination while ensuring 100% task coverage within the work center.

5. Trainees must accurately perform each assigned task unassisted IAW Technical References (TR) prior to being certified. To qualify for skill-level upgrade, trainees must be certified on assigned tasks, satisfactorily complete career knowledge training, and meet mandatory specialty qualifications IAW AFI 36-2101, AFI 36-2201, and AFMAN 36-2108. After upgrade, assign individuals to other work center duty positions and continue qualification training.

Supersedes AFJQS 2E1X3-206N, dated 2 September 1999
OPR: HQ USAF/ILMM
OCR: 81 TRSS/TSQR
DISTRIBUTION: X

SECTION B: DOCUMENTATION

1. AFJQS/CFETP tasks will be compiled in an automated training management system, such as the Core Automated Maintenance System (CAMS), if available. The system must contain each AFJQS/CFETP title line with appropriate AFJQS/CFETP numbers, titles, and dates. AFJQS/CFETP and automated documentation requirements are listed below. The alphanumeric AFJQS number is converted to a dotted decimal number for use in CAMS. Alphanumeric numbers have been converted by retaining the 200 series number and changing the alpha character to the corresponding number, i.e., -200B becomes -200.2 and -201LB becomes -201.12.2.

a. Load applicable tasks in the automated training system or identify training requirements by circling the task numbers on each individual's AFJQS/CFETP.

b. If task statements contain more than one noun or action verb which precludes certification on the entire task, load/circle the noun or verb to indicate the individual is being trained only on that portion of the task.

c. When training is started on a task, enter the start date in the appropriate place. When training is complete, document training and task certification IAW local certification procedures.

2. The identification blocks listed below are to be used when the trainer is other than the trainee's immediate supervisor.

TRAINEE'S NAME:	INITIALS:	SSN:
TRAINER'S NAME, INITIALS, DATE:		
TRAINER'S NAME, INITIALS, DATE:		
TRAINER'S NAME, INITIALS, DATE:		
TRAINER'S NAME, INITIALS, DATE:		
TRAINER'S NAME, INITIALS, DATE:		

BY ORDER OF THE SECRETARY OF THE AIR FORCE

OFFICIAL

JOHN W. HANDY, Lieutenant General, USAF
Deputy Chief of Staff/Installations and Logistics

4 Atch
1. AF Form 797
2. Trainer's Guide
3. Skill Training Material
4. Knowledge Evaluation Pamphlet

JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE, AND TECHNICAL REFERENCES	CORE TASK	CERTIFICATION				
		START DATE	COMPLETE DATE	TRAINEE'S INITIALS	TRAINER'S INITIALS	CERTIFYING OFFICIAL'S INITIALS
206.14.1 EQUIPMENT OPERATION						
206.14.1.1 Operate RT-1446 transceiver TR: 31R2-2URC-81, pgs 3-1 thru 4-26	X					
206.14.1.2 Operate C-11329 remote control unit (RCU) TR: 31R2-2URC-91, pgs 3-1 thru 4-26	X					
206.14.1.3 Operate CU-2310 antenna coupler TR: 31R2-2URC-111, pgs 3-1 thru 4-2	X					
206.14.1.4 Operate AM-7223 Linear Power Amplifier (LPA) TR: 31R2-2URC-101, pgs 3-1 thru 4-8	X*					
206.14.1.5 Operate AM-7224 LPA with PP-7913/URC TR: 31R2-2URC-121, pgs 3-1 thru 3-3 and 35C1-2-892-1, pgs 3-1 thru 4-3	X*					
206.14.2 PREVENTIVE MAINTENANCE INSPECTIONS						
206.14.2.1 Perform 56-day inspection TR: 31R2-2URC-86WC-1, cards 1-001 thru 1-007 and 2-001 thru 2-003; 31R2-2URC-96WC-1, cards 1-001 thru 1-007; 31R2-2URC-106WC-1, cards 1-001 thru 2-003; 31R2-2URC-116WC-1, cards 1-001 thru 1-007 and 2-001 thru 2-003	X					
206.14.2.2 Perform 168-day inspection TR: 31R2-2URC-106WC-1, cards 2-004 and 2-005; 31R2-2URC-116WC-1, cards 2-001 thru 2-003; 35C1-2-892-6WC-1, cards 2-004 and 2-005	—					
206.14.2.3 Perform 336-day inspection TR: 31R2-2URC-86WC-1, cards 1-008 and 1-009	—					

TRAINEE NAME *(Last, First, MI)*	CFETP/JQS NUMBER	PAGE NO
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JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE, AND TECHNICAL REFERENCES	CORE TASK	CERTIFICATION				
		START DATE	COMPLETE DATE	TRAINEE'S INITIALS	TRAINER'S INITIALS	CERTIFYING OFFICIAL'S INITIALS
206.14.3 ISOLATE FAULTS						
206.14.3.1 Perform fault isolation on RT-1446/URC transceiver TR: 31R2-2URC-81, pgs 6-2 thru 6-11	—					
206.14.3.2 Perform fault isolation on C-11329/URC RCU TR: 31R2-2URC-91, pgs 6-2 thru 6-6	—					
206.14.3.3 Perform fault isolation on AM7223/URC RF amplifier and/or AM-7224/URC RF amplifier TR: 31R2-2URC-101, pgs 6-2 thru 6-29; 31R2-2URC-121, pgs 6-3 thru 6-29	—					
206.14.3.4 Perform fault isolation on CU-2310/URC antenna coupler TR: 31R2-2URC-111, pgs 6-2 thru 6-4	—					
206.14.4 RT-1446 ALIGNMENTS TR: 31R2-2URC-81						
206.14.4.1 Align exciter assembly A1A1 TR: para 6-30a	—					
206.14.4.2 Align Intermediate Frequency (IF) filter assembly A1A2 TR: para 6-30b	—					
206.14.4.3 Align first converter assembly A1A3 TR: para 6-30c	—					
206.14.4.4 Align low pass filter assembly A1A5 TR: para 6-30e	—					

TRAINEE NAME *(Last, First, MI)*	CFETP/JQS NUMBER	PAGE NO
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JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE, AND TECHNICAL REFERENCES	CORE TASK	CERTIFICATION				
		START DATE	COMPLETE DATE	TRAINEE'S INITIALS	TRAINER'S INITIALS	CERTIFYING OFFICIAL'S INITIALS
206.14.4.5 Align Automatic Gain Control (AGC)/Transmit Gain Control (TGC) assembly A1A6 TR: para 6-30f	__					
206.14.4.6 Align receiver assembly A1A7 TR: para 6-30g	__					
206.14.4.7 Align crystal oscillator assembly A1A8 TR: para 6-30h	__					
206.14.4.8 Align reference/Beat Frequency Oscillator (BFO) assembly A1A9 TR: para 6-30i	__					
206.14.4.9 Align synthesizer assembly A1A10 TR: para 6-30j	__					
206.14.4.10 Align transceiver control assembly A1A12 TR: para 6-30m	__					
206.14.4.11 Align multivoltage supply assembly A1A14 TR: para 6-30o	__					
206.14.4.12 Align audio interface assembly A1A16 TR: para 6-30q	__					
206.14.4.13 Align Audio Frequency Shift Keying (AFSK) module assembly A1A18 TR: para 6-30s	__					
206.14.4.14 Align 13.6VDC power supply assembly A2A2 TR: para 6-30v	X					

JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE, AND TECHNICAL REFERENCES	CORE TASK	CERTIFICATION				
		START DATE	COMPLETE DATE	TRAINEE'S INITIALS	TRAINER'S INITIALS	CERTIFYING OFFICIAL'S INITIALS
206.14.5 C-11329 ALIGNMENTS TR: 31R2-2URC-91						
206.14.5.1 Align multivoltage supply assembly A3 TR: para 6-15c	X*					
206.14.5.2 Align audio interface assembly A4 TR: para 6-15d	X*					
206.14.5.3 Align audio/microprocessor assembly A2 TR: para 6-15e	X*					
206.14.6 AM-7223 LPA ALIGNMENTS TR: 31R2-2URC-101						
206.14.6.1 Align output filter assembly A3 TR: para 6-24c	X*					
206.14.6.2 Align low voltage power supply assembly A4 TR: para 6-24d	X*					
206.14.6.3 Align power control assembly A5 TR: para 6-24e	X*					
206.14.6.4 Align temperature sensor assemblyA10 TR: para 6-24j	X*					
206.14.7 Align CU-2310 Antenna Coupler TR: 31R2-2URC-111, paras 6-10a thru 6-10c	—					

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JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE, AND TECHNICAL REFERENCES	CORE TASK	CERTIFICATION				
		START DATE	COMPLETE DATE	TRAINEE'S INITIALS	TRAINER'S INITIALS	CERTIFYING OFFICIAL'S INITIALS
206.14.8 AM-7224 LPA ALIGNMENTS TR: 31R2-2URC-121						
206.14.8.1 Align tube assembly A1 TR: paras 6-23 thru 6-23a(5)	X*					
206.14.8.2 Align Voltage Standing Wave Ratio (VSWR)/Transformer (XFMR) assembly A3 TR: para 6-23c	X*					
206.14.8.3 Align power control assembly A5 TR: para 6-23e	X*					

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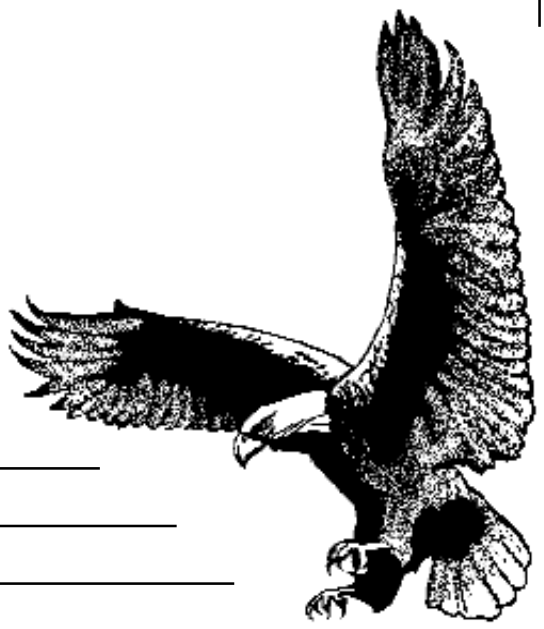
AIR FORCE QUALIFICATION TRAINING PACKAGE 2E1X3-206N

PART OF AFJQS 2E1X3-206N

AN/URC-119(V) HF COMMUNICATIONS SYSTEM

TRAINER'S GUIDE



1 OCTOBER 1999

SUPERSEDES AFJQS 2E1X3-206N
DATED 2 SEPTEMBER 1999

FOR OJT USE ONLY

TRAINER'S GUIDE

CONTENTS

ABOUT THIS TRAINING PACKAGE

This AFQTP was originally developed by SSgt Carl Alexander. It was revised by TSgt William S. Mabb, 81 TRSS Qualification Training Flight. MSgt William E. Bowman was the Training and Education Specialist. SSgt John C. Pauls of the 30 CS, Vandenberg AFB, CA, also supported the development as AN/URC-119(V) subject matter expert. It was field tested and validated at the 1 CCGP, Lindsey AS, GM.

For more information on the 81 TRSS Qualification Training Flight and a list of other products that are available, feel free to visit our home page at http://www.keesler.af.mil/81trss/qflight.

IMPORTANT INFORMATION

The following training guidance is intended for use by qualified trainers. It is mandatory that trainers complete Air Force Training Course J6AJI3S251-000 before attempting to train anyone on this material. Contact your unit training manager to obtain training on this course.

This training package was developed with four objectives in mind.

- Standardize on-the-job training.
- Reduce training time while maintaining proficiency standards.
- Provide trainers and trainees with a logically organized training plan which yields immediate and measurable feedback.
- Provide a standard to measure task knowledge and performance during personnel evaluations.

HOW TO USE THIS TRAINING PACKAGE

PACKAGE DESCRIPTION

This training package consists of

- an AF Form 797 that lists all tasks performed during development of OJT material that require structured training and certification.
- a Trainer's Guide that provides the trainer with instructions on how to effectively conduct on-the-job training using this training package. The Trainer's Guide includes Task Training Guides (TTG) and covers every task listed on the AF Form 797. The task evaluation checklists reflect the major areas of a task which must be performed satisfactorily

before certification. A Training Completion Certification is attached.

- Skill Training Material (STM) which contains training modules, review questions, performance procedures, and a review question confirmation key.
- a Knowledge Evaluation Pamphlet (KEP) which contains a test for each module. Keep the pamphlet separate until you are ready to administer the tests. Detach and store the KEP Key and Answer Sheet(s) in a secure place to ensure the KEP is not compromised.

INSTRUCTIONS FOR USING THIS TRAINING PACKAGE

- Review the trainee's training record (AF Form 623) and determine the trainee's previous training and certification.
- Assign the trainee to a duty position and develop the trainee's individual training plan (ITP) (see Figure 1 for an example of a computer-generated plan). Using the ITP, select the first task for training and review the applicable TTG.
- Ensure all training references are available and all prerequisites for that task are met.
- Discuss with trainee the task objective(s) and training steps. Assign corresponding STM module for the trainee to complete.
- When you are satisfied with the trainee's knowledge of the material, administer the KEP. (Normally, the trainee is NOT permitted to use TRs but if TR use is permitted, it will be stated at the beginning of each KEP test and a score of 100% required. Otherwise, the trainee must score a minimum of 70% on the KEP tests.) Check the trainee's answers against the KEP Confirmation Key and review missed questions with trainee to ensure understanding of the material. If the score is less than what is required, have the trainee restudy the module and retake the test. Using TRs and the Task Evaluation Checklist as guidance, explain the task performance procedures to the trainee. Demonstrate the task procedures to the trainee and answer any questions. Have the trainee practice and explain the task procedures to you.
- Have the trainee perform the task procedures unassisted. Using the Task Evaluation Checklist, evaluate the trainee's performance. Should the trainee fail, determine the cause of unsatisfactory performance. Reevaluate the trainee when you are satisfied the task can be performed unassisted. When the trainee performs the task at the desired level of

proficiency without assistance, document training and task certification IAW local certification procedures.

- Using the ITP, assign additional tasks until the trainee completes the requirements for the duty position. If, before completing this training package, the trainee is reassigned to another location which has a need for this training, we recommend you forward the training material to the gaining work center.
- Schedule periodic evaluations after the trainee is task certified. You may use the performance procedures, task evaluation checklists, or the KEP.
- When training is completed, remove the attached Training Completion Certification and give it to the trainee so he/she may make recommendations, suggestions, or offer corrections to the training package in the comments section. Mail the completed Training Completion Certification to the address specified. Upon receipt of a properly completed training certification, a Certificate of Training will be forwarded through channels to the trainee.

INDIVIDUAL TRAINING PLAN

TRAINEE: Amn Smith TRAINER: SSgt Jones

AFJQS NUMBER/ TASK NUMBER	ESTIMATED TRAINING TIME	ESTIMATED START TIME	DATE TRAINING COMPLETED	REMARKS
XXXXX-XXXX /1	2 days	21 Jun 98	23 Jun 98	
/2	4 hours	24 Jun 98	25 Jun 98	

EXAMPLE **EXAMPLE**

This Individual Training Plan is an example only.
It does not reflect accurate training times.

