5122.10-STD-2

DEPARTMENT OF DEFENSE

JOINT WORK-FORCE STANDARDS

ARMY
NAVY
AIR FORCE
MARINE CORPS

ARMED FORCES
RADIO AND TELEVISION BROADCAST ENGINEERING
AND MAINTENANCE

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ASSISTANT SECRETARY OF DEFESE (PUBLIC AFFAIRS)

FORWARD

This standard is issued under the author of DoD Directive 5122.10, "American Forces Information Service," March 19, 1980. Its purpose is to define the workload and prescribe the procedures used to determine work-force requirements for engineering and maintenance operations of the Armed Forces Radio and Television Service (AFRTS).

The provisions of this standard apply to the Office of the Secretary of Defense (OSD), Military Departments, the Organization of the Joint Chiefs of Staff (OJCS), the United and Specified Commands, The Defense Agencies, and activities administratively supported by OSD (thereafter called "DoD Components").

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CHAPTER 1

INTRODUCTION

A. STANDARD'S CONTENT. This standard contains the following chapters:

1. Chapter 1, Introduction, contains overview, applicability statement, and the concepts used to develop the work-force standard for the radio and television broadcast engineering and maintenance function of the Armed Forces Radio and Television Service (AFRTS).

2. Chapter 2, Work Center Description, contains the categories and corresponding task definitions, work-force equation data for the radio and television broadcast engineering and maintenance work center and the network and squadron headquarters engineering and maintenance management work center.

3. Chapter 3, Equation Displays, contains the work-force equations and staffing plan determinations for the radio and television in-studio, transmitter, maintenance supply, and network and squadron engineering and maintenance functions.

4. Chapter 4, Application Instructions, contains instructions for manually applying the standard for in-studio and transmitter maintenance, and maintenance supply at one or all locations plus instructions for determining the requirements for the network and squadron headquarters maintenance management function.

5. Chapter 5, Work-Force Tables, contains development procedures and work-force tables depicting various incremental work-force levels for the radio and television broadcast engineering and maintenance work center. (Table 1 is for both In-studio and transmitter maintenance functions; Table 2 is for the supply function; and Table 3 is for the network and squadron maintenance management function.

6. Chapter 6, Definitions and Concepts, contains general definitions applicable to the maintenance function. Concepts, contains information on the procedures, concepts, functions, and organizational policies of the maintenance complex. It outlines, as a minimum, those items and functions necessary to effectively operate and maintain the maintenance functions.

7. Chapter 7, Standards Development, contains specific data used in the development of this standard, rationale, and statistical information.

B. APPLICABILITY.

1. The Radio and Television Broadcast Maintenance Standard applies to all Army, Navy, and Air Force Armed Forces Radio and Television outlets except mini-TV, Fleet Support Detachment (FSD), and AFRTS operations aboard Navy vessels.

2. The network and squadron headquarters engineering and maintenance management portion of the standard applies to both the Army and Air Force. The Navy, due to present organizational structure, is exempt from use of this portion of the standard. If the Navy chooses to reorganize similar to the Army's and Air Force's maintenance management structure then this portion of the standard will apply to them.

CHAPTER 2

WORKCENTER DESCRIPTIONS

A. RADIO AND TELEVISION BROADCAST MAINTENANCE

1. Mission Statement. The radio and television broadcast maintenance workcenter is responsible for supporting the Armed Forces Radio and Television Service (AFRTS) through maintenance activities for the in-studio and transmitter equipment owned and operated by AFRTS. This work center is organizationally aligned under the station management function with staff assistance from the network and squadron headquarters engineering and maintenance management function. Although this statement lists both radio and television as one work center, the words contained in this statement, plus all the data displayed throughout this section, can independently apply to either. They are mutually exclusive entities when and where it is necessary to address them as such.

2. Description Summary

a. Direct

(1) Maintenance Management. Provides maintenance management and administrative support to the maintenance complex.

(2) Maintenance Control. Provides the functions of job control and material control, monitors contract maintenance, and maintains an engineering and maintenance library.

(3) Quality Control. Performs a quality control function for the maintenance complex.

(4) In-Studio Maintenance (includes co-located transmitters). Performs scheduled and unscheduled maintenance on all in-studio AFRTS equipment.

(5) Remote Transmitter Maintenance (includes travel). Performs scheduled and unscheduled maintenance on AFRTS transmitters, microwave relays, and other related equipment.

b. Indirect

(1) Supervision. Administers personnel, supervises personnel, reviews incoming and outgoing distribution, reviews report and statistical data, develops budget estimate, inspects facility, investigates accident or incidents, and receives and assists visiting officials.

(2) Administration. Processes unclassified distribution, maintains unclassified correspondence file, maintains classified material, maintains stock of blank forms, maintains status chart or bulletin board,

and maintains time and attendance card.

(3) Meeting. Prepares for meeting, and conducts and attends meeting.

(4) Training. Administers training, develops training material, conducts training, receives training, and maintains training record.

(5) Equipment Maintenance. Maintains office equipment and maintains assigned vehicle.

(6) Cleanup. Prepares work area and puts work away.

3. Description Detail

a. Direct

(1) Maintenance management:

(a) Provides maintenance management. Directs, controls, and monitors the maintenance activity of the broadcast engineering and maintenance work center.

(b) Provides administrative maintenance support. Processes maintenance management data, maintains maintenance correspondence file, maintains stock of blank maintenance forms, maintains maintenance stat chart or bulletin board, and maintains maintenance personnel time a attendance card.

(2) Maintenance Control:

(a) Provides the function of job control. Coordinates, schedules, controls, and, monitors maintenance activity within the maintenance complex.

(b) Provides the function of material control. Coordinates, manages, and controls the AFRTS maintenance supply system.

(c) Monitors contract maintenance. Monitors the AFRTS contract maintenance program to ensure contract maintenance is performed according to requirements.

(d) Maintains an engineering and maintenance library. Maintains a maintenance publication system necessary to operate and maintain AFRTS equipment.

(3) Quality Control. Performs a quality control function for the maintenance complex to make sure maintenance uses proven techniques, proper safety practices, sound maintenance discipline, and good housekeeping practices.

(4) In-Studio Maintenance (includes co-located transmitters):

(a) Performs scheduled maintenance. Performs scheduled maintenance on all in-studio AFRTS equipment.

(b) Performs unscheduled maintenance. Performs unscheduled maintenance on all in-studio AFRTS equipment.

(5) Remote Transmitter maintenance (includes travel):

(a) Performs scheduled maintenance. Performs scheduled maintenance on AFRTS remote transmitters, microwave relays, and other related equipment.

(b) Performs unscheduled maintenance. Performs unscheduled maintenance on AFRTS remote transmitters, microwave relays, and other related equipment.

b. Indirect: The indirect detail appears following the Network and Squadron Headquarters workcenter description and is the same for all workcenters indentified in this standard.

