

AD-A219 935

1



UNITED STATES AIR FORCE

EPI REPORT

DTIC
ELECTE
MAR 30 1990
S D CS D

ELECTRONICS PRINCIPLES INVENTORY

SHEPPARD TECHNICAL TRAINING CENTER

AFPT 90-EPI-825

FEBRUARY 1990

OCCUPATIONAL ANALYSIS PROGRAM
USAF OCCUPATIONAL MEASUREMENT CENTER
AIR TRAINING COMMAND
RANDOLPH AFB, TEXAS 78150-5000

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

90 03 29 076

DISTRIBUTION FOR EPI - SHEPPARD
OSR AND SUPPORTING DOCUMENTS

	<u>OSR</u>	<u>JOB INV</u>
ARMY OCCUPATIONAL SURVEY BRANCH	1	
DEFENSE TECHNICAL INFORMATION CENTER	2	
DET 4, USAFOMC (SHEPPARD AFB TX)	1	1
HRL/MODS	2	
HRL/ID	1	
HQ ATC/TTOK	2	
HQ ATC/SGAT	2	
NODAC	1	
3700 TCHTW/TTGX (SHEPPARD AFB TX)	17	17
3700 TCHTW/TTS (SHEPPARD AFB TX)	1	
USAFOMC/OMYXL	10	10
USMC (CODE TE-310)	1	

Accession For	
NTIS CRAWI	☒
DTIC TAB	☐
Unannounced	☐
Justification	
By _____	
Distribution /	
Availability Codes	
Dist	Availability or Special
A-1	

TABLE OF CONTENTS

	<u>PAGE NUMBER</u>
PREFACE	iii
REPORT SUMMARY	iv
INTRODUCTION	1
BACKGROUND	1
EXAMPLE EPI QUESTIONS	2
SURVEY ADMINISTRATION	4
RESULTS	6
DISCUSSION AND IMPLICATIONS	7

PREFACE

This report presents the results of an Air Force Electronic Principles survey of 13 selected Air Force specialties. Authority for conducting Electronic Principles (EP) surveys is contained in AFR 35-2.

Results presented in this report are part of an EP survey of 81 Air Force specialties. This survey was requested by the Chief, Common Electronics Training Program (CETP) Program Management Team (PMT) in October 1985.

The Electronic Principles Inventory (EPI) used to collect EP survey data was originally developed in 1976 by Dr Hendrick Ruck and Major Thomas O'Connor. Mr Theodore Wilcox revised and validated the EPI in 1986 as part of this survey project.

First Lieutenant Robert Hampel analyzed the data and wrote the final report. Computer programming support was provided by Ms Olga Velez and Mr Wayne Fruge, and Tamme Lambert provided administrative support. This report was reviewed and approved by Mr Gerald Clow, Chief, Management Applications Branch, Occupational Analysis Division, USAF Occupational Measurement Center.

This report is distributed to Air Staff sections, major commands, and other training and management personnel. Requests for additional copies should be sent to:

Chief, Occupational Analysis Division (OMY)
USAF Occupational Measurement Center
Randolph AFB, Texas 78150-5000

BOBBY P. TINDELL, Colonel, USAF
Commander
USAF Occupational Measurement
Center

JOSEPH S. TARTELL
Chief, Occupational Analysis Division
USAF Occupational Measurement
Center

REPORT SUMMARY

1. BACKGROUND: This report provides data on the electronic principles (EP) used by airmen in 13 Air Force specialties (AFSCs) with initial training at Sheppard Technical Training Center (TTC).

2. METHODOLOGY: The USAF Electronic Principles Inventory (AFPT 90-EPI-825) was administered to random samples of fully qualified job incumbents representing the 13 AFSCs in this report. The data were collected from March 1987 to September 1988.

3. RESULTS: Complete survey data is provided in three appendices:

Appendix A: Sheppard TTC AFSCs EP data in EPI
job inventory order

Appendix B: Sheppard TTC AFSCs EP data matched to
Electronic Fundamentals/Applications (EF/A) STS

Appendix C: Sheppard CETP AFSCs EP data matched to
POI J3AQR30020, dated 31 October 1984

NOTE: A "generic" version of the Electronic Fundamentals/Applications (EF/A) is used in Appendix B--complete analysis requires the use of AFSC-specific proficiency codes, rather than the generic set used in the appendix.