Figure 1. Individual Training Plan

LIST OF TERMS

TERM	DEFINITION
AFSK	Audio Frequency Shift Keying
AGC	Automatic Gain Control
AM	Amplitude Modulation
AME	Amplitude Modulation Equivalent
API	Analog Phase Interpolation
AVG	Average
BFO	Beat Frequency Oscillator
BIT	Built-In Test
CW	Continuous Wave
FSK	Frequency Shift Keying
HF	High Frequency
IF	Intermediate Frequency
LF	Low Frequency
LPA	Linear Power Amplifier
LSB	Lower Sideband
PEP	Peak Envelope Power
RCU	Remote Control Unit
SSB	Single Sideband
T/R	Transmit/Receive
TGC	Transmit Gain Control
USB	Upper Sideband
VOX	Voice Operated Transmit
VSWR	Voltage Standing Wave Ratio

RT-1446 TRANSCEIVER OPERATION TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.1.1

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-81
- AFQTP Modules 1 and 2

PREREQUISITE(S)

- Test equipment to be used: None.
- Downtime/user release is/is not required.

TRAINING OBJECTIVE(S)

- Given TO 31R2-2URC-81, operate RT-1446 transceiver IAW pgs 3-1 thru 4-26.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

Assign AFQTP Module 1.

Discuss the review questions and answers with the trainee.

Administer the KEP.

Check the KEP answers and review missed questions.

Assign AFQTP Module 2.

Discuss the review questions and answers with the trainee.

Administer the KEP.

Check the KEP answers and review missed questions.

OBJECTIVE TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform initial checkout.

Operate transceiver in each mode.

Make front panel adjustments (as necessary).

Program channels.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.1.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

Performed initial checkout.

Operated transceiver in each mode.

Made front panel adjustments (as necessary).

Programmed channels.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

C-11329 REMOTE CONTROL UNIT (RCU) AND CU-2310 ANTENNA COUPLER OPERATION TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.1.2
- 206.14.1.3

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-91
- TO 31R2-2URC-111
- AFQTP Module 3

PREREQUISITE(S)

- Test equipment to be used: None.
- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given TO 31R2-2URC-91, operate C-11329 RCU IAW pgs 3-1 thru 4-26.
- OBJECTIVE 2: Given TO 31R2-2URC-111, operate CU-2310 antenna coupler IAW pgs 3-1 thru 4-2.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

Assign AFQTP Module 3.

Discuss the review questions and answers with the trainee.

Administer the KEP.

Check the KEP answers and review missed questions.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Connect RCU to transceiver.

Set all applicable switches on the RCU and transceiver.

Operate RCU.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.1.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Connected RCU to transceiver.

Set all applicable switches on the RCU and transceiver.

Operated RCU.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Connect CU-2310 Antenna Coupler.

Verify antenna coupler operation.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.1.3 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Connected CU-2310 Antenna Coupler.

Verified antenna coupler operation.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

AM-7223/7224 LINEAR POWER AMPLIFIER (LPA) OPERATION TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.1.4
- 206.14.1.5

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-101
- TO 31R2-2URC-121
- TO 35C1-2-892-1
- AFQTP Module 4

PREREQUISITE(S)

- Test equipment to be used: None.
- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given TO 31R2-2URC-101, operate AM-7223 LPA IAW pgs 3-1 thru 4-8.
- OBJECTIVE 2: Given TOs 31R2-2URC-121 and 35C1-2-892-1, operate AM-7224 LPA with PP-7913/URC IAW pgs 3-1 thru 3-3 of the -121 TO and pgs 3-1 thru 4-3 of the -1 TO.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

Assign AFQTP Module 4.

Discuss the review questions and answers with the trainee.

Administer the KEP.

Check the KEP answers and review missed questions.

OBJECTIVE 1 AND 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 and 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Operate AM-7223/7224 LPA in the automatic mode.

Operate AM-7223/7224 LPA in the manual mode.

Perform the self-test on the AM-7223/7224 LPA.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

NOTE

Since the evaluation procedures for both amplifiers are the same, only one checklist is provided for both tasks.

TASK 206.14.1.4 AND 206.14.1.5 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

Operated AM-7223/7224 LPA in the automatic mode.

Operated AM-7223/7224 LPA in the manual mode.

Performed the self-test on the AM-7223/7224 LPA.

Restored system to normal operating configuration.

Trainee is ready to be certified on AFJQS task 206.14.1.4 and/or 206.14.1.5, as applicable. Follow local certification procedures.

Assign the next task for training.

PREVENTIVE MAINTENANCE INSPECTIONS TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.2.1
- 206.14.2.2
- 206.14.2.3

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-86WC-1
- TO 31R2-2URC-96WC-1
- TO 31R2-2URC-106WC-1
- TO 31R2-2URC-116WC-1
- TO 35C1-2-892-6WC-1

PREREQUISITE(S)

- Test equipment to be used:

  Frequency Counter
  Wattmeter
  Dummy Load

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 thru 4.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given TO 31R2-2URC-86WC-1, cards 1-001 thru 1-007 and 2-001 thru 2-003; TO 31R2-2URC-96WC-1, cards 1-001 thru 1-007; TO 31R2-2URC-106WC-1, cards 1-001 thru 2-003; TO 31R2-2URC-116WC-1, cards 1-001 thru 1-007 and 2-001 thru 2-003, perform 56-day inspection IAW prescribed directives.
- OBJECTIVE 2: Given TO 31R2-2URC-106WC-1, cards 2-004 and 2-005, and/or TO 31R2-2URC-116WC-1, cards 2-001 thru 2-003, and/or

TO 35C1-2-892-6WC-1, cards 2-004 and 2-005, perform 168-day inspection IAW prescribed directives.

- OBJECTIVE 3: Given TO 31R2-2URC-86WC-1, perform 336-day inspection IAW cards 1-008 and 1-009.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform system check.

Perform filter inspection.

Perform BIT on 500 or 1000 watt LPA (when applicable).

Perform BIT on RT-1446 Transceiver.

Perform BIT on CU-2310 Antenna Coupler (when applicable).

Perform BIT on C-11329 RCU (when applicable).

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.2.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Performed system check.

Performed filter inspection.

Performed Built-In Test (BIT) on 500 or 1000 watt LPA (when applicable).

Performed BIT on RT-1446 Transceiver.

Performed BIT on CU-2310 Antenna Coupler (when applicable).

Performed BIT on C-11329 RCU (when applicable).

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Ensure power is off and disconnect equipment.

Clean and lubricate 500 or 1000 watt LPA (when applicable).

Clean and lubricate CU-2310 Antenna Coupler (when applicable).

Connect equipment and initiate BIT.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.2.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Ensured power was off and disconnected equipment.

Cleaned and lubricated 500 or 1000 watt LPA (when applicable).

Cleaned and lubricated CU-2310 Antenna Coupler (when applicable).

Connected equipment and initiated BIT.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 3 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 3 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Check Frequency Counter for stability and accuracy.

Check frequency standard for offset information.

Check frequency of the standard.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.2.3 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 3 TRAINING STEPS if evaluation is unsatisfactory.)

Checked Frequency Counter for stability and accuracy.

Checked frequency standard for offset information.

Checked frequency of the standard.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

FAULT ISOLATION
TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.3.1
- 206.14.3.2
- 206.14.3.3
- 206.14.3.4

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-81
- TO 31R2-2URC-91
- TO 31R2-2URC-101
- TO 31R2-2URC-111
- TO 31R2-2URC-121

PREREQUISITE(S)

- Test equipment to be used: None.
- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 thru 4.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given TO 31R2-2URC-81, perform fault isolation on RT-1446/URC transceiver IAW pgs 6-2 thru 6-11.
- OBJECTIVE 2: Given TO 31R2-2URC-91, perform fault isolation on C-11329/URC RCU IAW pgs 6-2 thru 6-6.
- OBJECTIVE 3: Given TO 31R2-2URC-101 or 31R2-2URC-121, perform fault isolation on AM7223/URC RF amplifier and/or AM-7224/URC RF amplifier IAW pgs 6-2 thru 6-29 of the -101 TO or pgs 6-3 thru 6-29 of the -121 TO.

- OBJECTIVE 4: Given TO 31R2-2URC-111, perform fault isolation on CU-2310/URC antenna coupler IAW pgs 6-2 thru 6-4.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform BIT to check transceiver operation.

Troubleshoot transceiver using automatic BIT and/or manual BIT flowchart.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

NOTE

Based on local system configuration, skip those paragraphs that do not apply.

TASK 206.14.3.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Performed BIT to check transceiver operation.

Troubleshot transceiver using automatic BIT and/or manual BIT flowchart.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform BIT to check RCU operation.

Troubleshoot RCU using automatic BIT and/or manual BIT flowchart.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.3.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Performed BIT to check RCU operation.

Troubleshot RCU using automatic BIT and/or manual BIT flowchart.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 3 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 3 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform BIT to check 500 or 1000 watt LPA operation.

Troubleshoot 500 or 1000 watt LPA using automatic BIT and/or manual BIT flowchart.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.3.3 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 3 TRAINING STEPS if evaluation is unsatisfactory.)

Performed BIT to check 500 or 1000 watt LPA operation.

Troubleshot 500 or 1000 watt LPA using automatic BIT and/or manual BIT flowchart.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 4 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 4 with trainee. Ensure

all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform BIT to check CU-2310 Antenna Coupler operation.

Troubleshoot CU-2310 Antenna Coupler using automatic BIT and/or special procedures.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.3.4 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 4 TRAINING STEPS if evaluation is unsatisfactory.)

Performed BIT to check CU-2310 Antenna Coupler operation.

Troubleshot CU-2310 Antenna Coupler using automatic BIT and/or special procedures.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

RT-1446 TRANSMIT ALIGNMENTS
TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.4.1

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-81

PREREQUISITE(S)

- Test equipment to be used:

  Spectrum Analyzer
  Signal Generator
  Dummy Load
  Oscilloscope
  Wattmeter
  Audio Oscillator

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 and 2.

TRAINING OBJECTIVE(S)

- Given TO 31R2-2URC-81, align exciter assembly A1A1 IAW para 6-30a.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

OBJECTIVE TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform Carrier Null adjustment.

Perform 455kHz Presence Detector Peaking adjustment.

Perform Amplitude Modulation Equivalent (AME) Inserted Carrier Level adjustment.

Perform Tune Power adjustment.

Perform Bandstop Filter adjustment.

Perform Low Power Threshold adjustment.

Perform LINE and AUDIO 2 adjustment.

Perform Audio Meter Calibration adjustment.

Perform Voice Operated Transmit (VOX) and Continuous Wave (CW) Delay adjustments.

Perform Clipper Level adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.4.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

Performed Carrier Null adjustment.

Performed 455kHz Presence Detector Peaking adjustment.

Performed AME Inserted Carrier Level adjustment.

Performed Tune Power adjustment.

Performed Bandstop Filter adjustment.

Performed Low Power Threshold adjustment.

Performed LINE and AUDIO 2 adjustment.

Performed Audio Meter Calibration adjustment.

Performed VOX and CW Delay adjustments.

Performed Clipper Level adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

RT-1446 TRANSMIT/RECEIVE (T/R) ALIGNMENTS TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.4.2
- 206.14.4.3
- 206.14.4.4
- 206.14.4.5

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-81

PREREQUISITE(S)

- Test equipment to be used:

  Spectrum Analyzer
  RF Signal Generator
  Frequency Counter
  RF Wattmeter
  DC Voltmeter
  Multimeter
  Dummy Load

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 and 2.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given TO 31R2-2URC-81, align Intermediate Frequency (IF) filter assembly A1A2 IAW para 6-30b.
- OBJECTIVE 2: Given TO 31R2-2URC-81, align first converter assembly A1A3 IAW para 6-30c.
- OBJECTIVE 3: Given TO 31R2-2URC-81, align low pass filter assembly A1A5 IAW para 6-30e.
- OBJECTIVE 4: Given TO 31R2-2URC-81, align Automatic Gain Control (AGC)/Transmit Gain Control (TGC) assembly A1A6 IAW para 6-30f.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using the technical references and checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform L2, 455kHz Filter Input adjustment.

Perform R5, IF Gain adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnected all test equipment used and restored system to normal operating configuration.

Have trainee practice task steps and assist as necessary.

TASK 206.14.4.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Performed L2, 455kHz Filter Input adjustment.

Performed R5, IF Gain adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using the technical references and checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform 40MHz IF Filter Peaking adjustment.

Perform AGC adjustment.

Perform 40MHz IF Trap adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice task steps and assist as necessary.

TASK 204.14.4.3 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Performed 40MHz IF Filter Peaking adjustment.

Performed AGC adjustment.

Performed 40MHz IF Trap adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 3 TRAINING STEPS

Using the technical references and checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 3 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform Frequency and Level adjustments.

Perform Forward and Reflected Power adjustments.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice task steps and assist as necessary.

TASK 206.14.4.4 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 3 TRAINING STEPS if evaluation is unsatisfactory.)

Performed Frequency and Level adjustments.

Performed Forward and Reflected Power adjustments.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 4 TRAINING STEPS

Using the technical references and checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 4 with trainee. Ensure

all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform AGC Threshold adjustment.

Perform TGC Clock Frequency adjustment.

Perform 100W Set Point adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice task steps and assist as necessary.

TASK 204.14.4.5 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 4 TRAINING STEPS if evaluation is unsatisfactory.)

Performed AGC Threshold adjustment.

Performed TGC Clock Frequency adjustment.

Performed 100W Set Point adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

RT-1446 RECEIVE ALIGNMENTS TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.4.6

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-81

PREREQUISITE(S)

- Test equipment to be used:

  RF Signal Generator
  Oscilloscope
  Digital Voltmeter
  Spectrum Analyzer

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 and 2.

TRAINING OBJECTIVE(S)

- Given TO 31R2-2URC-81, align receiver assembly A1A7 IAW para 6-30g.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

OBJECTIVE TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Set up test equipment.

Perform 455kHz IF Peaking adjustment.

Perform Gain adjustment.

Perform AGC adjustment.

Perform 39.545MHz Oscillator Peaking adjustment.

Perform Sidetone Level adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.4.6 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEPS if evaluation is unsatisfactory.)

Set up test equipment.

Performed 455kHz IF Peaking adjustment.

Performed Gain adjustment.

Performed AGC adjustment.

Performed 39.545MHz Oscillator Peaking adjustment.

Performed Sidetone Level adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

RT-1446 REFERENCE FREQUENCY ALIGNMENTS TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.4.7
- 206.14.4.8
- 206.14.4.9

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-81

PREREQUISITE(S)

- Test equipment to be used:

  Frequency Counter
  Oscilloscope
  DC Voltmeter
  Spectrum Analyzer
  DC Power Supply

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 and 2.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given TO 31R2-2URC-81, align crystal oscillator assembly A1A8 IAW para 6-30h.
- OBJECTIVE 2: Given TO 31R2-2URC-81, align reference/Beat Frequency Oscillator (BFO) assembly A1A9 IAW para 6-30i.
- OBJECTIVE 3: Given TO 31R2-2URC-81, align synthesizer assembly A1A10 IAW para 6-30j.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Connect test equipment.

Perform Crystal Oscillator adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.4.7 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Connected test equipment.

Performed Crystal Oscillator adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure

all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Connect test equipment.

Perform 40MHz Output Peaking adjustment.

Perform 10MHz Input adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.4.8 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Connected test equipment.

Performed 40MHz Output Peaking adjustment.

Performed 10MHz Input adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 3 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 3 with trainee. Ensure

all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Connect test equipment.

Perform Analog Phase Interpolation (API) adjustment.

Perform the 40.455MHz Trap adjustment.

Perform the 100kHz Sideband Null adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.4.9 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 3 TRAINING STEPS if evaluation is unsatisfactory.)

Connected test equipment.

Performed API adjustment.

Performed the 40.455MHz Trap adjustment.