B. NETWORK AND SQUADRON HEADQUARTERS ENGINEERING AND MAINTENANCE MANAGEMENT

1. Mission Statement. The network and squadron headquarters engineering and maintenance management work center is responsible for supporting the Armed Forces Radio and Television Service through the management of the engineering and maintenance functions assigned to and throughout the network or squadron. The work center is aligned directly under the squadron commander or the headquarters network commander depending upon Army or Air Force configuration.

2. Description Summary

a. Direct

(1) Engineering. Directs engineering requirement, provides engineering support, and provides drafting support.

(2) Maintenance. Provides maintenance management support, provides maintenance control support, provides logistics support, and provides quality control support.

(3) Administration. Provides administrative support to the engineering and maintenance management function.

b. Indirect

(1) Supervision. Administers personnel, supervises personnel, reviews incoming and outgoing distribution, reviews report and statistical

data, develops budget estimate, inspects facility, investigates accident or incident, and receives and assists visiting official.

(2) Administration. Processes unclassified distribution, maintains unclassified correspondence files, maintains classified material, maintains stock of blank forms, maintains status chart or bulletin board, and maintains time and attendance card.

(3) Meeting. Prepares for meeting, and conducts and attends meeting.

(4) Training. Administers training, develops training material, conducts training, receives training, and maintains training record.

(5) Equipment maintenance. Maintains office equipment, and maintains assigned vehicle.

(6) Cleanup. Prepares work area and puts work away.

3. Description Detail

a. Direct

(1) Engineering:

(a) Directs engineering requirements. Responsible for the overall planning, designing and programming for new, replacement, modified and improved facilities, and equipment for the entire maintenance complex.

(b) Provides engineering support. This includes managing squadron maintenance contracts, providing installation team support, performing depot level maintenance, and providing basic engineering and construction support for equipment not available through commercial sources. Provides engineering support to the director of engineering in evaluating, planning, designing and programming for new, replacement, modified and improved facilities, and equipment for the entire maintenance complex.

(c) Provides drafting support. Provides drafting support to the engineering and maintenance complex.

(2) Maintenance:

(a) Provides maintenance management support. Provides maintenance management support to the director of engineering by managing, controlling, and monitioring all facets of the maintenance complex.

(b) Provides maintenance control support. Provides maintenance control support to the director of engineering by managing, controlling, and monitoring the overall maintenance control function within the

maintenance complex.

(c) Provides logistics support. Provides logistics support for the maintenance complex.

(d) Provides quality control support. Provides quality control support by serving as primary technical adviser for all maintenance requirements in the maintenance complex and assisting the director of engineering in identifying and resolving maintenance problems.

(3) Administration. Provides administrative support to the engineering and maintenance management function.

b. Indirect

(1) Supervision:

(a) Administers personnel:

1 Indoctrinates personnel. Conducts initial interview, makes original job assignment, and acquaints newly assigned personnel with the work center. Includes conducting employment interview with civilian applicant.

2 Rates performance:

a Prepares evaluation. Writes evaluation performance report by researching, evaluating, drafting, proofreading typed copy, marking boxes, and signing completed report. Excludes counseling and typing.

(1) Enlisted evaluation.

(2) Officer evaluation.

(3) Civilian evaluation.

b Endorses evaluation. Writes endorsement by researching, evaluating, drafting, proofreading typed copy, and signing completed report. Excludes typing.

(1) Enlisted evaluation.

(2) Officer evaluation.

(3) Civilian evaluation.

3 Nominates personnel for award. Prepares recommendation by researching, evaluating, drafting, proofreading typed copy, and signing completed recommendation as required.

4 Monitors management improvement program:

a Assists subordinate in developing improvement suggestion.

b Processes suggestion received for evaluation.

(b) Supervises personnel:

1 Schedules personnel. Reviews work requirement and priority, reviews personnel status, determines duty assignment, and prepares personnel schedule.

2 Develops directive. Develops policy, procedure, plan, operating instruction, checklist or performance standard by researching, drafting, proofreading typed copy, and signing completed directive as required.

3 Directs work center activity. Includes associated telephone call.

a Inspects work in progress.

b Coordinates with supervisor or other unit or agency on workcenter or personnel status.

c Informs workcenter personnel on change affecting individual or workcenter activity.

d Prepares routine correspondence.

4 Counsels personnel. Counsels subordinate personnel on performance and progress in career development and suggests areas for improvement. Counsels and assists individual with morale, welfare, and disciplinary problem. Takes necessary corrective action required to maintain discipline.

(c) Reviews incoming distribution. Reviews incoming distribution for information and necessary action.

(d) Reviews outgoing distribution. Reviews outgoing correspondence for completeness, accuracy, and signs as required.

(e) Reviews report and statistical data. Reviews information contained in report and statistical data for impact on workcenter status and to identify possible trend requiring management action.

(f) Develops budget estimate. Prepares input to unit resource monitor by researching, evaluating, coordinating, drafting, and forwarding estimate. Includes answering follow-on inquiry on estimate.

(g) Inspects facility. Periodically inspects workcenter facility for housekeeping, safety, fire hazard, or equipment condition that requires attention. Includes writing report.

(h) Investigates accident or incident. Investigates ground accident or incident within the workcenter. Prepares report and associated correspondence.

(i) Receives and assists visiting official. Receives visitor, inspector or other official, assists visitor to accomplish his or her purpose, and escorts visitor in restricted and controlled area, as required.

(2) Administration:

(a) Processes unclassified distribution. Includes delivery and pickup of unclassified distribution.

1 Processes incoming distribution. Receives and opens envelope, reviews for required action, marks, and routes distribution.

2 Processes outgoing distribution. Stamps, marks, seals, packages, and routes distribution.

(b) Maintains unclassified correspondence file:

1 Establishes file. Prepares file outline, folder, guide, and label.

2 Files correspondence. Reviews material, marks, sorts, classifies, inserts in file, removes for reference, and refiles.

3 Maintains suspense file. Determines need for suspense, assigns suspense, posts file, reviews file for compliance, reminds individual of suspense, and annotates file at completion of action.

4 Disposes of record. Removes record from file and disposes of in accordance with governing directives.

5 Maintains log and register. Obtains book or form, makes entry, and puts book or form away.

6 Maintains security file. Establishes, posts, and changes security record access documentation and the list of restricted area badge numbers for work center. Destroys material as required.

7 Maintains personnel locator file. Prepares card or similar record, posts, changes, and disposes of as required.

(c) Maintains classified material.