4. DISCUSSION AND IMPLICATIONS: Although there is no specific regulatory guidance on the use of EPI data, the survey data lends itself to the use of cutoff scores for deciding which EPI items to include in centralized training for each AFSC. Once the training needs of the individual AFSCs have been determined, the possibility for consolidated EP training can be considered.

The survey data indicate two areas needing review. First, some of the AFSCs which do not currently attend the Sheppard EP course use as many or more EPI items than those AFSCs which do attend. These AFSCs (361X0, 361X1, 542X0, 542X1, 542X2, 545X0, 545X2, and 545X3) should be investigated for possible enrollment in the course.

Second, the POI for course J3AQR30020 requires review whether or not new AFSCs are selected for attendance. Survey data showed very weak support for three POI objectives, with all five of the AFSCs which currently attend this course reporting less than 30 percent of group members responding "Yes" to the matched EPI items. Twenty-one POI objectives had only one of the five AFSC groups where at least 30 percent members responded "Yes" to the matched EPI items. Also, 72 of the EPI items not referenced any POI objective were used by at least 30 percent of group members in at least two of the five AFSCs which currently attend the EP course.

ELECTRONIC PRINCIPLES SURVEY REPORT SHEPPARD TECHNICAL TRAINING CENTER

INTRODUCTION

From missile systems maintainers to telephone switching specialists, from avionics technicians to biomedical equipment personnel, the U.S. Air Force employs more than 50,000 worker-level (primarily 5-skill level) personnel who require electronic principles (EP) training. These highly skilled, technically trained airmen work in over 80 Air Force specialties (AFSs) spanning 11 career fields. Furthermore, the depth and breadth of required EP training varies based on specialty needs. In short, the USAF spends vast amounts of money, manpower, and time to ensure that airmen are properly trained in electronic principles.

To make the best use of these resources, the USAF Common Electronics Training Program (CETP) was designed to consolidate and standardize Air Force EP training where possible and practical. This is primarily accomplished through special EP courses taught at four USAF Technical Training Centers (TTCs). These EP courses teach the electronic principles common to two or more AFSs. Another part of the CETP is the development of common training modules. Specific blocks of EP instruction are developed by one TTC, then shared with the other TTCs which teach that EP subject. By selectively combining and standardizing Air Force EP training, the USAF makes best use of limited training resources.

Not all Air Force electronic principles training is conducted in special EP courses, however. For example, some EP subjects are used in only one AFS. Students learn these generally advanced topics in AFSC-awarding courses, building on the more basic EP subjects from the common EP course. Also, some AFSs require very few electronic principles, and airmen in these specialties receive EP training only in their AFSC-awarding courses.

As with other Air Force technical training, EP training programs can profit from objective analysis of specific training requirements. These requirements can be analyzed objectively using occupational survey data. This EP survey provides data which can be used to analyze the specific EP training requirements in CETP courses and AFSC-awarding courses alike. The instrument used to collect EP survey data is the Electronic Principles Inventory (EPI).

BACKGROUND

The USAF EPI is a knowledge- and skills-based job inventory which identifies the electronic principles, skills, and equipment an airman uses in the performance of his or her job.

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

The EPI was originally developed by Dr Hendrick Ruck and Major Thomas O'Connor in 1976. An indepth discussion of the original concept, development, and validation of the EPI can be found in USAFOMC Technical Note 77-02, "The Development and Application of the Electronic Principles Job Inventory". Mr Theodore Wilcox revised and validated the EPI in 1986 for this survey.

The EPI contains two sections. First is a background section containing demographic and job satisfaction questions. The second section contains 712 electronic principles, skills, and equipment questions covering 39 EP subject areas. Below are some example questions taken from the EPI. The 39 EPI subject areas are listed in Table 1.

After completing the background section, job incumbents respond "Yes" or "No" to the 712 EPI questions. The result is a "profile" of electronic principles, skills, and equipment used by the incumbent in his or her present job. This electronic principles "profile" can be combined with the "profiles" of other job incumbents to produce a "profile" for the entire AFS.