Performed the 100kHz Sideband Null adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

RT-1446 TRANSCEIVER CONTROL/POWER SUPPLY ALIGNMENTS
TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.4.10
- 206.14.4.11
- 206.14.4.12
- 206.14.4.13
- 206.14.4.14

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-81

PREREQUISITE(S)

- Test equipment to be used:

  Multimeter
  600 ohm System Termination
  Frequency Counter
  Audio Oscillator
  Oscilloscope
  DC Voltmeter

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 and 2.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given TO 31R2-2URC-81, align transceiver control assembly A1A12 IAW para 6-30m.
- OBJECTIVE 2: Given TO 31R2-2URC-81, align multivoltage supply assembly A1A14 IAW para 6-30o.
- OBJECTIVE 3: Given TO 31R2-2URC-81, align audio interface assembly A1A16 IAW para 6-30q.

- OBJECTIVE 4: Given TO 31R2-2URC-81, align Audio Frequency Shift Keying (AFSK) module assembly A1A18 IAW para 6-30s.
- OBJECTIVE 5: Given TO 31R2-2URC-81, align 13.6VDC power supply assembly A2A2 IAW para 6-30v.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform Power-Off Reset Potentiometer adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.4.10 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Performed Power-Off Reset Potentiometer adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform +5VDC adjustment.

Perform +15VDC adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.4.11 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Performed +5VDC adjustment.

Performed +15VDC adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 3 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 3 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform PATCH Nulling adjustment.

Perform LINE Nulling adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.4.12 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 3 TRAINING STEPS if evaluation is unsatisfactory.)

Connected test equipment.

Performed PATCH Nulling adjustment.

Performed LINE Nulling adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 4 TRAINING STEPS:

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 4 with trainee. Ensure

all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform Oscillator Frequency adjustment.

Perform TTL DC Offset adjustment.

Perform Duty Cycle Balance adjustment.

Perform AFSK Meter Balance adjustment.

Perform Detector Threshold adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.4.13 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 4 TRAINING STEPS if evaluation is unsatisfactory.)

Performed Oscillator Frequency adjustment.

Performed TTL DC Offset adjustment.

Performed Duty Cycle Balance adjustment.

Performed AFSK Meter Balance adjustment.

Performed Detector Threshold adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 5 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 5 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform 13.6VDC Voltage adjustment.

Perform AFSK/CW Voltage Cutback adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.4.14 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 5 TRAINING STEPS if evaluation is unsatisfactory.)

Performed 13.6VDC Voltage adjustment.

Performed AFSK/CW Voltage Cutback adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

C-11329 REMOTE CONTROL UNIT ALIGNMENTS TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.5.1
- 206.14.5.2
- 206.14.5.3

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-91

PREREQUISITE(S)

- Test equipment to be used:

  Multimeter
  RF Signal Generator
  Audio Voltmeter
  Audio Signal Generator
  Oscilloscope

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 and 3.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given TO 31R2-2URC-91, align multivoltage supply assembly A3 IAW para 6-15c.
- OBJECTIVE 2: Given TO 31R2-2URC-91, align audio interface assembly A4 IAW para 6-15d.
- OBJECTIVE 3: Given TO 31R2-2URC-91, align audio/microprocessor assembly A2 IAW para 6-15e.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform +5VDC adjustment.

Perform +15VDC adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.5.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Performed +5VDC adjustment.

Performed +15VDC adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure

all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform the PATCH Nulling adjustment.

Perform the LINE Nulling adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.5.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Performed the PATCH Nulling adjustment.

Performed the LINE Nulling adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 3 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 3 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform the LINE RX AUDIO adjustment.

Perform the AUDIO 2 RX AUDIO adjustment.

Perform the AUDIO 2 TX AUDIO adjustment.

Perform the VOX Voice Delay adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.5.3 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 3 TRAINING STEPS if evaluation is unsatisfactory.)

Performed the LINE RX AUDIO adjustment.

Performed the AUDIO 2 RX AUDIO adjustment.

Performed the AUDIO 2 TX AUDIO adjustment.

Performed the VOX Voice Delay adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

AM-7223 LINEAR POWER AMPLIFIER ALIGNMENTS TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.6.1
- 206.14.6.2
- 206.14.6.3
- 206.14.6.4

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-101

PREREQUISITE(S)

- Test equipment to be used:

  DC Voltmeter
  Digital Multimeter
  HP-410C AC Voltmeter
  Dummy Load
  Model 11042A T-connector

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 and 4.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given TO 31R2-2URC-101, align output filter assembly A3 IAW para 6-24c.
- OBJECTIVE 2: Given TO 31R2-2URC-101, align low voltage power supply assembly A4 IAW para 6-24d.
- OBJECTIVE 3: Given TO 31R2-2URC-101, align power control assembly A5 IAW para 6-24e.
- OBJECTIVE 4: Given TO 31R2-2URC-101, align temperature sensor assembly A10 IAW para 6-24j.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform Null adjustment.

Perform Forward Power Sample adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.6.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Performed Null adjustment.

Performed Forward Power Sample adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform +13.5VDC adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.6.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Performed +13.5VDC adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 3 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 3 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform Loop Gain adjustment.

Perform CW/AFSK Power adjustment.

Perform Coupler Tune Power adjustment.

Perform Power Control adjustment.

Perform Max Plate Current adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.6.3 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 3 TRAINING STEPS if evaluation is unsatisfactory.)

Performed Loop Gain adjustment.

Performed CW/AFSK Power adjustment.

Performed Coupler Tune Power adjustment.

Performed Power Control adjustment.

Performed Max Plate Current adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 4 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 4 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform Temperature Sensor Assembly adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.6.4 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 4 TRAINING STEPS if evaluation is unsatisfactory.)

Performed Temperature Sensor Assembly adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

CU-2310 ANTENNA COUPLER ALIGNMENTS TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.7

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-111

PREREQUISITE(S)

- Test equipment to be used:

  Dummy Load
  HP-410c Voltmeter

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 and 3.

TRAINING OBJECTIVE(S)

- Given TO 31R2-2URC-111, align CU-2310 Antenna Coupler IAW paras 6-10a thru 6-10c.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

OBJECTIVE TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Align Logic Assembly A1.

Perform Variable Coil Limit Switch adjustment.

Perform Variable Coil Roller adjustment.

Perform Variable Capacitor Limit Switch adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.7 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE TRAINING STEP if evaluation is unsatisfactory.)

Aligned Logic Assembly A1.

Performed Variable Coil Limit Switch adjustment.

Performed Variable Coil Roller adjustment.

Performed Variable Capacitor Limit Switch adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

AM-7224 LINEAR POWER AMPLIFIER ALIGNMENTS TASK TRAINING GUIDE

TRAINEE'S NAME_____

AFJQS TASK NUMBER(S)

- 206.14.8.1
- 206.14.8.2
- 206.14.8.3

ESTIMATED TASK TRAINING TIME_____

TRAINING REFERENCE(S)

- TO 31R2-2URC-121

PREREQUISITE(S)

- Test equipment to be used:

  Digital Multimeter
  Dummy Load
  HP-410C Voltmeter
  11042-A T-connector

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Modules 1 and 4.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given TO 31R2-2URC-121, align tube assembly A1 IAW paras 6-23 thru 6-23a(5).
- OBJECTIVE 2: Given TO 31R2-2URC-121, align Voltage Standing Wave Ratio (VSWR)/Transformer (XFMR) assembly A3 IAW para 6-23c.
- OBJECTIVE 3: Given TO 31R2-2URC-121, align power control assembly A5 IAW para 6-23e.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform RF Plate Sample adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.8.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Performed RF Plate Sample adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform Null adjustment.

Perform Forward Power Sample adjustment.

Perform Reflected Power Sample adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.8.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Performed Null adjustment.

Performed Forward Power Sample adjustment.

Performed Reflected Power Sample adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 3 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 3 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Perform Loop Gain adjustment.

Perform CW/FSK Power adjustment.

Perform Coupler Tune Power adjustment.

Perform Power Control adjustment.

Perform Max Plate Current adjustment.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used and restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 206.14.8.3 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 3 TRAINING STEPS if evaluation is unsatisfactory.)

Performed Loop Gain adjustment.

Performed CW/FSK Power adjustment.

Performed Coupler Tune Power adjustment.

Performed Power Control adjustment.

Performed Max Plate Current adjustment.

Disconnected all test equipment used and restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

TRAINING COMPLETION CERTIFICATION FOR
AFJQS/AFQTP 2E1X3-206N
AN/URC-119(V) HF COMMUNICATIONS SYSTEM

I certify that _____

(Please print trainee's full name and rank)

completed all requirements for the above AFJQS/AFQTP.

_____

SUPERVISOR'S NAME, RANK, DUTY TITLE, DSN **(Please Print)**

_____

UNIT MAILING ADDRESS, INCLUDING ZIP CODE **(Please Print)**

_____

E-MAIL ADDRESS **(Please Print)**

_____

SUPERVISOR'S SIGNATURE

Please complete the above information, attach the completed and graded KEP answer sheet(s), and submit to 81 TRSS/TSQS, 601 D Street, Keesler AFB MS 39534-2229 (or FAX your answer sheet(s) to 597-9043).

TRAINER/TRAINEE: You have completed an AFJQS/AFQTP, and we need your feedback. Please fill out the following survey. If you found any errors or have suggestions for improvements, please tell us. Take advantage of this opportunity to express your ideas directly to the AFJQS/AFQTP development teams. List the errors you discovered in as much detail as possible. If you have product improvement suggestions, describe your ideas clearly and in a logical order. Thank you for your time and interest.

In the space provided, indicate your preference by placing the number corresponding to the following scale:

1. STRONGLY AGREE 2. AGREE 3. UNCERTAIN 4. DISAGREE 5. STRONGLY DISAGREE

TRAINEE

1. <u>Training Material</u>

a. The objectives were easy to understand. ___

b. The instructions were easy to understand. ___

c. The review and test questions reinforced the objective statement. ___

d. This is a high quality training package. ___

2. Training Material Presentation

a. I have easy access to a computer in my workplace. ___

b. Material was easy to read and presented in a logical sequence. ___

3. In my opinion

a. The Q Flight web page helps me stay current with training issues. ___

b. This training package accurately reflects my job requirements. ___

c. This package will help me be proficient in my career field. ___

d. After completing this package, I can do my job better. ___

TRAINER

1. Training Material

a. Instructions in the Trainer's Guide were clear and concise. ___

b. The objectives in this package were clear and attainable. ___

c. I have all the technical references listed for this package. ___

d. The figures, diagrams, and flowcharts helped student understanding. ___

e. The KEP questions measured the attainment of the objective. ___

2. In my opinion

a. This training package accurately reflects trainee job requirements. ___

b. This package helped make trainees proficient in their career field. ___

c. The Q Flight web page helps me stay current with training issues. ___

d. After completing this package, trainees can do their job better. ___

e. QTPs meet training needs. ___

3. In general

a. How do you receive our products?
   QMAIL
   Web Page
   Other (Specify)

b. Which method of delivery do you prefer?
   Electronic
   Hard copy

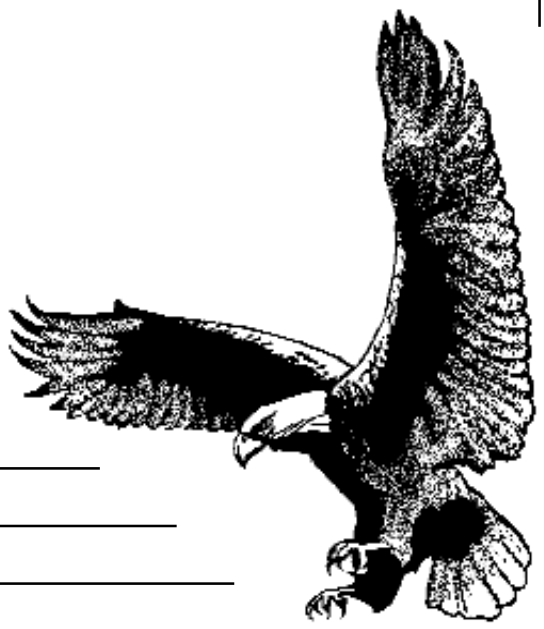
OTHER COMMENTS OR SUGGESTIONS FOR IMPROVEMENT:

AIR FORCE QUALIFICATION TRAINING PACKAGE 2E1X3-206N

PART OF AFJQS 2E1X3-206N

AN/URC-119(V) HF COMMUNICATIONS SYSTEM

SKILL TRAINING MATERIAL



1 OCTOBER 1999
SUPERSEDES AFJQS 2E1X3-206N
DATED 2 SEPTEMBER 1999

FOR OJT USE ONLY

SKILL TRAINING MATERIAL

CONTENTS

ABOUT THIS TRAINING PACKAGE

The purpose of this Air Force Qualification Training Package (AFQTP) is to

- standardize on-the-job training.
- reduce training time while maintaining proficiency standards.
- provide individuals with a logically organized training plan which yields immediate and measurable feedback.
- provide a standard to measure task knowledge and performance during personnel evaluations.

This training package was originally developed by SSgt Carl Alexander. It was revised by TSgt William S. Mabb, 81 TRSS Qualification Training Flight, Keesler AFB, MS. The Training and Education Specialist was MSgt William E. Bowman. It was validated by the 1 CCGP, Lindsey AS, GM. SSgt John C. Pauls of the 30 CS, Vandenberg AFB, CA, was the Subject Matter Expert for the AN/URC-119 HF Communications System.

For more information on the 81 TRSS Qualification Training Flight and a list of other products that are available, feel free to visit our home page at http://www.keesler.af.mil/81trss/qflight.

HOW TO USE THIS TRAINING PACKAGE

INSTRUCTIONS FOR THE TRAINEE

- Ensure your trainer explains how to complete this training package.
- As you read each section in the module, answer the review questions pertaining to that section. You may use the module and technical references to answer the questions. You'll find the answers to these review questions at the end of each module.
- When you finish the module, your trainer will administer the Knowledge Evaluation Pamphlet (KEP). Answer all KEP questions and give the answer sheet to your trainer for grading. Your trainer will discuss any incorrect answers with you.
- When you complete the AFQTP, your trainer should give you the Training Completion Certification so you may make any recommendations, suggestions, or offer corrections to the training package in the comments section. Your inputs provide us with valuable feedback which enables us to give our customers the best possible training materials.

MODULE 1
SYSTEM OVERVIEW

ABOUT THIS MODULE

This module is an overview of the AN/URC-119(V) System. It includes system characteristics, system configurations, and remote control operation.

OBJECTIVE(S)

List the characteristics of the AN/URC-119(V).

Explain system configurations:

- 100 watt (W)
- 500 watt (W)
- 1000 watt (W)

Explain the function of the C-11329 Remote Control Unit (RCU).

TRAINING REFERENCE(S)

TO 31R2-2URC-81
TO 31R2-2URC-91
TO 31R2-2URC-101
TO 31R2-2URC-111
TO 31R2-2URC-121
TO 35C1-2-892-1

SYSTEM CHARACTERISTICS

The URC-119(V) provides long-range HF voice and data communications for fixed plant, transportable, shelter, and mobile stations. The exceptionally rugged industrial/military design and construction of the URC-119(V) system guarantees reliable operation under demanding field conditions.

The URC-119(V) is tuned by simply selecting a frequency (or preset channel) and keying the transceiver. All other tuning functions, including Linear Power Amplifier (LPA) and antenna tuning, are performed automatically.

Power for the system can be 115VAC, 230VAC, 12VDC, or 28VDC selectable. The remote controls do not require internal strapping for the various power requirements.