1 Controls material. Prepares document receipt, routes file, and removes material for retrieval.

2 Inventories material. Screens file, reviews retention criteria, and removes obsolete or unnecessary material.

3 Safeguards material. Opens and closes safe, performs safe area check, and changes safe combination.

4 Destroys material. Prepares form, destroys material, and annotates record.

(d) Maintains stock of blank forms. Establishes requirement, prepares requisition, receives, routes, and controls stock of blank forms.

(e) Maintains status chart or bulletin board. Removes existing information and posts new information.

(f) Maintains time and attendance card. Records time and attendance information, and forwards card.

(3) Meeting:

(a) Prepares for meeting. Gathers information, organizes material, prepares briefing chart or slide, and practices presentation.

(b) Conducts and attends meeting. Conducts and attends a meeting, briefing, or conference.

(4) Training:

(a) Administers training. Reviews training record, interviews and counsels trainee, determines training need, designates trainer, and evaluates training progress.

(b) Develops training material. Researches, drafts, reviews, and updates training outline, lesson plan, or test. Develops chart, mock-up, demonstrator, or other training aid.

(c) Conducts training:

1 Prepares for training. Obtains material and prepares classroom and equipment.

2 Instructs trainee. Instructs trainee on the job and conducts lecture, demonstration, and group discussion.

3 Administers test. Administers and evaluates result of job related test given in the work center.

(d) Receives training:

1 Receives instruction. Attends lecture and demonstration or participates in group discussion.

2 Takes test. Takes locally devised oral, practical, or written test.

3 Reads publication. Maintains job proficiency by reading applicable technical and standard publication.

(e) Maintains training record. Establishes, posts, and reviews training record.

(5) Equipment maintenance:

(a) Maintains office equipment. Cleans, dusts, changes ribbon, belt, or tape, or makes minor adjustment.

(b) Maintains assigned vehicle. Cleans, washes, inspects, refuels, or makes minor adjustment.

(6) Cleanup:

(a) Prepares work area. Places working tool or equipment in proper location at beginning of duty period and arranges area to conform with any sanitary, safety, or security requirement.

(b) Puts work away. Stores working tool or equipment in proper location at the end of the duty period and arranges area to conform with any sanitary, safety, or security requirement.

CHAPTER 3

EQUATION DISPLAYS

A. In-Studio Maintenance Equation Data; in-studio maintenance function equation yc = .3830 (x)

(1) Workload ("X"value). Radio and television broadcast operations workload applied against standards' values to arrive at work-hours that were converted to work-force spaces and served as the "X" value.

(2) Work-force ("Y" value). These are the number of maintenance personnel assigned to maintain the equipment associated with the workload. This is for in-studio maintenance support only.

B. Transmitter Maintenance Equation

(1) Overview. As outlined in the introduction, this equation was developed through a different work measurement approach. Field-level personnel were brought together at Kelly AFB, Texas and a workshop was convened to develop the work-force requirements for radio and television transmitter maintenance.

(2) Work-force equation Data. Radio and television transmitter maintenance was measured in three major areas: Transmitters by size and type (radio or TV), AFRTS owned and non-owned transmitter facilities, and repeater sites maintained by AFRTS personnel.

(3) Work-force equation. The following work-force equation was developed for radio and television transmitters, facilities, and repeater maintenance.

$Y = b_1 x_1 + b_2 x_2 \ . \ . \ . + b_{13} x_{13}$ Where:

b_1 = 28.5 work-hours per unit
x_1 = The number of AFRTS owned remote AM & FM mono radio transmitters from 0.1 to 5.0 kilowatts.

b_2 = 38.5 work-hours per unit
x_2 = The number of AFRTS owned remote AM & FM mono radio transmitters from 5.1 to 10.0 kilowatts.

b_3 = 30.5 work-hours per unit
x_3 = The number of AFRTS owned remote FM stereo remote radio transmitters from 0.1 to 5.0 kilowatts.

b_4 = 41.5 work-hours per unit
x_4 = The number of AFRTS owned remote FM stereo remote radio transmitters from 5.1 to 10.0 kilowatts.

b_5 = 52.5 work-hours per unit
x_5 = The number of AFRTS owned remote TV transmitters from 0.1 to 1.0 kilowatts.

b_6 = 65.5 work-hours per unit
x_6 = The number of AFRTS owned remote TV transmitters from 1.1 kilowatts and up.

b_7 = 17.50 work-hours per unit
x_7 = The number of AFRTS owned remote radio transmitter facilities.

b_8 = 9.50 work-hours per unit
x_8 = The number of non-AFRTS owned remote radio transmitter facilities.

b_9 = 20.5 work-hours per unit
x_9 = The number of AFRTS owned remote TV transmitter facilities.

b_{10} = 12.5 work-hours per unit
x_{10} = The number of non-AFRTS owned remote TV transmitter facilities.

b_{11} = 15.00 work-hours per unit
x_{11} = The number of remote radio repeater stations serviced by AFRTS maintenance personnel.

b_{12} = 21.00 work-hours per unit
x_{12} = The number of remote TV repeater stations serviced by AFRTS maintenance personnel.

b_{13} = 1.00 work-hour per unit
x_{13} = The actual number of hours of travel between the AFRTS outlet and the transmitter and/or repeater sites to perform maintenance.

Note: All work-hour per unit values are monthly rates.

C. Maintenance Supply Equation Data.

(1) Overview. As outlined in the introduction, this equation was not developed through normal techniques. Experts were brought in from the field, along with the engineering and maintenance personnel, to develop concepts and procedures that would outline the responsibilities of the maintenance supply function at the individual outlets. Once the procedures and responsibillties were developed a staffing pattern approach was used to determine the number of maintenance supply personnel required at different support levels. The support requirements were based upon the scope of the overall maintenance supply function at the individual outlet plus the support received from the logistic and maintenance management function at the network and squadron headquarters level.

(2) Staffing pattern. The following staffing pattern matrix was developed for the maintenance supply function. The matrix reflects the

number of engineering and maintenance authorizations required to earn incremental maintenance supply billets. Engineering and maintenance authorizations are the total number of personnel authorized at an outlet.

Number of Authorized Maintenance Supply Personnel	Total Number of Engineering and Maintenance Personnel Authorized at an Outlet
1	6-13
2	14 and up

D. Network and Squadron Headquarters Engineering and Maintenance Management Equation Data.

(1) Overview. As outlined in the introduction this equation was developed through a different work measurement approach. In this case there were no similar existing systems that could be compared. Consequently, a system design had to take place first. To accomplish this, experts were brought in from the field to develop concepts and procedures that would outline the responsibllities of the network and squadron headquarters engineering and maintenance management function. After systems design came the responsibility to align work-force requirements to the workload in incremental levels. This task was accomplished through a staffing technique in which the experts defined the type of specialists required and corresponding numbers of specialists at different support levels. The support requirements were based upon the scope of the engineering and maintenance mission at varying levels.