EXAMPLE EPI QUESTIONS

Example Principles Questions

- A4-4 Do you use electron tube characteristic curves?
- G1-20 Do you use parity bit codes?
- H4-33 Do you use "FM" modulation principles?

Example Skills Questions

- C1-8 Do you calculate values of transistor amplifier voltage, current, or power gain?
- E2-1 Do you trace schematic or block diagrams of circuits containing frequency sensitive filters?
- I1-4 Do you measure RF effective power?

Example Equipment Questions

- B4-2 Do you use spectrum analyzers?
- D3-5 Do you perform tasks on variable resistor voltage regulators?
- J1-8 Do you work on dynamic microphones?

TABLE 1
EPI SUBJECT AREAS

<u>SUBJECT AREA NUMBER</u>	<u>SUBJECT AREA TITLE</u>
A1	Direct/Alternating Current
A2	Electro/Mechanical Devices
A3	Solid-State Circuits and Devices
A4	Tubes
A5	Soldering or Solderless Connections
B1	Multimeters
B2	Oscilloscopes
B3	Signal (Function) Generators
B4	Test Equipment
C1	Transistor Amplifier Circuits
C2	Transistor Amplifier Stabilization Circuits
C3	Coupling Circuits
C4	Electron Tube Amplifier Circuits
C5	Operational Amplifiers
C6	Magnetic Amplifiers
D1	Power Supply Circuits
D2	Power Supply Filters
D3	Power Supply Voltage Regulators
E1	Resistive Capacitive Inductive Circuits
E2	Frequency Sensitive Filters
F1	Oscillators
F2	Multivibrators
F3	Waveshaping Circuits
F4	Limiter/Clamper Circuits
G1	Digital Logic Numbering Systems and Functions
G2	Computers
G3	Digital Circuits
G4	Digital to Analog (D/A) and Analog to Digital (A/D) Converters
H1	Connections (Transmission Lines and Waveshaping Circuits)
H2	Microwave Oscillators and Amplifiers
H3	Resonant Cavities
H4	Transmitters and Receivers
H5	Antennas
I1	Radio Frequency Measurements
I2	Radio Frequency Calculations
J1	Microphones and Speakers
J2	Photosensitive Devices
J3	Storage Type Display Tubes
J4	Television, Laser, and Infrared Systems

SURVEY ADMINISTRATION

As mentioned in the PREFACE, data were collected for this survey from over 80 AFSSs (78 AFSSs, three Reporting Identifiers). Survey data were collected in four increments, from March 1987 through March 1989. A total of 24,651 EPI booklets were mailed to active duty airmen worldwide. After each of the first three increments, interim survey reports were published by USAFOMC. These reports are all numbered AFPT 90-EPI-825, and are dated July 1988 (EPI-1), January 1989 (EPI-2), and February 1989 (EPI-3). There was no separate report of data collected in EPI-4. Results were combined with those of the first three increments to produce the final reports. There are a total of five final EPI reports, one for each of the following: Chanutte TTC, Keesler TTC, Lowry TTC, Sheppard TTC, and the Air Force Military Training Center (AFMTC), located at Lackland AFB. This report presents results only for AFSCs with technical training courses at Sheppard Technical Training Center. EPI results for the following AFSCs are included in this report:

<u>AFSC</u>	<u>TITLE</u>
30653	Telecommunications Systems Maintenance
36150	Antenna/Cable Systems Project/Maintenance Action
36151	Cable Splicing Project/Maintenance Action
36251	Telephone Switching
36253	Missile Control Communications Systems
36254	Telephone and Data Circuitry Equipment
54250	Electrician
54251	Electric Power Line
54252	Electrical Power Production
54550	Refrigeration and Air-Conditioning
54552	Heating Systems
54573	Civil Engineering Control Systems
91850	Biomedical Equipment

Survey administration for these 13 AFSCs was spread over three increments of the EPI, from March 1987 through September 1988. To be eligible for the survey, airmen in these specialties had to have at least 4 weeks experience in their job, could not be within 90 days of retirement, nor expecting reassignment within 60 days. A random sample of survey eligible personnel was selected, and booklets were mailed to airmen worldwide. All useable EPI booklets that were returned to USAFOMC were included in the final samples. Table 2 shows the number of assigned personnel at the time of survey, as well as final sample size, for each AFSC in this report.