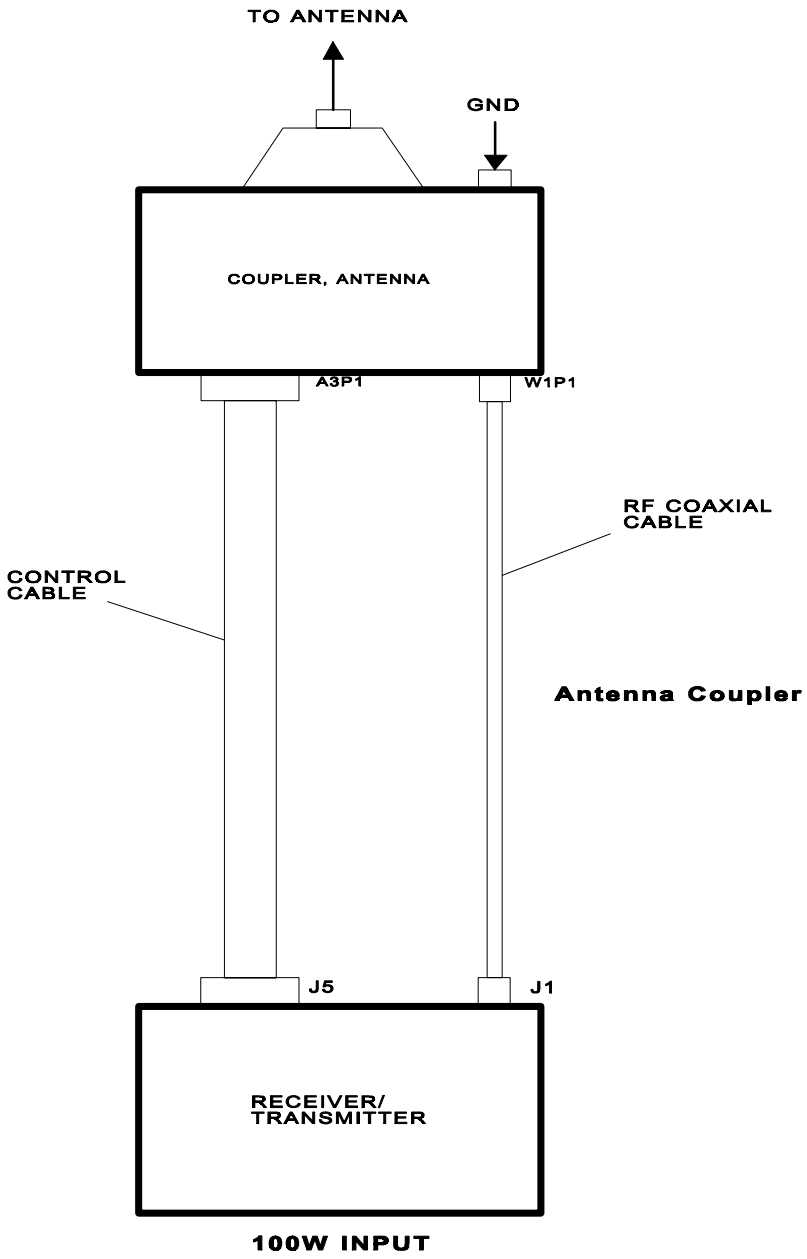


Figure 1-1. 100W Configuration

The frequency range of the URC-119(V) is from 1.6000MHz to 29.9999MHz. The modes of operation are USB, LSB, Amplitude Modulation Equivalent (AME), Continuous Wave (CW), and Audio Frequency Shift Keying (AFSK), with option installed. There are several ancillary pieces of equipment that can used to provide various system configurations. The system can be configured for 100W by using the transceiver only, or for 500 or 1000W when used with a LPA.

?

1. What does the URC-119(V) provide?

2. What is the procedure for tuning the URC-119(V) system?

3. What is the frequency range of the URC-119(V)?

4. Which modes of operation are possible with the URC-119(V)?

SYSTEM CONFIGURATIONS

As shown in Figure 1-1 in this module, the RT-1446 Transceiver, along with the CU-2310 Antenna Coupler, make up the 100W system.

100W SYSTEM

The RT-1446 is a microprocessor-controlled transceiver, conservatively rated at 100W Peak Envelope Power (PEP) and Average (AVG). The solid-state power amplifier ensures continuous rated output power during keydown operation. All operating and metering functions of the transceiver are fully remote controllable over 2/4-wire telephone lines.

Additionally, the built-in telephone patch and internally mounted AFSK option provide full communication flexibility. For a simplified functional diagram of the transceiver, refer to Figure 1-2 in TO 31R2-2URC-81.

TRANSMIT PATH

In the transmit mode, the 100W transceiver accepts audio/keyline inputs from a CW key, handset/mic, telephone line, or other source, and impresses the audio on a 455kHz intermediate frequency (IF) carrier. The 455kHz IF is raised in two conversions to the 1.6 to 30MHz transmitting range and amplified to a signal level of 100W PEP or AVG into a 50-ohm load.

A directional bridge in the transmit path measures the forward and reflected power levels. This information is used for front panel display and for transmitter gain control functions. A transmit/receive (T/R) switch separates the transmit and receive paths, which allows connection to a common antenna.

RECEIVE PATH

In the receive mode, the 1.6 to 30MHz received signals bypass the power amplifier and are reduced to a 455kHz IF using a double conversion process. The first conversion is made at an IF of 40.455MHz and band pass filtered to remove undesired image frequencies. The second conversion is made at an IF of 455kHz and band pass filtered to achieve selectivity. The resulting 455kHz IF signal is demodulated with an amplitude detector (Amplitude Modulation (AM) Mode) or product detector (Single Sideband (SSB) Modes) to obtain the audio output.

Control of the 100W transceiver is from the front panel or by remote input. Logic signals are processed by a microprocessor that provides the necessary memory, control, logic, and timing to coordinate the functions of the 100W transceiver in all modes of operation. The microprocessor also controls the detection and display indications of the Built-In Test (BIT) circuits.

The synthesizer and reference/Beat Frequency Oscillator (BFO) modules generate the frequencies used in the modulation, demodulation, and double conversion processes. All reference frequencies are derived from a stable 10MHz frequency standard.

The CU-2310 Antenna Coupler automatically matches the output impedance of the transceiver or 500W LPA to a whip or long wire antenna over the frequency range of 1.6 to 30MHz. Operation, including network tuning, is fully automatic. Tuning time is typically 5 to 8 seconds. The antenna coupler is used where the required characteristic load impedance is other than 50 ohms.

Typically, antennas do not exhibit constant 50-ohm impedance over the 1.6MHz to 30MHz range. The antenna coupler matches the antenna to the transceiver or 500W LPA so that at the operating frequency, a 50-ohm load is presented to the transmitter. Refer to Figure 1-2 in TO 31R2-2URC-111 for a simplified functional diagram.

RF from the transceiver enters the coupler and is sampled by a discriminator sampling circuit. An impedance matching transformer (A1T2) matches the coupler operating impedance of 12.5 ohms to the standard 50-ohm transmission line. Main tuning capacitor (A2C1) and main tuning inductor (A2L1) are placed in the circuit when needed to tune a long wire antenna.

500W SYSTEM

Figure 1-2 in this module shows the equipment that makes up the 500W system. The only difference between this configuration and the 100W configuration is the addition of the AM-7223 RF amplifier. Power for this configuration is supplied from either an AC or DC source. The output level delivered by the amplifier is 500W PEP with multiple tone input signals or 250W AVG with lock keyed CW or a continuous single tone input signal.

This LPA is designed for continuous operation under severe environmental conditions in either fixed or mobile applications. Automatic sensing circuits protect the LPA from damage due to overdrive, abnormal tuning, high Voltage Standing Wave Ratio (VSWR) (including open or short circuit conditions), high and low line voltages, insufficient air flow, and over temperature.

Figure 1-2 in TO 31R2-2URC-101 shows a simplified block diagram of the AM-7223 RF amplifier. Refer to this figure as we cover the signal flow of the amplifier.

TRANSMIT PATH

In the transmit mode, the transceiver RF signal is routed by the T/R relay on the output filter assembly to tube assembly (A1), where it is amplified. The RF signal then passes through the tuned 500W tank assembly (A2) to the low pass filter and the VSWR bridge circuit on the output filter assembly. From the VSWR bridge circuit, the RF signal is applied to the antenna connector J5 on the 500W LPA via the T/R relay.

RECEIVE PATH

In the receive mode, the RF signal from the antenna connector is routed to the XCVR RF connector via the T/R relay on the output filter assembly.

1000W SYSTEM

Figure 1-3 in this module shows the equipment that makes up the 1000W system. The difference between this configuration and the 500W configuration is: the AM-7223 RF amplifier and CU-2310 Antenna Coupler are replaced with the AM-7224 RF amplifier, associated power supply (PP-7913/URC), and the URA-38 antenna coupler. It is important to remember that an antenna coupler can be omitted with this RF amplifier in this particular configuration.

The AM-7224 RF amplifier is a 1000W amplifier used when 100 or 500W applications are not acceptable. Power for the RF amplifier is provided by the PP-7913 power supply. Refer to Figure 1-2 in TO 31R2-2URC-121 for a simplified block diagram of the AM-7224 RF amplifier.

TRANSMIT PATH

In the transmit mode, the XCVR RF signal is routed by the T/R relay on the VSWR/XFMR assembly to the tube assembly (A1), where it is amplified. The RF signal then passes through the tuned 1kW tank assembly to the impedance select circuit on the VSWR/XFMR assembly. The RF signal is applied through a VSWR bridge circuit on the VSWR/XFMR assembly to the low pass filter assembly on the antenna connector of the 1kW LPA.

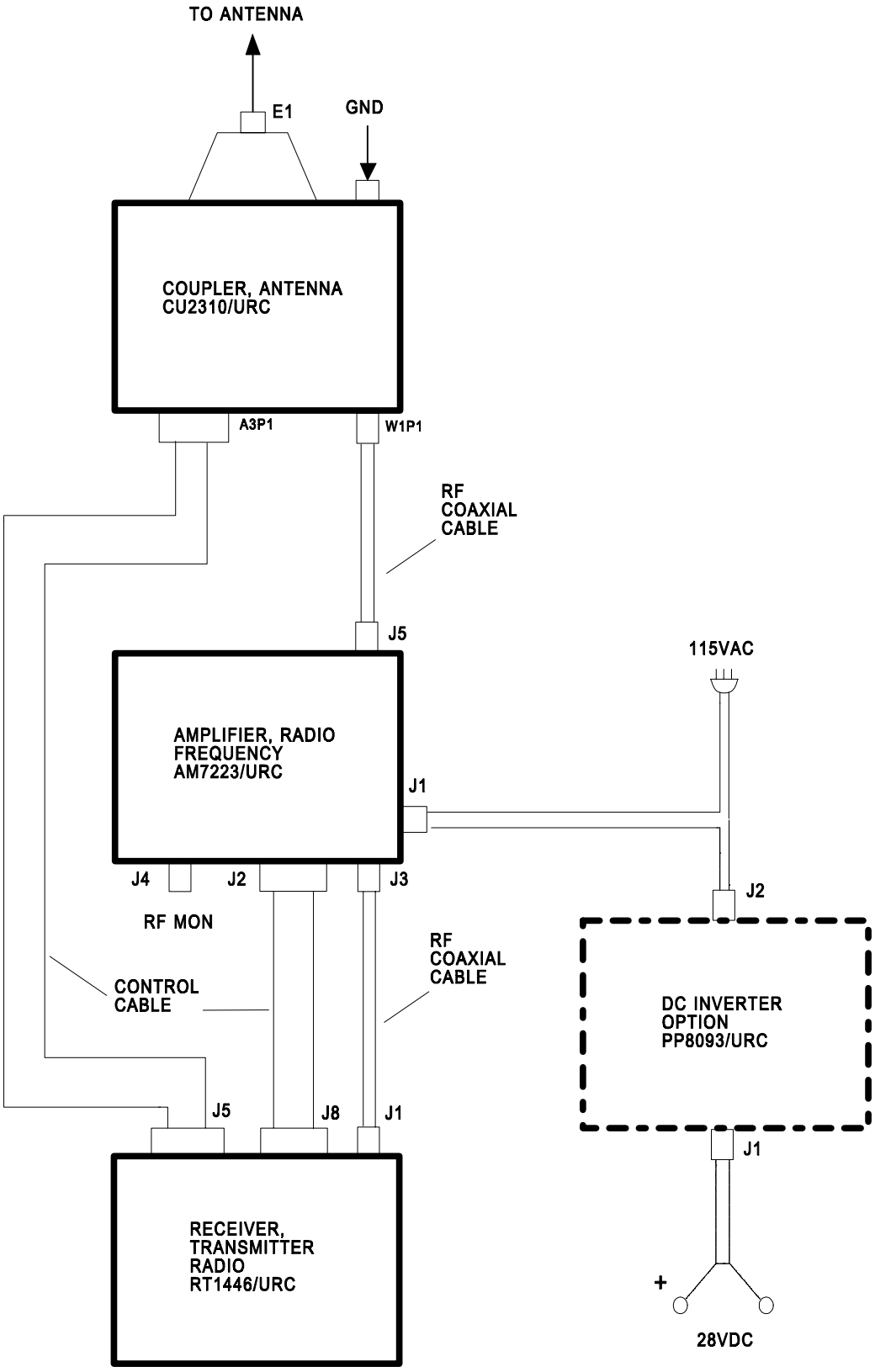


Figure 1-2. 500W System Configuration

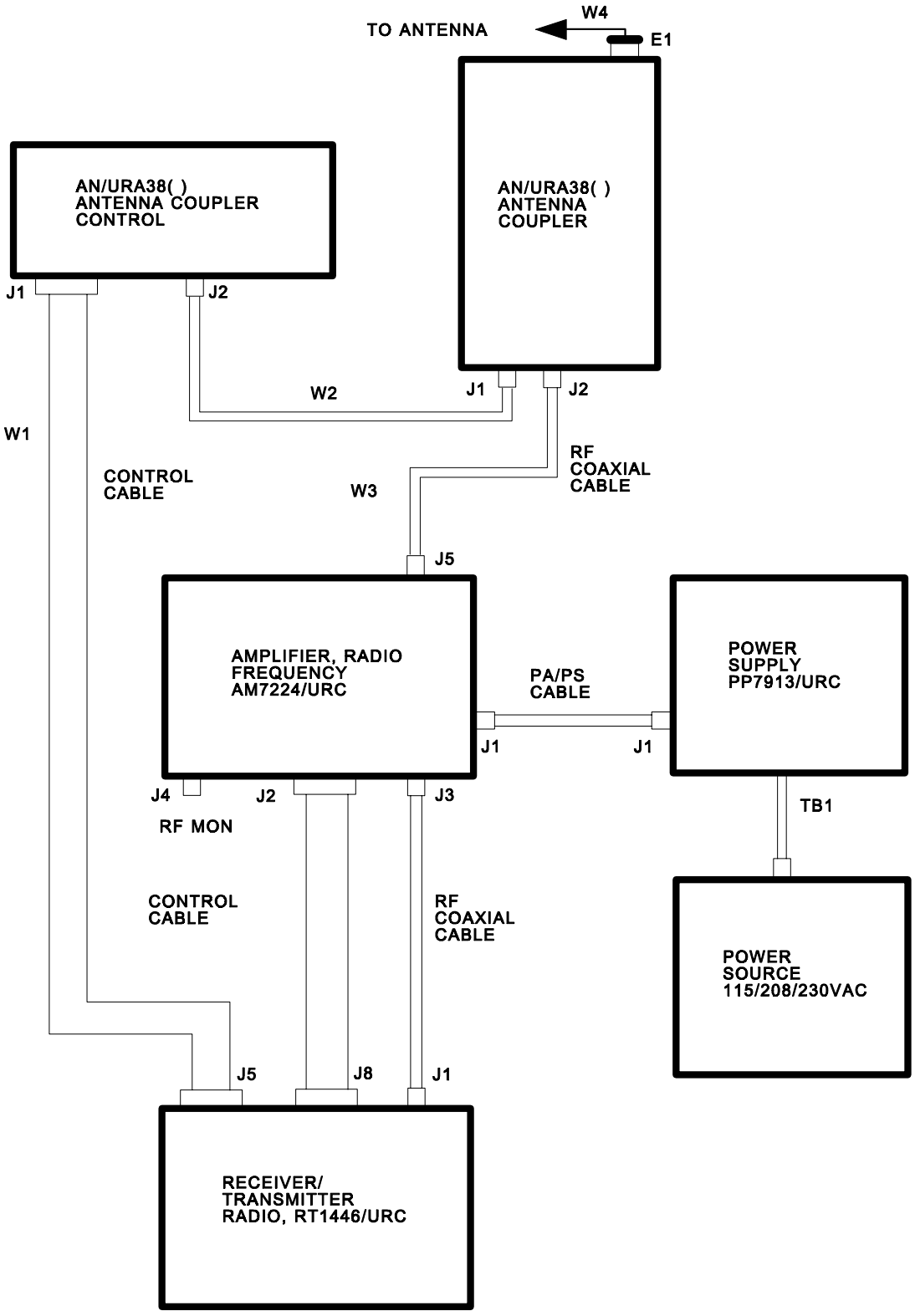


Figure 1-3. 1000W System Configuration

RECEIVE PATH

In the receive mode, the RF signal from the antenna connector of the LPA is routed through the low pass filter assembly to the XCVR RF connector via the T/R relay on the VSWR/XFMR assembly.