(2) Staffing pattern. The following staffing pattern matrix was developed for the network and squadron headquarters engineering and maintenance managewment function. The matrix reflects the number of engineering and maintenance management billets. Engineering and maintenance authorizations are the total number of personnel authorized at all outlets being serviced by the network and squadron headquarters engineering and maintenance management function.

Number of Authorized Maintenance Management Personnel		Total Number of Engineering and Maintenance Personnel Authorized at AFRTS Outlets
		between
8	*	31-40
9		41-50
10		51-60
11		61-70
12		71-80
13		81-90
14	*	91-100

*If the upper and lower limits expressed above are to be exceeded, submit complete justification and rationale on the corresponding number of maintenance managemenmt personnel required to support the exceeded limits. Use the work-force table 2 as a guide for submission of recommended position titles and grades.

CHAPTER 4

APPLICATION INSTRUCTIONS

The following instructions are provided for manual application of the standard for the in-studio and transmitter maintenance function and the network and squadron headquarters engineering and maintenance management function.

A. IN-STUDIO AND TRANSMITTER MAINTENANCE FUNCTION

Step No. 1. Apply the radio and television broadcast operations joint work-force standard, DoD publication 5122.10-STD-1 to arrive at the operations work-force required at one or all locations. (Note: only accomplish steps 1-7 in Chapter 6 of DoD publication 5122.10-STD-1.)

Step No. 2. Apply the in-studio engineering and maintenance function equation yc = .3830 (x) to the data arrived at in step No. 1.

Step No. 3. Apply the remote transmitter engineering and maintenance equation as follows: (Note:When a radio and television or repeater device are co-located within the same facility use the work-hour per unit value for television instead of radio for the facility.)

(a) Using the data contained in Chapter 4, determine which workload factors (the "x" and corresponding "b"values) apply to each location being considered.

(b) Once the WLFs have been identified, determine the actual number of times each WLF occurs at each location being considered.

(c) Multiply these number of occurences by the appropriate "b" value that corresponds to the identified WLF.

(d) Add together the individual results obtained in 3.c. above to arrive at total work-hours for transmitter maintenance.

(e) Divide the results obtained in 3.d. above by the appropriate work-hour availability factor (WAF) to arrive at fractional work-force requirements. WAFs are not provided in this report. They can be obtained from the work-force agency servicing the location(s).

Step No. 4. Add together the individual results obtained in steps 2. and 3.e. above.

Step No. 5. Determine the whole-person requirement based upon the outcome of step No. 4 above using the appropriate work-force breakpoint. Breakpoint data are not provided in this report. They can be obtained from the work-force agency servicing the location(s).

Step No. 6. Determine the specialty and grade requirements for the data obtained in step No. 5 above by using the work-force Table 1 contained in Chapter 5.

B. MAINTENANCE SUPPLY FUNCTION

Step No. 1. Determine the total number of engineering and maintenance personnel authorized at on AFRTS outlet based upon the procedures outlined in section A. above.

Step No. 2. If the total number authorized is between 6-13, then determine the specialty and grade for one supply authorization based upon the work-force Table 3 contained in Chapter 5. If the total number authorized is 14 and above, then determine the specialty and grade for two supply authorizations based upon the same table.

C. NETWORK AND SQUADRON HEADQUARTERS ENGINEERING AND MAINTENANCE MANAGEMENT FUNCTION

Step No. 1. Determine the total number of engineering and maintenance personnel below network and squadron headquarters level. This data is obtained from applying the in-studio and transmitter maintenance equations as outlined in section A.

Step No. 2. Determine the number of network and squadron headquarters engineering and maintenance management authorizations based upon the matrix in Chapter 3, paragraph 1.d.4., using the data obtained in step No. 1 above.

Step No. 3. Determine the specialty and grade requirements by using the Work-Force Table 3 contained in Chapter 5 for network and squadron headquarters maintenance management work centers.

CHAPTER 5

WORK-FORCE TABLES

A. WORK-FORCE TABLE FOR RADIO AND TELEVISION BROADCAST MAINTENANCE FUNCTION. The work-force table for radio and television broadcast maintenance functions was developed on the following basis.

1. Each services' present authorized and assigned military and civilian maintenance and engineering personnel strengths were analyzed to determine percentage of skill and grades allocated throughout AFRTS.

2. Present skill and grade requirements were then aligned to current work-force requirements to determlne if proper skill and grade requirements existed.

3. Total force specialty demographics were reviewed and compared to existing AFRTS assigned and authorized strengths.

4. Based upon these data, the table was developed and designed to ensure the incremental work-force requirements would provide for the proper skill and grade requirements at all AFRTS outlets.

5. Staffing of these work centers may be either civilian or military. Civilian staffing will be individually evaluated and justified in accordance with DoD civil service policies and procedures. Active duty work-force requirements need to be fully assessed within the constraints of military essentiality.

Note: This table is in conjunction with that portion of the work-force standard dealing with in-studio and outside transmitter maintenance and engineering work-force requirements.

WORK-FORCE TABLE 1

WORK-FORCE TABLE FOR RADIO AND TELEVISION BROADCAST ENGINEERING AND MAINTENANCE

ARMY MOS	NAVY	MARINE MOS	AIR FORCE AFSC	PAY GRADE	INCREMENTAL WORK-FORCE REQUIREMENT													
25Z50	IC 4747/4746	4653	30499	E08					1	1	1	1	1	1	1	1	1	1
25Z40	IC 4747/4746	4653	30475	E07					1	1	1	1	1	2	2	2	2	2
25R30	IC 4747/4746	4653	30475	E06	1	1	1	1	1	2	2	2	2	2	3	3	4	4
25R20	IC 4747/4746	4653	30455	E05		1	2	2	2	2	3	3	3	3	3	4	4	4
25R10	IC 4746	4653	30455	E04				1	1	1	1	1	2	2	2	2	2	3
25R10	IC 4746	4653	30435	E03														
				Total	1	2	3	4	5	6	7	8	9	10	11	12	13	14
25Z50	IC 4747/4746	4653	30499	E08					1	1	1	1	1	1	1	1	1	1
25Z40	IC 4747/4746	4653	30475	E07	1	1	2	2	2	2	2	2	2	2	3	3	3	3
25R30	IC 4747/4746	4653	30475	E06	2	2	2	3	3	3	3	4	4	4	4	4	5	5
25R20	IC 4747/4746	4653	30455	E05	4	5	5	5	5	6	6	6	6	7	7	7	7	7
25R10	IC 4747/4746	4653	30455	E04	5	5	5	5	5	5	5	5	5	5	5	6	6	6
25R10	IC 4747/4746	4653	30435	E03	3	3	3	3	3	3	4	4	5	5	5	5	5	6
				Total	15	16	17	18	19	20	21	22	23	24	25	26	27	28

B. WORK-FORCE TABLE FOR INDIVIDUAL AFRTS OUTLET MAINTENANCE SUPPLY FUNCTION. The work-force table for the maintenance supply function was developed on the following basis.