TABLE 2
SPECIALTY REPRESENTATION OF SURVEY SAMPLES

<u>DUTY AFSC</u>	<u>TOTAL ASSIGNED</u>	<u>SURVEY SAMPLE</u>
30653	997	237
36150	339	127
36151	427	138
36251	528	172
36253	60	34
36254	592	180
54250	871	187
54251	362	138
54252	1,297	186
54550	899	211
54552	931	191
54573	92	51
91850	263	132

RESULTS

Each completed EPI survey booklet shows which electronic principles the respondent uses in his or her present job. When the responses of all survey respondents from a specific group are combined, the results are shown as percent of group members using each of the 712 EP items. This listing of all EPI items and the percent of group members responding "Yes" is the EP "profile" of that group. Appendix A shows percent group members responding "Yes" information for all 712 EPI items, listed in EPI job inventory order.

To facilitate development of Specialty Training Standards (STSs), subject-matter experts (SMEs) matched EPI items to appropriate block(s) of the Electronic Fundamentals/Applications (EF/A) part of the STS, also known as the STS Attachment 2. For this study, a "generic" version of the EF/A STS was used for the match. All blocks of the EF/A were matched, and the proficiency codes are NOT specific to individual AFSCs. Still, this information (located in Appendix B) can be used to determine which blocks of the STS Attachment 2 should be included in individual STSs.

Subject-matter experts also matched EPI items to the objectives from Plans of Instruction (POIs) for Air Force courses which teach electronic principles. This match of EPI items to appropriate POI objective(s), when combined with survey data, shows how well the POI objectives are supported. For example, if many group members respond "Yes" to the EPI items matched to an objective, then that objective is considered well supported by survey data. If, however, few group members respond "Yes", the objective is not well supported.

For this study, SMEs matched the 712 EPI items to the POI for course J3AQR30020, dated 31 October 1984. This match (with survey data) is shown as Appendix C of this report. The first section shows the EPI items matched to the POI, while the second section shows the EPI items which were not referenced to any POI objectives.

Following is a summary of the Appendices, which show the survey results:

Appendix A: Sheppard TTC AFSCs EP data in EPI
job inventory order

Appendix B: Sheppard AFSCs EP data matched to Electronic
Fundamentals/Applications (EF/A) STS

Appendix C: Sheppard CETP AFSCs EP data matched to
POI J3AQR30020, dated 31 October 1984

DISCUSSION AND IMPLICATIONS

We collect EPI data to assess the use of EP by different Air Force specialties. For each AFSC surveyed, this data shows the percent members responding "Yes" to each of the 712 EPI items. We can use this data to select for each AFSC the items we wish to include in centralized training. Once we've selected for each AFSC the EPI items we wish to include in centralized training, we can look for commonalities among those items for the possibility of combined electronic principles training.

How should we use the EPI data to select the items we wish to include in centralized training? Currently, there is no regulatory guidance on the use of EPI data for the development of centralized training programs (or STSs). ATC Regulation 52-22 states only that "EPI studies provide valuable information for curriculum development or validation in terms of percent members requiring a range of electronics principles knowledge in the performance of their job." Lacking direction from regulations, we must devise an intelligent method for using this data.

The EPI percent members responding "Yes" data lends itself to the use of a cutoff score for selecting items to teach in centralized training. For each AFSC, EPI items at or above the cutoff score are selected for centralized training, while items with scores below the cutoff (in percent members responding "Yes") are left for other training methods, such as on-the-job training (OJT). This cutoff score can theoretically be anything from one to 100 percent members responding "Yes". If we select 1 percent as our cutoff, we must train all airmen in all EPI items used throughout the AFSC. If 100 percent is selected, we will only train the EPI items used by every airmen within the AFSC. These cutoffs are the extremes, so we should find some middle ground for our cutoff score.