The PP-7913 power supply produces three output voltages: +3000VDC at 1A, +13.5VDC at 8A, and 115VAC at 1 amp(A). These voltages are supplied to the AM-7224 RF amplifier.

The AN/URA-38( ) Coupler and Coupler Control are capable of handling the output power of the AM-7224 RF amplifier. The coupler control provides automatic or manual tuning and impedance matching for the RF signal to the antenna.

?

5. What is the nominal output power of the RT-1446 transceiver?

6. Name the three input sources that can be used when the transceiver is in the transmit mode.

7. Which component separates the transmit and receive paths allowing connection to a common antenna for the transceiver?

8. Which process is used to reduce received signals to a 455kHz IF in the transceiver?

9. Which unit processes logic signals?

10. What generates the frequencies used in the modulation, demodulation, and double conversion processes?

11. What is the purpose of the CU-2310 antenna coupler?

12. What is the nominal output power of the AM-7223 RF amplifier?

13. What is the nominal output power of the AM-7224 RF amplifier?

RCU

The C-11329 RCU can be used with any system configuration to provide remote operations capability. The three modes of operation are RS-232, RS-422, and modem. Remember that for control mode, audio interface, and modem interface selections, the transceiver/remote control cable wiring must agree. A brief description of each remote mode follows.

- The RS-232C mode of remote operation is an unbalanced control line in a digital format useful for direct wire control at ranges up to 100 feet.
- The RS-422 mode of remote operation is a balanced control line in a digital format useful for direct wired control at ranges up to 1 mile.
- The modem mode of remote operation is an analog Frequency Shift Keying (FSK) format for use over standard telephone lines/network at unlimited distance.

The remote control interface assembly must be installed in the transceiver for remote operation. Determine the modes of remote operation by selecting the appropriate mode on the remote control assembly in the transceiver and the audio/microprocessor assembly on the RCU.

In remote operation, control the transceiver by using the front panel keypad on the remote control. The operator can make frequency, channel, and mode selections from the keypad (of the RCU). The remote control can access transceiver memory that can store up to 100 channels of frequencies and operating modes. The operator may also adjust analog controls on the remote control front panel to set audio/RF gain levels, audio squelch level, and audio input level of the transceiver.

?

14. Name the three control modes of remote operation.

15. Which assembly must be installed in the transceiver for remote control operation?

16. Which operations can the operator perform from the RCU keypad?

SUMMARY

The URC-119(V) operates in the HF range from 1.6000MHz to 29.9999MHz and is tunable in 10Hz increments. It operates in USB, LSB, AME, CW, and AFSK. AFSK is optional and requires AFSK card installation. Tuning the URC-119(V) is a fairly simple two step process: select the window frequency and key the radio. The rest of the tuning process is done automatically.

The URC-119(V), Pacer Bounce, can be configured for 100/500/1000W power outputs. The most common configurations are 100W and 500W setups. The RT-1446 transceiver, along with the CU-2310 Antenna Coupler, make up the 100W configuration. Adding the AM-7223 RF amplifier boosts the output to 500Ws. The 1000W configuration is a little different from the other setups. The AM-7223 RF amplifier and CU-2310 antenna coupler are replaced by the AM-7224 RF amplifier, PP-7913/URC Power Supply, and URA-38 Antenna Coupler.

The C-11329 RCU can be used with any of the system configurations. For remote operation, it must have the Remote Interface Card installed in the RT-1446 transceiver. The RCU front panel and keypad are identical to that of the RT, which allows the operator to access all functions available to the RT front panel. When remoting the RCU, make sure the mode selection switches on the interface cards are set for the same mode of operation.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test and you must score 70% or more. Your trainer will check your answers and review any incorrectly answered questions with you. When you have achieved the KEP standard, your trainer will assign the next module.

REVIEW QUESTIONS CONFIRMATION KEY

1. High-performance, long-range communications capability
2. Select a frequency or preset channel and key the transceiver.
3. 1.6 to 29.9999MHz
4. USB, LSB, AME, CW, and AFSK
5. 100Ws
6. CW key, handset/mic, telephone line
7. A T/R switch
8. A double conversion process
9. A microprocessor
10. The synthesizer and reference/BFO modules
11. To automatically match the output impedance of the transceiver or 500W LPA to a whip or long-wire antenna over the frequency range of 1.6 to 30MHz
12. 500W
13. 1000W
14. RS-232C, RS-422, and modem
15. The remote control interface assembly
16. Frequency, channel, and mode selections

MODULE 2
RT-1446 TRANSCEIVER OPERATION

ABOUT THIS MODULE

This module covers the different operating modes and functions used by the RT-1446 transceiver. Since the transceiver can be operated with a variety of ancillary equipment, it is the responsibility of the user to configure the equipment to support the intended operations.

PREREQUISITE(S)

Must have completed Module 1 of this AFQTP.

OBJECTIVE(S)

Given TO 31R2-2URC-81, operate the RT-1446 Transceiver IAW pgs 3-1 thru 4-26. (AFJQS TASK 201.14.1.1)

- Explain the RT-1446 transceiver controls and indicators.
- Explain the transceiver modes of operation.

TRAINING REFERENCE(S)

TO 31R2-2URC-81

RT-1446 CONTROLS AND INDICATORS

POWER APPLICATION AND WARM-UP

The RT-1446 is solid state equipment and requires no warm-up, although a 30-minute warm-up may be required for stabilization of the frequency standard if it is operated after being in cold storage. However, operations may be started before the warm-up period provided you remember T/R frequency errors may be experienced until stabilization occurs.

ANALOG CONTROLS POSITIONING

Use the analog controls (AUDIO GAIN, RF GAIN, and SQUELCH) to set up the transceiver for comfortable listening and signal detection. A brief discussion of each control follows.

- AUDIO GAIN. This control affects the front panel speaker, headset, and handset. The audio outputs available at the rear of the transceiver have separate level adjustments. If the supplied headset is connected to the front panel HEADSET jack, the front panel speaker is not disconnected.

If desired, use the front panel switch to disconnect the speaker.

- RF GAIN. This control is typically placed in the high gain position, i.e., turn the knob fully clockwise. In this position, the RF gain of the receiver is determined by normal Automatic Gain Control (AGC) action. If a condition exists where normal AGC action is detrimental to reception, turn the RF GAIN control counterclockwise. The RF GAIN control then overrides the normal AGC circuit, and manually adjusts the gain of the receiver.
- SQUELCH. This control is usually placed in the OFF position. This enables all receive signals to be monitored regardless of signal strength. If it is desired to monitor only a received signal that is strong enough to rise above the background noise, enable the squelch function. If SQUELCH is desired, find the correct setting of the SQUELCH control by turning the squelch knob out of detent in the clockwise direction during a period when only background noise is present in the speaker. Turn the SQUELCH control slowly clockwise until the squelch action just mutes the audio output. An incoming voice signal, above the noise level, breaks the squelch and can be heard in the front panel speaker. Squelch action affects the PATCH and AUD2 audio outputs as well as the front panel speaker. The LINE receive audio output is not affected by the squelch circuit. It is important to remember that the squelch responds only to VOICE signals.

CONTROL OPERATION DURING TRANSMIT

Frequency and channel changes cannot be made when the transceiver is keyed. Only the controls TEST, S TONE (there is no front panel display for sidetone), and CLIP (used in voice modes only) are active when the transceiver is transmitting. A keyline inhibit signal prevents equipment damage during frequency and channel changing operations and accidental keying of the transceiver.

FREQUENCY SELECTION

The frequency range of the transceiver and all associated ancillary equipment is in the HF spectrum (1.6MHz to 29.99999MHz). In CW mode, a 1kHz offset is entered in the transmitted frequency. Accomplish frequency selection either by scrolling or entering the number via the front panel keypad.

CHANNEL SELECTION

Channel selection (another way to select a different frequency) is done by programming frequencies into the radio. Up to 100 channels may be programmed. This information remains in memory after the transceiver is powered off due to an internal lithium battery. Press the memory erase button at the rear of the transceiver to clear the memory. This clears all programmed channels and last parameter information.

?

1. *What should you remember if you start operating the transceiver before the 30-minute warm-up has elapsed?*

2. *What does the AUDIO GAIN control affect?*

3. *When would the RF GAIN control be adjusted?*

4. *How is the channel memory cleared?*

MODES OF OPERATION

There are five operating modes. To access each mode, turn the MODE switch to the desired mode. For USB and LSB modes, the carrier is fully suppressed. The AME mode is USB plus carrier, and the CW mode is audio derived with a plus or minus 1kHz carrier frequency offset depending on whether CW-LSB or CW-USB has been internally selected. For AFSK mode selection, the AFSK option must be installed.

- USB and LSB Operation. The SSB, USB, and LSB modes operate with a suppressed carrier. The bandwidth of the SSB filters is 350Hz to 3050Hz.
- AME Operation. AME operates with carrier and USB. The carrier is normally 25 watts, but the PEP resulting when modulated is a full 100Ws. The IF filter for the AME mode is the same filter used in the USB mode; it has a bandwidth

of 350Hz - 3050Hz. AME is also known as compatible AM.

- CW Operation. CW mode (MORSE) is full carrier transmission without modulation. A frequency offset of exactly 1kHz automatically results in transmissions 1kHz above or below the displayed frequency. An internally adjustable CW hang-time determines the amount of time that elapses following the last transmitted CW character before the transceiver switches to receive mode.
- AFSK Operation. It is important to adjust the AFSK equipment at each end of the radio link for the same sideband, center frequency, and frequency shift. It must also have the AFSK option installed in the radio. The AFSK option has an 850Hz shift with a center frequency of 2000Hz, a 170Hz shift with a center frequency of 2000Hz, or an 85Hz shift with a center frequency of 2805Hz. Each of these shifts can be used in LSB and USB. Make shift and sideband selections at the AFSK Configuration Switch located on AFSK IF Filter A1A18A2.

An indication of correct tuning of an AFSK received signal may be obtained by using the AFSK meter function. When receiving a correctly tuned AFSK transmission, the AFSK meter segment should be positioned over the central arrow shown on the meter scale. If this is not the case, the operating frequency of the transceiver may be changed using the scroll keys until the correct center indication is obtained.

If sufficient receive signal is not present at the input of the AFSK module for reliable error free operation, the unit forces a mark-hold condition to the teleprinter. In certain circumstances, high receive noise levels may cause the mark-hold to be released and the teleprinter to print randomly. To stop this, reduce the RF GAIN control on the front panel until the teleprinter is forced back into a mark-hold condition.

The normal sense is where a (+) = binary 0 = space, and (-) = binary 1 = mark. If Keyer Reverse for transmit (KREV) or Converter Reverse for receive (CREV) is selected, the respective sense is reversed with (+) = binary 1 = mark, and (-) = binary 0 = space.

It is possible to compensate at the transceiver for other AFSK center frequencies by adjusting the operating frequency of the 100W transceiver by the amount of the difference. The procedure uses the AFSK Relative Center frequency meter scale where the distant party transmits a series of "RY" characters

and the receiving party observes the AFSK meter. The frequency of the transceiver is then adjusted to zero out any offset.

AUDIO SOURCE SELECTION

In CW and AFSK modes, AUDIO SOURCE has no effect. In the other modes, when AUDIO: MIC is selected as the audio source, the microphone audio and push-to-talk keyline information are from the front panel HANDSET/MIC connector.

A compression circuit, in series with this input, automatically compensates for variations in input levels of ±15dB. The input is designed for use with a dynamic microphone, and carbon type microphones cannot be used.

AUDIO: AUD2 accepts audio and push-to-talk keyline information from the rear panel AUD2 J4, such as a KY-65. There is no compression circuit associated with the AUD2 input, and it is designed to accept a 0dBm average power speech signal from a 600-ohm source. The sensitivity of the AUD2 input is adjusted internally.

AUDIO PATCH is used when connection to a 2-wire or 4-wire telephone is necessary. There is no compression circuit associated with this input. Both the incoming and outgoing phone patch audio levels are metered and adjusted via front panel controls.

AGC SELECTION

There are four options of AGC: AGC OFF, AGC SLOW, AGC MEDIUM, and AGC FAST. The decay time is slow, medium, or fast. When a mode of operation is selected, an AGC speed is automatically selected typical for operations in that mode. AGC has no affect if the AGC indicator reads AGC OFF.

VOICE OPERATED TRANSMIT (VOX) SELECTION

Use VOX to automatically generate a keyline when transmit audio is detected. There is a choice of 2 VOX decay time constants: a long decay for voice signals and a short decay for data signals. The voice time constant is internally adjustable. There are two front panel adjustments for the VOX circuit: VOX and ANTIVOX. The VOX adjustment sets the threshold level required to trigger the VOX circuit. The ANTIVOX circuit samples the received speaker audio and counteracts the effect of the microphone picking up the receive audio signal, thereby preventing false VOX operation. Adjust the ANTIVOX

only when the microphone is in a fixed position. VOX VOICE, VOX DATA, and VOX OFF are the choices available.

BFO SELECTION

Use the BFO to raise or lower the pitch of received audio signals in all modes except AME. There is no frequency read-out of the BFO offset. The BFO does not change the pitch of the received audio signals when operating in the AME mode. The maximum BFO offset is 1000Hz. BFO offset is entered with scroll keys with a change of 10Hz per keystroke.

CLIP SELECTION

The CLIP function is selectable only in voice modes from the MIC and PATCH sources. Use this feature for peak clipping of the transmit audio levels to increase the average RF output levels. The clipper is adjustable internally from 0dB to 12dB.