1. Existing supply support was evaluated to determine if appropriate skill and grades were being used.

2. New procedures were developed outlining the supply support required at an outlet.

3. Based upon these data, the table was developed and designed to provide the incremental work-force requirements necessary to provide individual AFRTS outlets with supply support.

4. Staffing of these work centers may be either civilian or military. Civilian staffing will be individually evaluated and justified in accordance with DoD civil service policies and procedures.

WORK-FORCE TABLE 2

WORK-FORCE TABLE FOR SUPPLY SUPPORT

ARMY MOS	NAVY	MARINE CORPS MOS	AIR FORCE AFSC	PAY GRADE	INCREMENTAL WORK-FORCE REQUIREMENT	
76Y30	SK 2815	3044	64570	E06		1
76Y20	SK 2815	3044	64550	E05	1	1
				TOTALS	1	2

C. WORK-FORCE TABLE FOR NETWORK AND SQUADRON HEADQUARTERS MAINTENANCE MANAGEMENT FUNCTION. The work-force table for the network and squadron headquarters maintenance management function was developed on the following basis.

1. Existing maintenance management work centers were reviewed for position titles and grade requirements.

2. New position titles and corresponding grades were developed for areas not identified during initial review.

3. Based upon these data, the table was developed and designed to provide the incremental work-force requirements necessary to provide for maintenance management support for AFRTS outlets.

4. Staffing of these work centers may be either civilian or military. civilian staffing will be individually evaluated and justified in accordance with DoD civil service policies and procedures.

WORK-FORCE TABLE 3

WORK-FORCE TABLE FOR NETWORK AND SQUADRON HEADQUARTERS MAINTENANCE MANAGEMENT

POSITION TITLES	PROPOSED PAY GRADES (MIL)	(CIV)	INCREMENTAL WORK-FORCE REQUIREMENT						
Technical Director	NA	11-13	1	1	1	1	1	1	1
Engineering Technician	E09	11			1	1	1	1	1
Engineering Technician	E08	9	1	1	1	1	1	1	1
Engineering Technician	E07	7						1	1
Maintenance Superintendent	E08	9	1	1	1	1	1	1	1
Maintenance Controller	E07	7	1	1	1	1	1	1	1
Maintenance Controller	E06	7							1
Logistician	E07	7	1	1	1	1	1	1	1
Logistician	E06	7				1	1	1	1
Quality Controller	E07	7	1	1	1	1	1	1	1
Quality Controller	E06	7		1	1	1	1	1	1
Administrator	E05	5	1	1	1	1	1	1	1
Administrator	E04	5					1	1	1
Draftsman	E06	7	1	1	1	1	1	1	1
		TOTAL	8	9	10	11	12	13	14

NOTE 1: MOSs/NECs/AFSCs are not provided. Each service will be responsible for designation of appropriate specialties.

NOTE 2: Position titles are optional and may vary from service to service.

NOTE 3: Pay grades are only proposals. Actual grades will be based upon local evaluation, requirements, and availability of personnel.

CHAPTER 6

DEFINITIONS and CONCEPTS

SECTION I - DEFINITIONS

The following definitions concerning transmitter maintenance are provided.

Co-located transmitter. Radio and/or TV transmitter located in the AFRTS outlet/studio facility.

Remote transmitter. Radio and/or TV transmitter that is not co-located with the AFRTS outlet/studio facillty.

Link. Communication (audio and/or visual) signal to intermediate or terminal site.

Repeater. Any communication device other than the originating or terminating transmitter used to link a signal between destinations (includes microwave relays).

Backup transmitters. These are transmitters used as a backup to the primary transmitter.

AFRTS owned remote transmitter facility. A remote transmitter facility maintained by and the property of the AFRTS.

Non-AFRTS owned remote transmitter facility. A remote transmitter facility maintained by, and the property of someone other than AFRTS. These can be facilities that are maintained by contract or where AFRTS shares a site with the owner of the facility.

SECTION II - CONCEPTS

A. OVERVlEW AND INTRODUCTION. This section outlines the basic concepts, functions, organization, and procedures necessary to aid in the effective control and management of the maintenance complex.

B. MAINTENANCE MANAGEMENT SYSTEM

1. Definitions of Key Terms:

a. Broadcast Squadron Maintenance Complex. All staff functions, management support functions, and maintenance activities directly or functionally responsible to a single director of engineering.

b. Chief of Maintenance. The director of engineering is the chief of maintenance in AFRTS.

c. Maintenance Activity. All production work centers that are in dir support of AFRTS. They may be either directly or functionally responsible to the director of engineering.

d. Functionally Supported Maintenance Activity(FSMA). A production-oriented element of the maintenance complex which is normally geographically separated from its parent unit. It is functionally responsible to and supported by the director of engineering, as specified by maintenance operating instructions (MOI) but does not come under the direct control of the parent unit director of engineering.

e. Maintenance Supervisor. For span of control, a maintenance supervisor may be required. Maintenance supervisors should be directly or functionally responsible to the director of engineering for:

(1) Making sure that quality and safety are emphasized in the accomplishment of maintenance.

(2) Frequently visiting each of the work centers and the equipment operating locations to ensure that the work center personnel have a thorough knowledge of their duties.

(3) Supporting the training program and for correcting or helping correct any observed or reported training deficiencies.

(4) Knowing the work center capabilities and its limitations in or to effectively use resources and solve problems.

(5) Letting the director of engineering know of any problem that is beyond their capability to solve.

2. Description and Functional Relationships. AFRTS maintenance activities are those functional elements under the director of engineering that are responsible for the accomplishment of all maintenance. They include work centers and FSMAs.

3. Management of FSMAs. FSMAs are not managerially self-sufficient. Although all staff functions and responsibilities should be done within the maintenance complex, FSMAs will perform only those maintenance staff responsibilities which, because of their nature, should be done locally. The supporting director of engineering and stoff should plan and implement a maintenance management program for the FSMA, and designate in an MOI the duties to be done there. When maintenance staff personnel must be assigned at the FSMA, they should augment rather than duplicate the director of engineering staff.

4. Maintenance Standardization and Evaluation Program. Quality Control (QC) should do the inspections and evaluations that are needed to determine maintenance quality and technical competence. The combined results of these QC actions gives the director of engineering a method to judge the mission capability of the maintenance complex.