For example, if we select a cutoff score of 50 percent, it means that the EPI items we train will be used by at least every other student. Similarly, if we select items with 20 percent members responding "Yes" as our cutoff, we know that at least every fifth student will need to know those items. The task is to select a cutoff which provides training that is effective without being excessive. Therefore, the practical upper limit for this cutoff score should be 50 percent members responding "Yes" (any higher, and training would be ineffective). Twenty percent should be considered the practical lower limit (any lower, and training would be excessive).

Regardless of the cutoff scores selected, there are some basic observations we can make from survey data which indicate areas needing review. The first concerns the selection of AFSCs to attend the common EP course. The data show that some AFSCs which do not currently attend the Sheppard EP course may benefit from attending. Second, the course content needs review, as evidenced by several POI objectives with little support from survey data, as well as some EPI items which have relatively high percent members responding "Yes", but are not referenced to any objective.

Table 3 shows the total number of EPI items and the number of EPI items used by 30 percent of members for each AFSC in this report. This cutoff of 30 percent is only an example, but serves to show the trend of EP use among the AFSCs. These data show that some AFSCs which do not attend the EP course use as many or more EPI items than AFSCs which currently attend. Training personnel for these AFSCs should consider sending their personnel through the Sheppard EP course. These AFSCs include 361X0, 361X1, 542X0, 542X1, 542X2, 545X0, 545X2, and 545X3.

The second area for consideration, as mentioned above, is the current course content for the Sheppard EP course. Brief examination of the information in Appendix C reveals some areas where improvements may be possible. The survey data show very weak support for three of the POI objectives (VI 2c, VI 2d, and VI 2e). For each of these objectives, all of the five AFSC groups which currently attend the course had less than 30 percent members responding "Yes" to the matched EPI items. Also, 21 POI objectives were supported by only one of the five AFSC groups. That is, for each of these 21 objectives, only one AFSC of the five reported that matched EPI items were used by 30 percent or more of group members. These objectives should be reviewed to see if they are best taught in the common EP course, or if perhaps they may best be left to individual AFSC-awarding courses.

Furthermore, there are 72 unmatched EPI items which had at least 30 percent members responding "Yes" in at least two of the AFSCs which currently attend the EP course. These items are found in Appendix C in the TASKS NOT REFERENCED section. Some examples of these items are listed in Table 4. These items should be reviewed for possible inclusion in the Sheppard EP course, regardless of whether new AFSCs are selected for attendance or not.

These two areas for course review (unsupported POI objectives and items which appear supported by survey data but are not included in the course) are only beginnings of the in-depth review of all survey data that will be necessary. Some additional considerations will include whether or not new AFSCs attend the EP course, scheduling of instruction topics, and financial constraints.

In conclusion, the data presented in this report should serve as the foundation for selecting the EPI items to train in centralized courses. Once this foundation, based on the EP use of each AFSC, is determined, it can be modified by these other considerations, resulting in a plan for training which is mindful of each specialty's needs, while avoiding excesses that waste precious Air Force resources.

TABLE 3
NUMBER OF TOTAL EPI ITEMS USED/
NUMBER OF EPI ITEMS USED BY 30 PERCENT OF GROUP MEMBERS
(BY AFSC)

<u>DUTY AFSC</u>	<u>ITEMS USED BY 30 PERCENT</u>	<u>TOTAL USED</u>
*30653	222	624
36150	60	274
36151	27	340
*36251	51	619
*36253	132	408
*36254	33	623
54250	64	562
54251	57	259
54252	89	569
54550	46	199
54552	32	339
54573	85	621
*91850	359	655