SIDETONE SELECTION

Use the sidetone feature to inject a portion of the transmit audio into the receive audio path. This is useful for the operator in voice modes for headset feedback, in CW mode for a 1kHz tone when the CW key is closed, or to monitor the transmit audio during any mode of operation. There is no indicator for sidetone function, and it is automatically selected when operating in the CW mode.

FSK REV SELECTION

The FSK REV function is selectable only in the AFSK mode. This feature is used to reverse the sense of the AFSK keyer (KREV), the AFSK Converter (CREV), or both.

TX KEY SELECTION

The TX KEY function is selectable in all modes of operation. This feature may be used to generate a keyline whenever the normal keyline is absent, or to enable transmit BIT for test procedures, etc. In the CW mode, a CW key closure is also required to obtain output power. (The transmit key is selected and the CW key is also closed.)

FRONT PANEL LEVEL ADJUSTMENTS

There are two front panel adjustments for the VOX circuit: VOX and ANTIVOX. The VOX adjustment sets the threshold for the audio level required to trigger the transmitter keyline. The ANTIVOX circuit is there to prevent the receive audio from keying the radio.

To set the VOX threshold, connect MIC to the front panel jack and speak into the microphone. Adjust the VOX potentiometer until the transmitter keys. To align the ANTIVOX circuit, start by selecting the VOX feature. With no audio, adjust the ANTIVOX potentiometer counterclockwise until the transmitter keys. When this happens, turn the ANTIVOX clockwise until it unkeys. The VOX and ANTIVOX adjustments interact with each other so you may have to repeat several times to suit your needs.

Use PATCH RCV and PATCH XMIT maintenance controls to set the levels to and from 2-wire/4-wire external telephone patch connections, respectively. Use TB1 on the rear of the transceiver to establish phone patch circuits. A telephone line is provided for use. If the line provider does not know whether the line is 2- or 4-wire, you have to figure it out. Most telephone lines are 2-wire; therefore, you should connect the telephone lines to TB1-2 and 3. If you have a 4-wire phone line, use TB1-1 through 4. The polarity of the 2-wire line does not matter. However, when using a 4-wire line, you cannot mix the line IN with the line OUT. This means there are two wires for receive and two wires for transmit. The polarity of the transmit and receive lines does not matter. However, you cannot connect a receive line with a transmit line or vice versa. Another important thing to remember is that the screws on TB1 are fragile. Take care when connecting wires to the terminal board.

The normal adjustment of the PHONE RCV is such that voice peaks observed on the PATCH meter are -10dBm. This level may be adjusted upward if the phone user reports weak received audio. The purpose of the PATCH function is to allow a user to operate the radio using a telephone. You must key the radio unless VOX operation is used.

The MIC control is active when the audio source is MIC. The MIC control adjusts the input transmit audio levels. 0dBm is the normal setting. Anything above that causes excessive noise to be transmitted during speech pauses.

Use line adjustments when equipment other than the RCU is used with the transceiver. The adjustment allows you to set the line level anywhere from -20 to +10dBm. The RCU is connected to the transceiver via J9 and has internal adjustments for the line.

METER EXPLANATIONS

The "S" scale gives an indication of received signal strength and ranges from S3 (-100dBm) to +60dBm. This scale is automatically selected when in the receive mode and the meter is set to FWD, REF, or VSWR.

The AUDIO meter gives an indication of transmit audio signal strength. The scale ranges from -20dBm to +10dBm. The nominal level is 0dBm.

The LINE meter gives an indication of the receive line audio signal or the remote line input signal when keyed. The scale ranges from -20dBm to +10dBm.

The PATCH meter gives an indication of the PATCH input signal (TX) or PATCH output signal (RX). The meter indication for XMIT occurs when the transceiver is keyed. The scale is from -20dBm to +10dBm.

The FWD meter gives an indication of forward output power of the transceiver. The scale is from 0 to 150 Watts. With the 500 or 1000W LPA connected, the scale is multiplied by 10. It also gives an indication of received signal strength because the "S" scale is automatically selected when the FWD meter is selected.

The REF meter gives an indication of the transmit reflected power. The scale is the same as the FWD.

The VSWR meter gives an indication of the VSWR. The scale ranges from 1 (1:1) to 4 (4:1).

The AFSK meter shows relative center frequency with an arrow indicating midscale and a bar showing offsets to the left or right. This meter reading is correct only when the average mark and space signals of the incoming signal are equal. A steady mark or space does not yield an accurate reading.

PROGRAMMING CHANNELS

The transceiver has the capability of storing 100 frequencies and their operating parameters. This is done using the PROG and LOAD functions on the keypad. After a channel is programmed, the transceiver displays the operating conditions that were set before programming started.

?

5. In which operation modes is the carrier fully suppressed?

6. *Briefly describe USB and LSB operation.*

7. *Which mode of operation uses USB and carrier?*

8. *What is the normal carrier power when operating in AME mode?*

9. *Which mode provides full carrier transmission without modulation?*

10. *When is PATCH selection used?*

11. *What is the purpose of the ANTIVOX circuit?*

12. *What is the CLIP function used for?*

13. *What is the purpose of the PATCH maintenance controls?*

14. *Which terminal board is used to establish a PATCH circuit?*

15. *How many channels may be programmed?*

SUMMARY

Set operating parameters for the RT-1446 by using the front panel controls and keypad. Three Analog Control knobs (Audio Gain control, RF Gain control, and Squelch control) allow you to adjust the RF and audio levels at several different stages in the receive process. Select frequencies by either scrolling or entering numbers via the keypad. Up to 100 channels may be

stored in the RT's memory. You can choose from LSB, USB, AME, CW, and AFSK for modes of operation. The AFSK mode is an option that must be installed. When Audio Source is selected you are given three choices: MIC, AUD2, and Audio Patch. However, this selection does not affect the CW or AFSK modes because they contain no audio. There are four AGC options to choose from: AGC OFF, AGC SLOW, AGC MED, and AGC FAST. Other settings selectable from the front panel keypad are the BFO for receive, CLIP function for transmit MIC and PATCH audio inputs, Sidetone, FSK REV, and the TX KEY selection. FSK REV is selectable with the AFSK mode.

As a radio technician, it is imperative to know the function of each control and indicator. The RT-1446 transceiver has many capabilities. Knowing what they are and how to apply them gives you the confidence to be a better technician.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test and you must score 70% or more. Your trainer will check your answers and review any incorrectly answered questions with you. When you have achieved the KEP standard, proceed to the performance procedures.

PERFORMANCE PROCEDURES

Your trainer will demonstrate the initial check procedures and all operating sequences for the transceiver. Following the demonstration, you will be given an opportunity to practice the procedure. When you feel comfortable with the procedure, you will be evaluated on the following:

- Perform the initial check-out procedure for the transceiver.
- Perform all operating sequences for the transceiver.

After you complete these procedures, your trainer will review your work. When you are proficient in performing the procedures, you may be certified on the AFJQS. Your trainer will assign the next task.

REVIEW QUESTIONS CONFIRMATION KEY

1. T/R frequency errors may be experienced until frequency standard stabilization
2. The front panel speaker, headset, and handset signal level
3. When a condition exists where normal AGC action is detrimental to reception
4. By pressing the memory erase button on the rear of the transceiver
5. USB and LSB
6. The SSB, USB, and LSB modes operate with a suppressed carrier. The bandwidth of the SSB filters is 350 to 3050Hz.
7. AME only
8. 25 watts
9. CW
10. When connection of a 2- or 4-wire telephone is necessary
11. Counteracts the effect of the microphone picking up the receive signal
12. Peak clipping of the transmit audio levels to increase the average RF output levels
13. Used to set the levels to and from the 2- and 4-wire external telephone patch connections
14. TB1 on the rear of the transceiver
15. 100

MODULE 3
C-11329 REMOTE CONTROL UNIT (RCU) AND CU-2310 ANTENNA COUPLER OPERATION

ABOUT THIS MODULE

This module covers the RCU and Antenna Coupler connections and operation.

PREREQUISITE(S)

Must have completed Modules 1 and 2 of this AFQTP.

OBJECTIVE(S)

Given TO 31R2-2URC-91, operate C-11329 RCU IAW pgs 3-1 thru 4-26. (AFJQS TASK 201.14.1.2)

- Explain how to connect the RCU to the RT-1446 Transceiver.
- Explain RCU operation.

Given TO 31R2-2URC-111, operate CU-2310 Antenna Coupler IAW pgs 3-1 thru 4-2. (AFJQS TASK 201.14.1.3)

- Explain how to connect the antenna coupler to the RT-1446 Transceiver.
- Explain antenna coupler operation.

TRAINING REFERENCE(S)

TO 31R2-2URC-91
TO 31R2-2URC-111

C-11329 RCU OPERATION

The RCU is normally used when the transceiver and antenna coupler are collocated at a different location than the RCU. The different configurations used with the RCU were briefly discussed in Module 1.

RCU CONNECTION

Refer to TO 31R2-2URC-91, Figure 2-5, for RCU rear panel connections and to TO 31R2-2URC-81, Figure 4-1, for transceiver rear view. Figure 3-1 in this module shows all possible connections for the RCU. Follow these steps for configuring, and there should be no problems.

- Verify that the RT has the Remote Control Interface Assembly, and if it does not, install one.
- Connect the power cable to the RCU, but do not plug it into the power source yet.
- Connect J2 on back of the RCU to J9 of the transceiver. This connection provides interface between the two units.
- Ensure all switch settings on the RCU and transceiver correspond by removing the covers of each unit and setting the switches. If the two units are to be separated by a great distance, set the switches before separating the units.

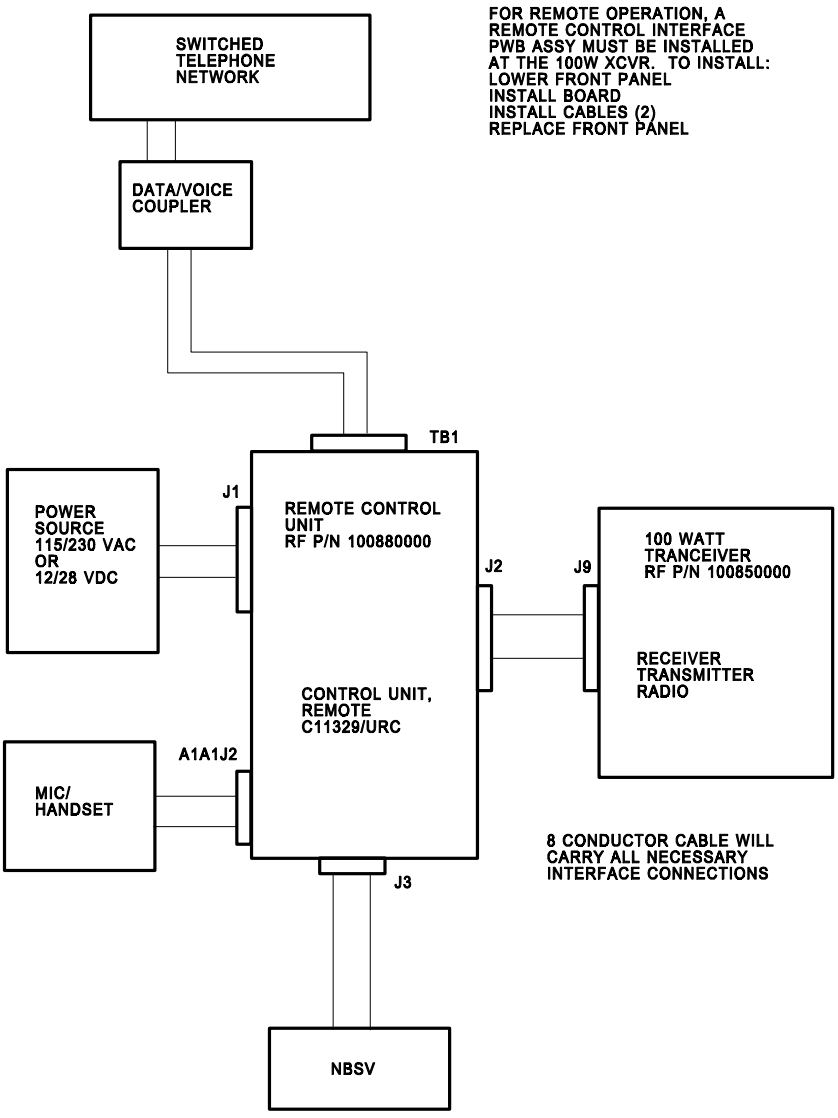


Figure 3-1. RCU Equipment Connections

CONTROL MODE SWITCHES

Accomplish control mode selection via switch S4 located on Audio/Microprocessor Assembly (A2) in the remote control, and at the transceiver by using switch S2 located on A1A19 Remote Control Interface Assembly. These two switch positions must match for the unit to operate correctly. The status of these switches is only read during power up; therefore, changing the switch positions while the equipment is running is not recognized. In other words, the units must be turned off during switch selection.

BAUD RATE SWITCHES

Control is possible at a variety of baud or data rates ranging from 300 to 9600 baud. Use the 300 baud rate in the modem mode. In other modes, the 9600 baud rate is generally selected since the higher data rates provide a more rapid response to remote commands.

Make baud rate selection via two switches. The first switch, S3, is located on Audio/Microprocessor Assembly (A2) in the remote control. The second switch, S1, is located on A1A19 Remote Control Interface Assembly installed in the transceiver. The baud rate settings must be the same on both assemblies for proper operation. Again, the status of these switches is only read during power-up.

AUDIO INTERFACE SWITCHES

The audio interface may be either 2- or 4-wire. Use the 2-wire configuration when interfacing with standard telephone lines/networks or when it is desired to minimize the number of wires between the RCU and transceiver.

Select the audio interface via two switches. The first switch, S2, is located on Audio Interface Assembly (A4) in the RCU. The second switch, S2, is located on Audio Interface Assembly (A1A16) in the transceiver. The switch settings must match for correct equipment operation.

MODEM INTERFACE SWITCHES

The modem interface may be either 2- or 4-wire. As with the interface switches, use the 2-wire configuration when interfacing with standard telephone lines/networks or when it is desired to minimize the number of wires between the RCU and the transceiver. Otherwise, use the 4-wire configuration.

Select the modem interface via two switches. The first switch, S5, is located on Audio Microprocessor Assembly A2 in the

remote control. The second switch, S5, is located on Remote Control Interface Assembly A1A19 in the transceiver. The switch settings must match for correct equipment operation.

RCU OPERATION

As previously mentioned, operation of the RCU is identical to the transceiver, but with one exception. The only difference is the AFSK mode, which cannot be operated via the RCU. The RCU has the same keypad as the transceiver, and all functions are the same as the transceiver. This completes our discussion of RCU operation.

?

1. Where is the Remote Control Interface Assembly installed?

2. Which jacks provide interfacing of the RCU and the transceiver?

3. Which switch provides control mode selection on the RCU? Transceiver?

4. Where is the Control Mode switch located in the RCU? Transceiver?

5. Which baud rate provides a more rapid response to remote commands?

6. Which switch provides baud rate selection on the RCU? Transceiver?

7. Where is the Audio Interface switch located in the RCU? Transceiver?

8. Which mode cannot be controlled via remote operation?

CU-2310 ANTENNA COUPLER

Use the CU-2310 Antenna Coupler with the transceiver in the 100 or 500W configuration. It automatically matches the output impedance of the transceiver or RF amplifier to an antenna over the frequency range of 1.6 to 30MHz. Refer to Figure 2-2 in TO 31R2-2URC-111 for coupler connections.