C. DIRECTOR OF ENGINEERING. The director of engineering is responsible to the broadcasting squadron and/or network commander for the engineering and maintenance mission. The director of engineering must be thoroughly familiar with the key elements of personnel, equipment, facilities, and logistics support in managing the engineering and maintenance function. The director of engineering should:

1. Make sure that the maintenance accomplished is timely and of the required quality.

2. Manage the maintenance complex by providing the direction and guidance needed to implement and comply with the policies and procedures shown in this publication.

3. Delegate, to the lowest practical level, the authority necessary for staff and production activities to accomplish their duties.

4. Appoint staff and other supervisory personnel, based upon their technical knowledge and managerial ability.

5. Control the assignment and use of all maintenance personnel and coordinate with the appropriate agencies to satisfy maintenance work-force requirements. When work-force imbalances exist, the director of engineering may direct the temporary transfer of personnel within the maintenance complex.

6. Establish restoration criteria in coordination with operations or other users.

7. Make sure that requirements necessary to support the maintenance mission are included in plans, programs, host-tenant agreements, interservice agreements, and interagency agreements.

8. Control the use of allocated maintenance facilities. Submit requests with necessary justification to appropriate agencies for new construction and changes to existing facilities. Monitor the status of requests to ensure that required unit actions are done on time.

9. Make sure that an effective safety program is established for the maintenance complex.

10. Manage the financial program for the maintenance complex.

11. Make sure that a comprehensive training and evaluation program is established in the maintenance complex. The primary goal is to provide the specific training needed to overcome known deficiencies rather than to set up a general-purpose program.

12. Establish an orientation program for key supervisors.

13. Fully support the QC program.

14. Make sure that sufficient material resources are authorized and on ha

15. Make sure that an effective corrosion control program is established.

16. Make sure that the technical publication system is set up and used with applicable directives. Make sure all required commercial manuals are on hand and complied with.

17. Make sure that action is taken to resolve management and equipment deficiencies and their causes.

18. Make sure that indirect maintenance is programed in accordance with applicable directives.

19. Make sure that all supervisors enforce supply discipline and good test equipment and tool management practices.

20. Make sure that material deficiencies are reported in accordance with applicable directives.

D. ADMINISTRATION. This function performs the administrative tasks for the maintenance complex. It serves and gives assistance to the director of engineering, the staff, and the maintenance management work centers. The director of engineering should determine appropriate administrative tasks to be performed by this function.

E. LOGISTICS SUPPORT

1. Description of the function. To make sure that a continuing maintenance capability exists, the director of engineering should have knowledge of changes in mission, new programs, new support agreements, and so forth, together with their impact on existing maintenance concepts and resources. In addition, the director of engineering should gauge the impact and should ensure that the necessary logistics support is on hand to satisfy the need. The logistics support function is meant to do that job for the director of engineering. The job entails those management, planning, and implementation tasks that should be done to make sure logistics support is available.

2. Functional Responsibilities. The responsibilities of the maintenance logistics support function should be as follows:

a. Make the logistics inputs for host-tenant, interservice, and interagency agreements.

b. Make the logistics inputs to programing documents for new or modified AFRTS equipment and systems. Such inputs should address each of the following elements of logistics support for adequacy: maintenance concepts, spares, technical data, computer support (hardware and software), support equipment, facilities, funds, work-force, and training. Failure to plan for any of these elements can lead to an inability to maintain the new or modified equipment

c. Make the logistics inputs to and monitor the command plans and programs that affect the maintenance complex.

3. Logistics Support for New or Modified Equipment. In order to ensure a maintenance capability for new or modified equipment, the logistics support function should:

a. Take action as necessary to obtain the test equipment, tools, and other support equipment that is required to support new or additional equipment.

b. Advise QC of estimated installation or relocation completion dates so that an inspection may be scheduled.

c. Advise QC of removals or end item turn-ins so that a QC inspection may be scheduled.

d. Make sure that budget inputs show added cost for spares, test equipment, TDY, and training for new programs to be implemented during the budget period.

e. Advise the director of engineering of any deficiencies which may impact support of the program.

f. Make sure that all excess and redundant support items are properly disposed of when equipment is removed from the inventory.

F. MAINTENANCE CONTROL

1. Description of the Function. The maintenance control function monitors, controls, and provides support for maintenance production. It includes the subfunctions of job control and material control.

2. Maintenance Control Supervisor. The maintenance control supervisor is directly responsible to the director of engineering. He or she supervises the performance of the maintenance control functions, advises the director of engineering on problems which affect maintenance production, and recommends solutions for these problems.

3. Job Control Should:

a. Coordinate unscheduled maintenance and tracks in-progress maintenance that is done by contractor personnel.

b. Keep a current inventory of all mission essential equipment/systems.

c. Control the preventive maintenance inspection (PMI)program.

d. Establish job priorities. These are set up to make sure that resources are allocated to maintenance jobs in accordance with the importance of the job to the operational mission. Job control should use the equipment restoration criteria established by the director of engineering to assign job priorities

when an urgent need exists or when competition for resources occur.

4. Material Control. Material Control should:

a. Advise the maintenance control supervisor of the overall supply situation as it affects maintenance and make recommendations for improvements of supply support.

b. Coordinate with the chief of supply, the director of engineering or the maintenance supervisor, and work center supervisors, for bench stock, prepositioned spares, special levels, and supply points.

c. Maintain a file of supply catalogs and administrative or technical publications.

d. Give supply guidance and help to all supported work centers.

e. Help quality control to process the materiel deficiency report exhibits and report of discrepancy reports.

f. Comply with the host command's local procedures for processing all the materiel requirements for maintenance.

g. Set up supply assistance procedures to identify unsatisfactory supply support to maintenance and take action to solve serious supply support deficiencies.

h. Help the director of engineering, the maintenance control supervisor, and the maintenance equipment custodians to meet the objectives of the equipment management system of the respective Military Departments and to tailor equipment authorizations to the mission needs.

G. QUALITY CONTROL (QC)

1. Concept of QC. QC is organized as a staff function of the director of engineering. It serves as the primary technical advisor to the maintenance complex, and assists the work center and the director of engineering in identifying and resolving problems. This activity should be more than just inspection oriented in order to identify underlying causes of poor quality in the maintenance production effort.

2. Work Center QC Representatives. When circumstances justify the need, work center QC representatives should be appointed in writing to do the required inspections and evaluations. However, setting the depth and the detail of the inspections and the evaluations should remain the responsibility of the director of engineering. The responsibility for doing the activity inspections should not be delegated below the director of engineering QC staff.

3. Responsibilities. QC should make sure that maintenance uses proven techniques and proper safety practices, sound maintenance discipline, and good

housekeeping. However, QC should only be involved in hands-on direct maintenance to the extent needed to monitor the quality of maintenance. That involvement should be limited to providing advice or authoritative references to the director of engineering. The director of englneering should only direct QC personnel to do hands-on maintenance when there is a lack of required skill or knowledge in the work center or when questionable maintenance practices exist, and then only until the problem is solved.