* Denotes AFSCs which currently attend the Sheppard EP course

TABLE 4

EXAMPLES OF EPI ITEMS NOT REFERENCED TO POI
WITH AT LEAST 30 PERCENT MEMBERS RESPONDING "YES"
IN AT LEAST TWO AFSCs

ITEM NUMBER/TITLE	306 <u>53</u>	362 <u>51</u>	362 <u>53</u>	362 <u>54</u>	918 <u>50</u>
A1-17 Do you adjust relays	38	69	68	42	71
A1-18 Do you perform tasks on contacts, cores, coils, armatures, or springs	68	71	68	46	93
A1-42 Do you trace schematic or block diagrams of circuits containing three phase transformers	31	9	26	5	68
A3-2 Do you troubleshoot circuits to isolate a faulty diode	85	47	82	28	93
A3-10 Do you check transistors using transistor testers	60	11	44	7	67
A3-14 Do you troubleshoot circuits to isolate a faulty IC	79	10	35	13	90
D1-3 Do you troubleshoot circuits to isolate a faulty power supply	88	37	85	68	92
D2-4 Do you troubleshoot power supply filters to circuit level components	49	3	35	4	73
D3-4 Do you troubleshoot power supply voltage regulators to circuit level components	59	5	41	3	82
F2-3 Do you troubleshoot to isolate a faulty multivibrator circuit	39	3	24	1	58
G1-35 Do you perform tasks related to exclusive OR/NOR logic functions	54	10	12	1	70
H1-7 Do you troubleshoot transmission lines	14	38	15	37	3
H1-9 Do you perform tasks on twisted pair transmission lines	15	42	15	44	4

TABLE OF CONTENTS

Report	Element	Program	Title	Page
1.	RP0002	PRTMOD	All Sheppard TTC AFSCs (Inventory Order)	1
2.	RP0003	PRTMOD	All Sheppard TTC AFSCs Matched to EF/A STS	31
3.	RP0014	PRTMOD	Sheppard TTC CETP AFSCs matched to Shepard EP POI	85

Report Option Table for Modules

Option	Status
Primary Sort	Inventory Sequence
Secondary Sort	Not Used
Print Suppress	Not Used

Report Option Table for Tasks

Option	Status
Primary Sort	Inventory Sequence
Secondary Sort	Not Used
Print Suppress	Not Used

Description of Reported Module Factors

Col	Factor	Source vector	Title	Module Statement	Number Members	Mean	S.D.	Based on All Tasks Within Range	Min	Max	Valid
1	TITLE										
1	TITLE			Task Statement							
2	F0026	GP0029/PHP	All DAFSC 30653		237	22.69	24.98	98.73	.00	98.73	712
3	F0027	GP0030/PHP	All DAFSC 36150		127	6.76	17.04	91.34	.00	91.34	712
4	F0028	GP0031/PHP	All DAFSC 36151		138	3.63	11.81	89.13	.00	89.13	712
5	F0029	GP0032/PHP	All DAFSC 36251		172	8.08	15.96	95.35	.00	95.35	712
6	F0030	GP0033/PHP	All DAFSC 36253		34	16.51	25.87	100.00	.00	100.00	712
7	F0031	GP0034/PHP	All DAFSC 36254		180	5.57	13.93	95.00	.00	95.00	712
8	F0032	GP0035/PHP	All DAFSC 54250		187	8.04	17.42	98.93	.00	98.93	712
9	F0033	GP0036/PHP	All DAFSC 54251		138	6.51	17.94	98.55	.00	98.55	712
10	F0034	GP0037/PHP	All DAFSC 54252		186	9.74	20.06	95.70	.00	95.70	712
11	F0035	GP0038/PHP	All DAFSC 54550		211	5.63	17.53	96.21	.00	96.21	712
12	F0036	GP0039/PHP	All DAFSC 54552		191	4.25	13.00	89.01	.00	89.01	712

Description of Reported Task Factors

PRTMOD All Sheppard TTC AFSCs (Inventory Order)

PM0001

Occupational Analysis Program
USAFOMC (ATC) Randolph AFB TX

Page 2

Col	Factor	Source vector	Title	Number Members	----- Based on All Tasks Within Range -----			Valid
					Mean	S.D.	Max	
13	F0037	GP0040/PHP	All DAFSC 54573	51	14.58	20.63	98.04	712
14	F0041	GP0044/PHP	All DAFSC 91850	132	35.97	30.41	99.24	712

Electronic Principles Inventory (EPI) data for Air Force specialties is presented below in job inventory order. Data for this report was collected from job incumbents during the period March 1987 - September 1988

Percent members responding "YES" is shown for each specialty listed.