CU-2310 ANTENNA COUPLER CONNECTION

As you can see from the figure, it is simple to set up the antenna coupler. Start with the RF coaxial cable; it connects to (J1) on the RT in 100W mode. In the 500W configuration it connects to (J5) on the RF Amplifier. The control cable (supplied with the coupler) always connects to the transceiver. There are no power connections for the coupler; however, it must be grounded. The last step in hooking up the coupler is connecting the antenna wire to E1.

CU-2310 ANTENNA COUPLER OPERATION

Once the coupler is properly connected, operation is controlled by the transceiver (or RCU, if used) and is fully automatic. The CU-2310 Antenna Coupler receives power from the transceiver. The power switch on the transceiver front panel controls power to the antenna coupler.

To operate the antenna coupler, tune the transceiver to a specific operating frequency and momentarily key the unit. The antenna coupler can be heard driving to the HOME position. If nothing is heard, a fault code should display, or the coupler may already be tuned. If no faults appear, consider the antenna coupler operational. This concludes our discussion of the operation of the CU-2310 Antenna Coupler.

?

9. With which equipment configurations is the CU-2310 Antenna Coupler used?

10. What is the purpose of the CU-2310 Antenna Coupler?

11. Which unit provides power to the antenna coupler?

12. How is tuning the antenna coupler accomplished?

SUMMARY

The RCU and the transceiver have several switches that must correspond to each other for proper equipment operation. Audio/Microprocessor (A2), located in the RCU, is home to all but one of the switch settings. It houses switches S4 Modem Control, S3 Baud Rate, and S5 Modem Interface. These switch settings must match those of S1, S2, and S5 located on Remote Control Interface PWB Assy (A1A19) in the transceiver. The other switch setting is the Audio interface switch, located on Audio Interface Assy (A1A16) in the transceiver and the A4 card in the RCU. Operation of the RCU is the same as the RT with one exception; you cannot access the AFSK mode in the remote setup.

The CU-2310 Antenna Coupler can be used in the 100 and 500W configurations. The transeiver supplies power to the coupler. The front panel keypad or the RCU controls the antenna coupler when in remote configuration. To tune the coupler, select a frequency and momentarily key the radio.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. You are permitted to use all available technical references and must score 100%. Your trainer will check your answers and review any incorrectly answered questions with you. When you have achieved the KEP standard, proceed to the performance procedures.

PERFORMANCE PROCEDURES

Your trainer will demonstrate how to connect/operate the RCU and the antenna coupler to the transceiver. Following the demonstration, you will be given an opportunity to practice the

procedure. When you feel comfortable with the procedure, you will be evaluated on the following:

- Connect the RCU to the transceiver (if applicable).
- Connect the CU-2310 Antenna Coupler to the transceiver (if applicable).
- Operate the RCU.
- Operate the CU-2310 Antenna Coupler via the transceiver or RCU.

After you complete these procedures, your trainer will review your work. When you are proficient in performing the procedures, you may be certified on the AFJQS. Your trainer will assign the next task.

REVIEW QUESTIONS CONFIRMATION KEY

1. In the transceiver
2. J2 (RCU), J9 (transceiver)
3. S4; S2
4. Audio/Microprocessor Assembly (A2); Remote Control Interface Assembly A1A19
5. 9600
6. S3; S1
7. Audio Interface Assembly (A4); Audio Interface Assembly (A1A16)
8. AFSK
9. 100 and 500W
10. Automatically matches the output of the transceiver or LPA to an antenna over the frequency range of 1.6 to 30MHz
11. Transceiver
12. Tune the transceiver to a specific operating frequency and momentarily key the unit.

MODULE 4
AM-7223/7224 LINEAR POWER AMPLIFIER (LPA) OPERATION

ABOUT THIS MODULE

This module covers the operation of the two LPAs and takes a look at each control on the front panel of the amplifiers. The operation of the AM-7223 and 7224 LPAs is similar with a few exceptions. These similarities may remind you of the RCU and antenna coupler operational procedures presented in an earlier module. To assist in troubleshooting the equipment, it is important to know the operational procedures.

PREREQUISITE(S)

Must have completed Modules 1 through 3 of this AFQTP.

OBJECTIVE(S)

Given TO 31R2-2URC-101, operate the AM-7223 LPA IAW pgs 3-1 thru 4-8. (AFJQS TASK 201.14.1.4)

- Explain the purpose of the AM-7223 LPA.
- Explain the operating procedures for the AM-7223 LPA.

Given TOs 31R2-2URC-121 and 35C1-2-892-1, operate the AM-7224 LPA with the PP-7913/URC IAW pgs 3-1 thru 3-3 of the -121 TO, and pgs 3-1 thru 4-3 of the -1 TO. (AFJQS TASK 201.14.1.5)

- Explain the purpose of the antenna loading switch on the AM-7224 LPA.
- Explain the function of the PP-7913 Power Supply.

TRAINING REFERENCE(S)

TO 31R2-2URC-101
TO 31R2-2URC-121
TO 35C1-2-892-1

AM-7223 LPA DESCRIPTION

PURPOSE

The AM-7223 LPA is a microprocessor-controlled power amplifier that amplifies the selected HF input signal from the RT-1446 in the 1.6 to 30MHz. It delivers 500Ws PEP with

multiple tone input signals, or 250 watts average with lock keyed CW or a continuous single tone input signal. The LPA tunes automatically, in 10 seconds or less, in response to frequency data from the 100W Transceiver and to its own internally generated servo signals. It can also be manually tuned using the front panel controls.

The 500W LPA is usually operated in the auto mode of operation. During power-up, the circuit breakers on the rear panel must be on and the POWER ENABLE/OFF switch on the front panel in the POWER ENABLE position. Since the 1000W LPA is operated with the PP-7913 Power Supply, the POWER ENABLE/OFF switch needs to be in the POWER ENABLE position.

If either LPA has been turned off for more than 10 seconds, there is a 3 minute warm-up period before the LPA can be placed to OPERATE. During this time, the manual controls (such as TUNE PWR and LOCAL KEY) are disabled. The STANDBY LED on the LPA flashes during the warm-up period and remains steady after the warm-up period.

PROCEDURES

TO 31R2-2URC-101, Figures 1-1 and 2-5 and Table 3-1, illustrate the AM-7223 LPA controls, outputs, jacks, and initial control settings. Let's take a look at these controls, starting with the initial control settings.

INITIAL CONTROL SETTINGS

Initial control settings establish standard positions with which further operations can be made. Ensure all controls are in the proper position before attempting to operate the unit. Table 3-1 lists the initial control settings for the AM-7223 LPA.

STEP-BY-STEP SEQUENCE FOR POWER APPLICATION

Before applying power to the LPA, ensure the LPA is connected to its associated ancillary equipment. Remember, operation with a transceiver is an absolute must.

- Once the LPA is connected, begin the power application sequence by completing the associated transceiver power application checks. Make sure the transceiver has passed the BIT.
- Verify the power source for the LPA matches the input power requirements.

- Set the POWER ENABLE/OFF switch to the ENABLE position. This allows the LPA to be powered on at the transceiver by pressing 2ND AMP PWR. If the LPA has been off for more than 10 seconds, there will be a 3 minute warm-up period upon power application before the LPA goes into the OPERATE mode. The STANDBY indicator on the LPA flashes during this 3 minute warm-up and becomes steady after the warm-up time has expired.

STEP-BY-STEP SEQUENCE FOR MANUAL BIT PROCEDURE

Before performing this procedure, make sure the applicable antenna coupler is tuned. When performing the manual BIT procedure, do test initiation with the LPA, not with the transceiver; however, the transceiver must be connected. To initiate BIT:

- Set the AUTO/MANUAL switch to the band corresponding to the frequency selected on the associated transceiver (bands begin at 0000 and end at 9999).
- Rotate the METER switch to the STATUS/FAULT position. If the METER switch is not in the STATUS/FAULT position, the self-test cannot be initiated at the LPA.
- Press the SELF TEST button (the white push button) on the LPA front panel.
  - If any fault codes are indicated, refer to the fault isolation portion of the TO for the fault code definition and procedure for correcting the fault condition.
  - If no faults exist, a "PASS" message appears on the METER display.
- After the test cycle is complete, move the METER switch out of the STATUS/FAULT position to remove the LPA from the test mode.

STEP-BY-STEP SEQUENCE FOR AUTOMATIC BIT PROCEDURE

Initiate the automatic BIT procedure via the transceiver. Clear LPA faults the same way as in the manual BIT procedure. To initiate an automatic BIT from the transceiver:

- Power up the LPA by depressing 2ND/AMP PWR.
- After a 3 minute warm-up time, press the 2ND/STB OPR buttons.
- Momentarily key the transceiver for tuning the LPA.
- Press 2ND/KEY 2ND/TEST.

- When the BIT test is completed, press 2ND/KEY again to unkey the transceiver.
- If there are no faults, a "PASSED" message appears on the transceiver display. This indicates all equipment connected passed the BIT.
- If any of the fault codes (2-01 through 2-22) are seen on the display, there is a problem with the LPA. To display a fault code on the LPA's LCD display, place the METER switch to the STATUS/FAULT position. You can clear the fault code by commanding the LPA amplifier to operate from the transceiver or by moving the LPA's METER selector switch out of the STATUS/FAULT position. However, if a fault condition still exists that affects the operation of the LPA, the LPA fault indicator lights and the LPA go into the BYPASS mode. This means the transceiver output is routed directly to the coupler or antenna, whichever the case may be.

STEP-BY-STEP SEQUENCE FOR MANUAL TUNING PROCEDURE

Use this procedure to check the manual tuning capability of the LPA. Refer to TO 31R2-2URC-101, Figure 3-1, as we cover this procedure.

- Connect the equipment to the system configuration at your location.
- Set the transceiver to the desired operating frequency.
- At the LPA, select the band corresponding to the selected transceiver frequency using the AUTO/MANUAL BAND switch.
- Place the METER selector switch to the COIL POS position.
- Using the TUNE control, preposition the coil to the value indicated on the manual tune chart (the number will be observed on the LPA's LCD display).
  - Look at the "frequency" portion of the chart and find the transceiver frequency.
  - Move up to the range line, and then left to the coil "position" line. This gives you the number that corresponds to the coil position for that particular frequency. These coil position segments are 100 points apart, so approximate the frequency if it falls between points, e.g., between 600 and 700 on the coil position scale.
- Once the coil is tuned, set the METER switch to either the FWD PWR (WATTS) or RF PLATE (VOLTS) position.

- When the bandswitch has finished tuning the bandswitch wafer, set the MANUAL TUNE PWR switch to the ON position. This generates a TUNE POWER REQUEST to the transceiver, and the LPA is keyed.
- If a fault is detected while this switch is active, the LPA drops back to STANDBY, and before the fault can be cleared, the MANUAL TUNE PWR switch must be turned off.
- While observing the METER display, use the TUNE switch to tune the servo coil for maximum meter reading.
- Turn off the MANUAL TUNE PWR switch. When the MANUAL TUNE PWR switch is turned off, the transceiver is notified that the LPA is tuned whether it actually is or not. Therefore, before you turn this switch off, ensure you correctly tuned the LPA. Otherwise, there is the possibility of a severe mismatch between the LPA and antenna system, thus resulting in a high VSWR and low forward power.
- Set the MANUAL LOCAL KEY switch to the ON position. The LPA should go into the OPERATE condition, and the OPERATE indicator should become a steady light.

STEP-BY-STEP SEQUENCE FOR AUTOMATIC TUNING PROCEDURE

This procedure checks the ability of the LPA to automatically tune from the transceiver front panel buttons. After connecting the equipment:

- Turn the LOCAL KEY switch to OFF.
- Set the AUTO/MANUAL BAND switch to the AUTO position. This deactivates all manual tune switches.
- On the transceiver, press 2ND STBY/OPR switch to place the LPA in the operate mode.
- Select a different frequency band (one other than the one used for the manual tuning procedure) and key the transceiver. The LPA should tune to the new frequency in 10 seconds or less.
    - If it does not tune to a new frequency, a fault code is displayed on the transceiver LCD. If a fault code is not encountered, the initial check-out procedure is completed.
    - If a fault code is encountered, refer to the trouble-shooting portion (Chapter 6) of the appropriate TO.

AUTO/MANUAL BAND SELECTION

This front panel, ten-position, AUTO/MANUAL rotary switch selects between automatic and manual mode of operation in the

frequency band selected. In AUTO position, tuning is automatic and controlled completely by signals from the transceiver. In this position, the MANUAL TUNE, MANUAL TUNE POWER, MANUAL LOCAL KEY, and self-test controls are disabled.

When the AUTO/MANUAL BAND switch is not in the AUTO position, the LPA is in the manual mode and the current operating frequency band is selected. (Actually, you select the operating frequency band with the AUTO/MANUAL BAND switch.) The 500W LPA has nine operating bands and the 1000W LPA has 10 operating bands. Selecting a new switch position causes the internal band switch wafer to turn to its corresponding position. The wafer does not turn unless the operator has left the band switch in one position for more than one second. Then the microprocessor sends an RF mute signal to the transceiver and unkeys the LPA. Also, the bandswitch does not turn while there is RF power at the XCVR RF input of the LPA. All manual tuning keys, along with the self-test control, are disabled while the wafer is turning.

MANUAL TUNE POWER SWITCH

When manual operation is selected, the Manual Tune Power switch is moved to the ON position. This sends a tune power request message to the transceiver and keys the LPA. When the Manual Tune Power switch is activated, any previous fault indications are cleared. If a fault is detected while this switch is active, the LPA drops back to STANDBY, and the Manual Tune Power switch must be turned off before the fault can be cleared. Activation of the tune mode causes the transceiver to transmit a CW carrier emission.

MANUAL LOCAL KEY SWITCH

This switch keys and places the LPA in OPERATE when it is turned on. Also, the switch is active only in the manual mode and clears any previous fault indications when it is activated. If this key is activated and a fault condition occurs, the LPA drops back to STANDBY and must be deactivated before the fault condition can be cleared. This switch keys only the LPA, so the transceiver must be keyed independently.

MANUAL TUNE SWITCH

This switch is active only in the manual mode and allows the operator to fine tune the LPA by controlling the position of the tune variable coil.

SELF TEST BUTTON

With the AUTO/MANUAL BAND switch in any position except AUTO and the METER switch in the STATUS/FAULT position, push the SELF TEST push button to initiate the BIT for the LPA only. The BIT tests all functional modules and displays failures on the meter display (of the LPA) when the STATUS/ FAULT position of the METER switch is selected. Other functions of this button are explained later in the BIT interpretation section.

METER SELECT SWITCH

The METER select switch controls the inputs to the METER LCD display. There are eleven possible functions for the LPA. The details of each function were described in an earlier module.

TRANSCEIVER CONTROLLED OPERATION

Automatic tuning of the LPA is controlled completely by the transceiver when the AUTO/MANUAL BAND select switch is in the AUTO position.

METER DISPLAY UPDATE

Periodically, the microprocessor reads the appropriate inputs and calculates a new value for the METER LCD display. The meter display routine is inactive during BIT. The analog inputs are read every 100 milliseconds, and an average or peak value is displayed every second for the function selected.