CHAPTER 7

STANDARDS DEVELOPMENT DATA

A. STANDARD DEVELOPMENT.

1. Background. The standard developed and contained within this report is part two of a three-part process. The part one, standards for the radio and television broadcast operations work centers, has already been completed and part three, standards for the station management and headquarters broadcast management, has been completed and approved for broadcast service use. It is currently going through the DoD coordination prior to printing and distribution to the field. The joint work-force standards for the Army, Navy, Air Force, and Marine Corps Armed Forces Radio and Television broadcast operations are contained in Department of Defense publication 5122.10-STD-1.

2. Concept. The standard for engineering and maintenance is basically founded on the assumption that the broadcast operations mission determines the requirements of engineering and maintenance. Therefore, it was necessary first to obtain an accurate definition of the broadcast operation's mission. This was accomplished through the detailed development of the radio and television broadcast operations work-force standards. These standards identify over 50 workload factors applicable to operations. Each workload factors has a corresponding work-hour value assigned. These workload factors and associated work-hours are based upon product outputs of the radio and television work centers. The work-hour values vary based upon complexity of product output.(* Complexity is defined as the number of people, length of time, and the amount of radio and television equipment used to produce a product.)

3. Initial Analysis. Based upon the above assumptions, industrial engineering techniques were used to prove or disprove the assumption and accuracy of the prediction. Through these techniques three basic things were learned. (1) There was a define relationship between the operations work center requirements and the engineering and maintenance required to support it. (2) This support was found to be Limited to In-studio maintenance and not outside transmitter maintenance or the maintenance supply function. (3) It also did not include maintenance support received from the headquarters. Based upon the initial findings it was necessary to develop three separate work-force systems for expressing the total work-force requirements of engineering and maintenance.

4. Work-Force Systems Development.

a. In-Studio Engineering and Maintenance. The work-force system used for the In-studio engineering and maintenance area was based upon a conventional industrial engineering practice. This practice consists of correlating the relationship between variables. This relationship is evaluated through regression analysis. This analysis technique is used to evaluate a stated mathematical association between variables. In this case It was the relationship between the operations and engineering and maintenance

area. The results of this analysis are contained In the section for the r and television broadcast engineering and maintenance work centers.

b. Transmitter Maintenance.

(1) The work-force system used for transmitter maintenance did not follow conventional industrial engineering concepts. Although this is true, the results are considered as accurate as if obtained through the conventional approach. The conventional approach, in simplistic terms, is to first define the work and associated workload indicators. The second step is to sample a portion of the total population to obtain the work-hours associated with each workload indicator. The third step is to analyze this relationship by comparing the obtained samples to each other to obtain a mathematical relationship. Usually, under this concept, It is recognized that there are some variations in the work-hours associated with accomplishing the workload from location to location. Consequently, many work-hours can be spent analyzing the data to remove or adjust improper input data prior to achieving a "good" mathematical relationship between the sampled data.

(2) A workshop concept was used instead of the usual approach of sampling individual locations. The panel consisted of selected individuals from specified locations. They were first tasked with defining and refining the tasks associated with the workload. Further, they were chartered with ensuring the workload was accurately defined and obtainable as a work count. They were then split up into two working groups. Each group appointed a group leader. Each group also had an industrial engineer or technician assigned for techn assistance. Each group was chartered with the same mission to develop work-h values associated with workload accomplishments. Upon completion of this tasking, both groups were brought back together to present their findings. The group leaders presented their findings. The findings of each group were then compared to each other. When a difference occurred between the groups, an open forum was held to resolve the differences. Once all differences were resolved, the resultant work-hour values became the standard.

(3) Since this concept is not considered normal practice for standards development, it is important to highlight some of the pluses of this concept. Number one,it takes far less time and money to convene a workshop with trained specialists than it does to write a report and have numerous Industrial engineering technicians visiting locations all over the world. Also, since you have the experts together, you have, In essence, refined the work practices and procedures, plus developed agreed upon work-hour values that should be as accurate as could ever be achieved through regression analysis. And finally, by having everyone agree to the values and definitions, you should be able to eliminate all disagreement over the standard's development process prior to and during staffing of the finished product.

c. Network and Squadron Headquarters Engineering and Maintenance Management. Again, the work-force system used for this area did not lend itself to conventional methods. In this case there were no similar existing systems that could be compared. Consequently, a system design had to take place

first. To accomplish this, experts were brought in from the field to develop concepts and procedures that would outline the responsibilities of the network and squadron headquarters engineering and maintenance management function. After systems design came the responsibility to align work-force requirements to the workload in incremental levels. This task was accomplished through a staffing pattern technique in which the experts defined the type of specialists required and corresponding numbers of specialists at different support levels. The support requirements were based upon the scope of the engineering and maintenance mission at varying levels.

d. Maintenance Supply. The some approach as sited in paragraph 4.c. above was used for determining the number of supply specialists required at the individual outlets.

B. Work-Force Equation Data

a. In-Studio Engineering and Maintenance Equation Data

(1) Overview. Prior to listing the data used for developing the standard in the radio and television broadcast engineering and maintenance function, it is necessary to provide some explanations on certain conditions that existed in the population from which the standard was developed.

(a) Population parameters. Since the operations standard had already been developed and applied to the same AFRTS outlets that the engineering and maintenance standard will apply to, there was an excellent advanced description and understanding of the entire population that will be served with the standard.

(b) Workload data. Since the engineering and maintenance standard is established upon the operations workload, there is an excellent data base from which a relationship can be developed between operations, and engineering and maintenance.

(c) Data pairs. With extensive knowledge of the entire population, it was possible to selectively eliminate those locations (due to known and verified causes) from the data pairs used to develop the work-force equation for the in-studio part of the standard. Consequently, the data pairs contain only the minor unexplained differences that exist between similar locations as in almost all cases of standards development.

(2) Data pairs. The following data pairs and definitions were used in the regression analysis.

(a) Workload ("X"value). Radio and television broadcast operations workload applied against standards' values to arrive at work-hours that were converted to work-force spaces and served as the "X" value.

(b) Work-force ("Y" value). These are the number of engineering and maintenance personnel assigned to maintain the equipment associated with the workload. This is for in-studio maintenance support only.