For assistance in using this EPI printout phone USAFOMC/OMYA, at AUTOVON 487-6811.

Tsk Y Nbr	Task Title	306	361	362	362	542	542	542	542	545	545	545	918
		53	50	51	51	53	54	50	51	52	50	52	73 50

0001 EPI Electronic Principles Inventory

0002 I. General Electronic/Electricity

0003 I 1. AC Direct/Alternating Current

A 1	Al-1 Do you use metric terms (example mill, kilo, mega)	66	46	53	55	68	25	70	62	70	42	40	75 95
A 2	Al-2 Do you use basic DC electrical/electronic terms	97	68	78	95	100	92	84	74	95	72	72	96 99
A 3	Al-3 Do you use basic AC electrical/electronic terms	97	69	64	90	97	88	97	98	95	96	88	98 99
A 4	Al-4 Do you trace schematic or block diagrams of circuits containing conductors, fuses, lamps, switches, or batteries	95	54	42	92	100	95	97	94	87	94	86	96 98
A 5	Al-5 Do you troubleshoot circuits containing conductors, fuses, lamps, switches, or batteries	97	53	67	91	97	94	99	97	90	94	89	94 98
A 6	Al-6 Do you calculate values of DC voltage, current, resistance, or power	48	23	51	34	68	26	61	49	48	30	28	57 79
A 7	Al-7 Do you calculate values of AC effective voltage, average voltage, or peak-to-peak voltage	49	18	14	24	68	17	65	51	37	27	22	29 67
A 8	Al-8 Do you calculate values of frequency, phase relationship, or wave length	47	27	22	28	71	11	44	29	34	18	13	24 70
A 9	Al-9 Do you trace schematic or block diagrams of circuits containing resistors	92	33	11	69	97	52	46	57	75	36	23	82 97
A 10	Al-10 Do you troubleshoot circuits to isolate a faulty resistor	89	21	12	62	91	24	36	57	70	31	20	75 96
A 11	Al-11 Do you calibrate or adjust circuits by using variable resistors	85	11	8	49	88	21	29	38	60	25	12	61 95
A 12	Al-12 Do you calculate the value of a resistor required for a circuit	43	8	9	29	59	10	27	30	37	18	10	53 65
A 13	Al-13 Do you determine ohmic value of a resistor using the color code	69	14	5	43	74	13	31	46	42	19	13	78 93
A 14	Al-14 Do you ohm check resistors	91	31	18	58	91	27	43	58	76	32	23	82 94