1. What does the POWER ENABLE/OFF switch allow when placed to the ENABLE position?

2. What is the range of the frequency bands?

3. Which position must the METER switch be in to initiate the self-test at the LPA?

4. Where is automatic BIT procedure initiated?

5. What is the purpose of the manual tuning procedure when initially checking out the LPA?

6. When is a TUNE POWER REQUEST generated to the transceiver?

7. When the LPA is tuned (manually), what does turning the MANUAL LOCAL KEY switch to the ON position do?

8. How long should it normally take for the LPA to tune to a new frequency?

9. How is tuning controlled during automatic operation?

10. How many operating bands do the 500 and 1000W LPAs have?

11. How long must the operator leave the AUTO/MANUAL BAND switch in one position before the wafer will turn?

12. What happens if a fault is detected while the manual tune power switch is active?

13. What is the only position of the AUTO/MANUAL BAND switch that will not allow the initiation of a self-test?

14. What controls automatic tuning of the LPA when the AUTO/MANUAL BAND select switch is in the AUTO position?

AM-7224 LPA ANTENNA LOADING SWITCH OPERATION

PURPOSE

The 1000W LPA has the capability for antenna loading selection. The ANTENNA loading switch controls the output impedance to the antenna for the 1kW LPA in MANUAL mode. The 1kW LPA microprocessor controls the output impedance to the antenna in AUTO mode. The manual ANTENNA switch selects between LOW Z, 50 OHMS, and HIGH Z loading. When a new ANTENNA switch position is selected in the manual mode, the 1kW LPA microprocessor does not change impedance until after an RF MUTE request is sent to the transceiver and the 1kW LPA is unkeyed. This prevents damage to the equipment.

PP-7913 POWER SUPPLY FUNCTION

The function and purpose of the PP-7913 Power Supply is to supply AC and DC voltages to the AM-7224 LPA. The power supply is a 115/208/230VAC, ±10%, single-phase 50/60/400Hz unit that produces three output voltages: +3000VDC at 1A, +13.5VDC at 8A, and 115VAC at 1A. After proper connections are made to the LPA, power is applied when the PP-7913 power supply is turned on.

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15. What is the purpose of the ANTENNA loading switch of the 1000W LPA?

16. What is the purpose of the PP-7913 power supply?

SUMMARY

As discussed throughout this module, the AM-7223 and AM-7224 LPAs are the two RF amplifiers that connect to the RT-1446. Both are microprocessor controlled amplifiers that boost a 100W HF signal to either a 500 or 1000W output. They have identical front panel controls and operate the same except the AM-7224 LPA must have the PP-7913 Power Supply for operation.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test and you must score 70% or more. Your trainer will check your answers and review any incorrectly answered questions with you. When you have achieved the KEP standard, proceed to the performance procedures.

PERFORMANCE PROCEDURES

Your trainer will demonstrate how to operate the AM-7223/7224 in automatic/manual modes, perform the self-test, and the BIT test. Following the demonstration, you will be given an opportunity to practice the procedure. When you feel comfortable with the procedure, you will be evaluated on the following:

- Operate the AM-7223/7224 LPA in the automatic mode.
- Operate the AM-7223/7224 LPA in the manual mode.
- Perform the self-test on the AM-7223/7224 LPA.
- Perform BIT using the transceiver.

After you complete these procedures, your trainer will review your work. When you are proficient in performing the procedures, you may be certified on the AFJQS.

REVIEW QUESTIONS CONFIRMATION KEY

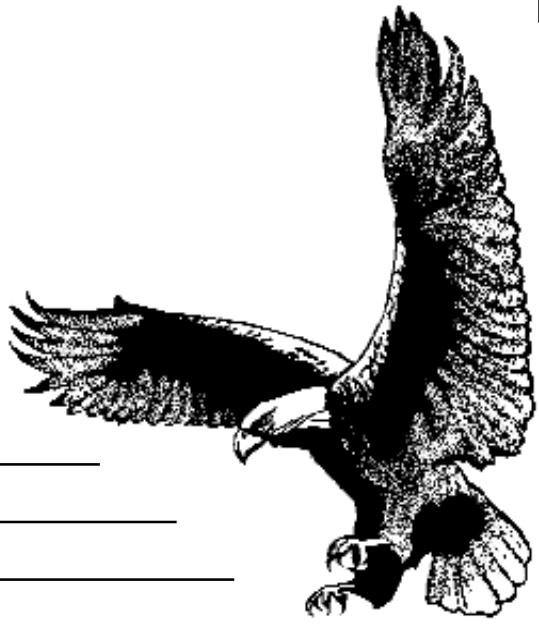
1. The LPA to be powered on by the transceiver
2. 0000 to 9999
3. STATUS/FAULT
4. At the transceiver
5. To check the manual tuning capability of the LPA
6. When the bandswitch is finished tuning, the bandswitch wafer and the MANUAL TUNE PWR switch are set to ON.
7. Causes the LPA to go into OPERATE
8. 10 seconds
9. By signals from the transceiver
10. Nine and ten respectively
11. 1 second
12. The LPA will drop back to STANDBY.
13. AUTO
14. The transceiver
15. Controls the output impedance to the antenna in the MANUAL mode
16. Provides power to the 1000W LPA

AIR FORCE QUALIFICATION TRAINING PACKAGE 2E1X3-206N

PART OF AFJQS 2E1X3-206N

AN/URC-119(V) HF COMMUNICATIONS SYSTEM

KNOWLEDGE EVALUATION PAMPHLET



1 OCTOBER 1999
SUPERSEDES AFJQS 2E1X3-206N
DATED 2 SEPTEMBER 1999

FOR OJT USE ONLY

KNOWLEDGE EVALUATION PAMPHLET (KEP)

- This pamphlet should be separated from the package immediately and stored to prevent compromise of the questions. The answer sheet for the KEP is located at the back of this pamphlet. This answer sheet may be detached to make it easier to enter the answers. The KEP confirmation key, also located at the back of this pamphlet, should be detached and stored until ready for grading.
- After the trainee completes each module, the supervisor/trainer administers the corresponding KEP test. Using the KEP confirmation key, the supervisor/trainer checks the trainee's answers and reviews the incorrect responses. If the score is less than what is required, have the trainee restudy the module and retake the test.
- The trainee's responses to the KEP questions will aid us in evaluating the effectiveness of this training package. After the questions have been answered for all the module tests, please attach the completed and graded answer sheets to the training completion certification and send the package to us at the address specified.

KEP QUESTIONS - MODULE 1

1. What must be done in order to tune the AN/URC-119(V)?

    a. A frequency must be selected in the USB mode.
    b. A channel must be selected and transceiver keyed.
    c. A mode must be selected and the speaker must be on.
    d. AGC must be selected and the MIC must be depressed.

2. In which frequency spectrum does the AN/URC-119(V) operate?

    a. LF
    b. HF
    c. UHF
    d. VHF

3. Which modes of operation are available with the AN/URC-119(V)?

    a. LSB, USB, AME, CW, and SFSK
    b. LSB, USB, AME, CW, and AFSK
    c. UUSB, LLSB, AME, CW, and AFSK
    d. LF, HF, UHF, VHF, and automatic mode

4. Which units make up the 100 watt configuration?

    a. RT-1446 transceiver and CU-2310 antenna coupler
    b. RT-1446 transceiver, AM-7223 RF amplifier, and CU-2310 antenna coupler
    c. RT-1446 transceiver, AM-7224 RF amplifier, and CU-2310 antenna coupler
    d. RT-1446 transceiver, AM-7224 RF amplifier, and URA-38( ) antenna coupler

5. Which units make up the 500 watt configuration?

    a. RT-1446 transceiver and CU-2310 antenna coupler
    b. RT-1446 transceiver, AM-7223 RF amplifier, and CU-2310 antenna coupler
    c. RT-1446 transceiver, AM-7224 RF amplifier, and CU-2310 antenna coupler
    d. RT-1446 transceiver, AM-7224 RF amplifier, and URA-38() antenna coupler

6. Which units make up the 1000 watt configuration?

   a. RT-1446 transceiver and CU-2310 antenna coupler
   b. RT-1446 transceiver, AM-7223 RF amplifier, and CU-2310 antenna coupler
   c. RT-1446 transceiver, AM-7224 RF amplifier, and CU-2310 antenna coupler
   d. RT-1446 transceiver, AM-7224 RF amplifier, and URA-38() antenna coupler

7. What separates the transmit and receive paths in the transceiver?

   a. Antenna
   b. T/R switch
   c. Directional bridge
   d. Capacitor in the RF line

8. Reference frequencies for the transceiver are derived from which frequency standard?

   a. 1MHz
   b. 5MHz
   c. 10MHz
   d. 15MHz

9. What is the maximum output power that the CU-2310 antenna coupler can handle?

   a. 1200 watts
   b. 1000 watts
   c. 500 watts
   d. 100 watts

10. What in the CU-2310 antenna coupler samples the RF from the transceiver?

   a. An impedance matching transformer
   b. A transceiver RF sampling circuit
   c. A discriminator sampling circuit
   d. A directional bridge

11. How many watts of output power does the AM-7223 RF amplifier provide?

    a. 1500
    b. 1000
    c. 500
    d. 100

12. Which piece of equipment has an external power supply?

    a. RT-1446
    b. CU-2310
    c. AM-7223
    d. AM-7224

13. How many output voltages does the PP-7913 power supply provide?

    a. 3
    b. 4
    c. 5
    d. 6

14. Which mode of remote operation allows unlimited distance for remote operation?

    a. RS-232
    b. RS-332
    c. RS-432
    d. Modem

15. The remote control interface assembly is installed in the

    a. remote control unit.
    b. antenna coupler.
    c. RF amplifier.
    d. transceiver.

KEP QUESTIONS - MODULE 2

1. Which change(s) cannot be made when the transceiver is keyed?

    a. Meter
    b. Sidetone
    c. VOX and ANTIVOX
    d. Frequency and channel

2. PATCH operation is used when connection to which type of equipment is needed?

    a. Remote control unit
    b. Cryptographic
    c. Telephone
    d. Audio

3. What is used to raise or lower the pitch of received audio signals?

    a. BFO
    b. VOX
    c. ANTIVOX
    d. Frequency scrolling keys

4. Which control is used to increase the average RF output levels?

    a. AGC
    b. BFO
    c. TGC
    d. CLIP

5. Which meter scale gives an indication of the received signal strength?

    a. AUDIO
    b. PATCH
    c. LINE
    d. "S"

6. Which meter scale gives an indication of the transmit audio signal strength?

    a. AUDIO
    b. PATCH
    c. LINE
    d. "S"

7. How many programs may be stored in memory?

    a. 25
    b. 50
    c. 100
    d. 150

8. Which information may be stored in memory?

    a. Frequency and mode
    b. Frequency and meter
    c. Channel and audio source
    d. Audio source and frequency

KEP QUESTIONS - MODULE 3

You may use all technical references and must score 100%.

1. The connections which provide interfacing of the remote control unit to the transceiver are

   a. J2 and J4.
   b. J2 and J9.
   c. J9 and J4.
   d. J3 and J9.

2. Switch settings between the _____ and the remote control unit must correspond.

   a. antenna coupler
   b. RF amplifier
   c. transceiver
   d. antenna

3. The Control Mode switches are located on the _____ assembly of the remote control unit and the _____ assembly of the transceiver.

   a. audio microprocessor; audio interface
   b. audio interface; remote control interface
   c. remote control interface; audio microprocessor
   d. audio microprocessor; remote control interface

4. Which assembly contains the Modem Interface switch on the remote control unit?

   a. Exciter
   b. Audio interface
   c. Audio microprocessor
   d. Remote control interface

5. Which mode cannot be controlled using the remote control unit?

a. AFSK
b. BFSK
c. AME
d. USB

6. The CU-2310 antenna coupler can be used with the _____ watt or _____ watt configurations.

a. 1000; 5000
b. 1000; 500
c. 500; 100
d. 100; 50

7. Connection of the CU-2310 Antenna Coupler to the transceiver is made using an RF coaxial cable and _____ cable.

a. modem
b. control
c. auxiliary
d. telephone

8. The CU-2310 antenna coupler receives power from the

a. remote control unit.
b. AC power source.
c. RF amplifier.
d. transceiver.

KEP QUESTIONS - MODULE 4

1. Initial control settings are performed

    a. prior to operation.
    b. on the power supply.
    c. on the microprocessor.
    d. in step-by-step sequences.

2. The warm-up period when the LPA is initially turned on is _____ minutes.

    a. 2
    b. 3
    c. 4
    d. 5

3. If the METER switch on the LPA is not in the STATUS/FAULT position, a self-test cannot be initiated at the

    a. linear power amplifier.
    b. remote control unit.
    c. transceiver.
    d. Both a and b

4. In order to remove the LPA from the test mode, the METER switch must be moved _____ position.

    a. to the MANUAL
    b. from the MANUAL
    c. to the STATUS/FAULT
    d. from the STATUS/FAULT

5. If a fault code of _____ is seen on the transceiver display, there is a problem with the LPA.

a. 1-01 thru 1-022
b. 2-01 thru 2-022
c. 3-01 thru 3-022
d. 4-01 thru 4-022

6. If a fault condition exists which affects the operation of the LPA, the fault light comes on and the RF amplifier goes into the _____ mode.

a. SHUTDOWN
b. OVERRIDE
c. COUPLER
d. BYPASS

7. When the LPA's AUTO/MANUAL BAND switch is in the AUTO position, the _____ is/are deactivated.

a. antenna coupler
b. automatic tuning
c. LPA manual tune switches
d. transceiver front panel keys

8. The 500 watt LPA has _____ operating bands.

a. 12
b. 11
c. 10
d. 9

9. When the MANUAL TUNE PWR switch is activated, any previous _____ indications/displays are cleared.

a. mode
b. fault
c. status
d. frequency

10. The _____ switch allows the operator to fine tune the LPA by controlling the position of the variable coil.

a. MANUAL TUNE
b. MANUAL TUNE PWR
c. MANUAL LOCAL KEY
d. AUTO/MANUAL BAND

11. In order to initiate the BIT procedure for the LPA only, the AUTO/MANUAL BAND switch must be in any position except AUTO, and the METER switch must be in the _____ position.

a. COIL POS
b. RF PLATE
c. ANT VSWR
d. STATUS/FAULT

12. The ANTENNA LOADING switch and the PP-7913 power supply make up the differences between the AM-7223 and AM-7224 LPAs.

a. True
b. False

13. The ANTENNA loading switch controls the output _____ to the antenna for the 1kW LPA.

a. capacitance
b. inductance
c. impedance
d. power

14. When a new ANTENNA switch position is selected, the impedance change will not be made until a _____ is sent to the transceiver.

a. tune power request
b. formal message
c. manual key
d. RF mute

KEP CONFIRMATION KEY

MODULE 1	MODULE 2	MODULE 3	MODULE 4
1. b	1. d	1. b	1. a
2. b	2. c	2. c	2. b
3. b	3. a	3. d	3. a
4. a	4. d	4. c	4. d
5. b	5. d	5. a	5. b
6. d	6. a	6. c	6. d
7. b	7. c	7. b	7. c
8. c	8. a	8. d	8. d
9. c			9. b
10. c			10. a
11. c			11. d
12. d			12. a
13. a			13. c
14. d			14. d
15. d			

KEP QUESTIONS ANSWER SHEET

NAME_____ RANK_____ DAFSC_____

ORGANIZATION_____ MAJCOM_____ DSN_____

AFJQS/AFQTP PUBLICATION DATE_____ DATE COMPLETED_____

MODULE 1	MODULE 2	MODULE 3	MODULE 4
1. ____	1. ____	1. ____	1. ____
2. ____	2. ____	2. ____	2. ____
3. ____	3. ____	3. ____	3. ____
4. ____	4. ____	4. ____	4. ____
6. ____	6. ____	6. ____	6. ____
7. ____	7. ____	7. ____	7. ____
8. ____	8. ____	8. ____	8. ____
9. ____			9. ____
10. ____			10. ____
11. ____			11. ____
12. ____			12. ____
13. ____			13. ____
14. ____			14. ____
15. ____			

NOTE: After completing and grading all tests, attach this answer sheet to the Training Completion Certification and send the package to the following address:

81 TRSS/TSQS
601 D STREET
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