(3) Locations and data pairs used for standards development:

Location	X Value (Operations Work-Force)	Y Value (assigned Personnel)
Bremerhaven	11	5
Munich	5	2
Nuremberg	7	3
Kaiserslautern	7	2
Stuttgart	5	2
Berlin	27	13
Wuerzburg	6	3
SCN (Panama)	16	8
Argentina	9	3
Diego Garcia	27	11
Guantanamo Bay	31	10
Keflavik	27	7
Roosevelt Roads	28	12
Rota	13	4
Sigonella	19	8
Adak	17	7
Sasebo	10	3
Kadena	35	17
Eielson	2	1
Elmendorf	33	11
Incirlik	21	6
Iraklion	19	6
Iwakuni	15	5
Misawa	17	6
Zaragoza	6	2
Kunsan	2	2

Note: Locations not listed here were eliminated for cause. In most cases it was caused by the inability to clearly isolate those maintenance personnel that could be aligned exclusively to in-studio maintenance. Even If they could have been Isolated through extensive research and analysis, their inclusion in the regression analysis would not have significantly changed the results, since they would have only added redundant values or relationships. Also, the inputs represent approximately 60% of the total population, which far exceeds any statistical requirements levied on the number of locations required to draw statistically accurate inferences from.

(4) Regression analysis. The initial attempt at regression analysis yielded a negotive "a" coefficient in the linear equation. Also the parabolic, power and ratio equations either failed the realistic or economical tests or did not fit as well as the linear equation. Therefore a test of the no-intercept

equation was conducted. The test results indicated it met all the criteria for use plus it provided for more utility than the linear, equation. The results of the original linear equation plus the development of the no-intercept equation, are as follows.

(a) Overall statistics

1 Original linear equation. ($Y = a + bx$)

$Y_c = -0.1250 + .3886(x)$

$R = .9364$

$R^2 = .8768$

$S_{yx} = 1.4990$

$Sb = .02972$

$V = 31\%$

2 No-intercept equation. ($Y = bx$)

$Y_c = .3830(x)$

$R^2 = .8783$

$S_{yx} = 1.4598$

$V = 24\%$

(b) Data arrays used for equation development.

X	X^2	Y	Y^2	XY
11	121	5	25	55
5	25	2	4	10
7	49	3	9	21
7	49	2	4	14
5	25	2	4	10
27	729	13	169	351
6	36	3	9	18
16	256	8	64	128
9	81	3	9	27
27	729	11	121	297
31	961	10	100	310
27	729	7	49	189
28	784	12	144	336
13	169	4	16	52
19	361	8	64	152
17	289	7	49	119
10	100	3	9	30
35	1225	17	289	595
2	4	1	1	2
33	1089	11	121	363
21	441	6	36	126
19	361	6	36	114
15	225	5	25	75
17	289	6	36	102
6	36	2	4	12
2	4	1	1	2
Σ 415	Σ 9,167	Σ 158	Σ 1,398	Σ 3,510

(c) Variance due to the "a" term (a multiplier for S_{yx}) computations.

$$Q = \sqrt{\frac{\sum x^2}{N\left(\sum x^2 - \frac{[\sum x]^2}{N}\right)}}$$

$$Q = \sqrt{\frac{9167}{26\left[9167 - \frac{172225}{26}\right]}}$$

$$Q = \sqrt{\frac{9167}{66116.999}}$$

$$Q = \sqrt{.1386}$$

$$Q = .3723$$

(d) T-value computation. Based upon 95% confidence, the T test yields a value of:

$$T = 2.064.$$

(e) Test of significance of the "a" term computation.

$$a \pm t\, Q\, S_{yx}$$

$$a \pm (2.064)(.3723)(1.4990)$$

$$a \pm 1.1519$$

$$\begin{array}{rcl} +\ 1.1519 & & -\ 1.1519 \\ -\ .1250\ * & \pm & -\ .1250\ * \\ +\ 1.0269 & & -\ 1.2769 \end{array}$$

$$-1.2769 < 0 < 1.0269$$

Passes

* "a" value taken from original linear equation

(f) Regression coefficient computation.

$$b = \frac{\sum xy}{\sum x^2}$$

$$b = \frac{3510}{9167}$$

$$b = .3830$$

(g) Sum of squares computation.

1 TSS.

$$TSS = \sum y^2 - \frac{(\sum y)^2}{N}$$

$$TSS = 1398 - \frac{24964}{26}$$

$$TSS = 1398 - 960.1538$$

$$TSS = 437.8462$$

2 SSE.

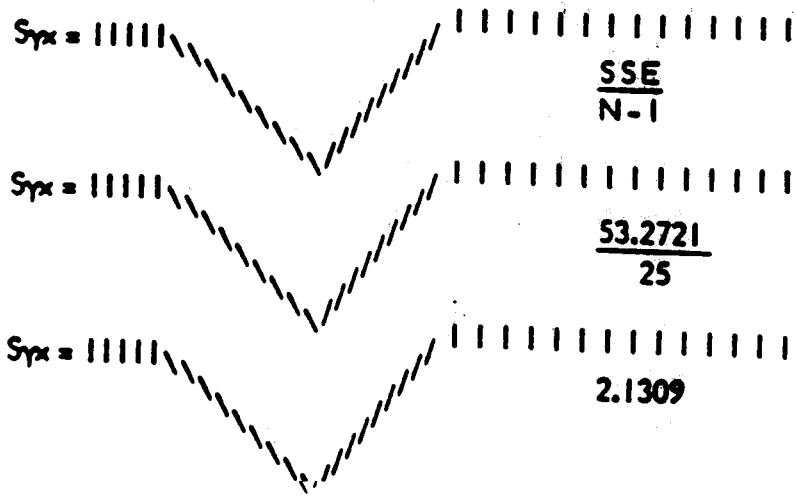
$$SSE = \sum y^2 - \frac{(\sum xy)^2}{\sum x^2}$$

$$SSE = 1398 - \frac{12320100}{9167}$$

$$SSE = 1398 - 1343.9620$$

$$SSE = 54.0380$$

(h) Standard error of the estimate computation.



$S_{yx} = 1.4598$

(i) Correlation computation.

$$R^2 = 1 - \frac{SSE}{TSS}$$

$$R^2 = 1 - \frac{53.2721}{437.8462}$$

$$R^2 = 1 - .1217$$

$$R^2 = .8783$$

(j) Coefficient of Variation.

$$V = \frac{S_{yx}}{\bar{Y}}$$

$$V = \frac{1.4598}{6.0769}$$

$V = .2419$ or 24%

(k) Extrapolation limits. Since the work-force equation was built the premise of all known or usable workload, there is no requirement to levy xtrapolation limits on this equation. Although this is true, there are cases when the data range may exceed the upper and lower boundaries of the data. In these cases, for a point of departure, anytime the range is exceeded by ± 30%, it will require careful evaluation of the workload and projected work-hour expenditures prior to acceptance as a valid work-force requirement.

b. Transmitter maintenance Equation Data

(1) Overview. As outlined in the introduction, this equation was developed through a different work measurement approach. Field-level personnel were brought together at Kelly AFB, Texas and a workshop was convened to develop the work-force requirements for radio and television transmitter maintenance.