D	T	Task	Task Title	306	361	361	362	362	362	542	542	542	545	545	545	918
Y	T	Nbr		53	50	51	51	53	54	50	51	52	50	52	73	50
A	15		A1-15 Do you trace schematic or block diagrams of circuits containing relays	78	37	4	78	94	71	75	74	82	91	61	94	96
A	16		A1-16 Do you troubleshoot circuits to isolate a faulty relay	76	36	4	77	91	62	76	77	81	92	66	92	94
A	17		A1-17 Do you adjust relays	38	26	5	69	68	42	53	52	53	43	30	63	71
A	18		A1-18 Do you perform tasks on contacts, cores, coils, armatures, or springs	68	21	5	71	68	46	77	69	61	84	42	75	93
A	19		A1-19 Do you continuity check relays	72	35	4	67	88	41	76	72	81	88	54	92	92
A	20		A1-20 Do you trace schematic or block diagrams of circuits containing inductors, chokes, or choke coils	60	2	4	22	71	19	19	27	35	5	6	29	84
A	21		A1-21 Do you troubleshoot circuits to isolate a faulty inductor, choke, or choke coil	58	2	7	20	65	8	17	26	33	3	4	25	80
A	22		A1-22 Do you calculate values of circuit total inductance	17	2	3	8	35	4	13	6	19	4	3	18	39
A	23		A1-23 Do you calculate values of circuit or component inductive reactance	15	2	4	8	35	4	12	6	18	4	4	18	36
A	24		A1-24 Do you calculate values of circuit voltage or current in circuits containing inductors	22	2	2	8	32	4	16	7	19	3	3	16	43
A	25		A1-25 Do you calibrate or adjust circuits by using variable inductors	30	2	1	9	32	3	12	4	19	3	3	18	59
A	26		A1-26 Do you ohm check inductors	54	6	4	19	62	5	18	10	31	5	5	24	74
A	27		A1-27 Do you trace schematic or block diagrams of circuits containing capacitors	89	24	11	66	97	58	48	62	63	78	29	73	96
A	28		A1-28 Do you troubleshoot circuits to isolate a faulty capacitor	86	19	18	62	91	33	48	59	62	76	29	65	94
A	29		A1-29 Do you calculate values of circuit total capacitance	30	3	14	23	44	11	24	21	24	27	10	25	48
A	30		A1-30 Do you calculate values of circuit or component capacitive reactance	24	4	7	20	41	7	23	13	21	22	9	27	43
A	31		A1-31 Do you calculate values of circuit or component voltage or current in circuits containing capacitors	31	6	8	22	47	8	25	25	22	30	8	27	55
A	32		A1-32 Do you calibrate or adjust circuits using variable capacitors	35	3	4	20	29	7	19	12	24	18	6	22	61
A	33		A1-33 Do you ohm check capacitors	79	19	14	46	82	23	43	50	55	77	27	61	88
A	34		A1-34 Do you use capacitor color codes in your present job	20	5	3	10	21	7	17	8	19	15	7	27	29
A	35		A1-35 Do you trace schematic or block diagrams of circuits containing transformers	87	15	2	28	97	27	77	87	71	82	61	92	95
A	36		A1-36 Do you troubleshoot circuits to isolate a faulty transformer	83	15	1	22	94	23	80	93	67	82	74	92	93
A	37		A1-37 Do you calculate transformer voltage or current step-up or step-down ratios	39	7	1	5	50	7	68	75	35	41	40	61	63
A	38		A1-38 Do you calculate impedance of transformers	22	5	0	5	38	3	37	37	18	16	14	24	39
A	39		A1-39 Do you calibrate or adjust circuits using variable transformers	27	2	0	6	44	3	39	45	30	18	15	37	70
A	40		A1-40 Do you ohm check transformers	71	13	1	16	76	11	72	93	56	75	50	82	83
A	41		A1-41 Do you measure transformer output voltage	78	13	1	20	71	22	82	96	60	74	65	86	92
A	42		A1-42 Do you trace schematic or block diagrams of circuits containing three phase transformers	31	6	1	9	26	5	63	84	50	45	20	35	68
A	43		A1-43 Do you troubleshoot circuits to isolate a faulty three phase transformer	28	6	1	6	24	2	61	87	41	39	19	27	58
A	44		A1-44 Do you adjust three phase transformers	17	2	0	5	18	3	39	75	23	16	12	22	39

PRTHOD	Task Title	306	361	362	362	362	542	542	542	545	545	545	918
Tsk		53	50	51	51	53	54	50	51	52	50	52	73
Y Mbr		50											50
A 73	A2-29 Do you trace schematic or block diagrams of circuits containing transducers	5	1	17	1	3	1	6	0	23	3	2	41
A 74	A2-30 Do you troubleshoot circuits to isolate a faulty transducer	5	1	22	1	3	1	5	0	24	3	1	31
A 75	A2-31 Do you calibrate or adjust transducers	4	1	26	1	0	1	5	0	11	2	2	29
A 76	A2-32 Do you repair, clean or lubricate transducers	3	1	17	0	0	0	5	0	14	2	1	25
A 77	A2-33 Do you trace schematic or block diagrams of circuits containing solenoids	44	8	10	4	0	4	48	18	73	89	62	84
A 78	A2-34 Do you troubleshoot circuits to isolate a faulty solenoid	43	9	12	4	0	3	51	21	74	90	72	86
A 79	A2-35 Do you perform maintenance on solenoid component parts	33	6	9	3	0	3	37	17	56	83	47	65
A 80	A2-36 Do you trace schematic or block diagrams of circuits containing meter movements	19	2	7	8	15	5	21	21	45	15	9	43
A 81	A2-37 Do you troubleshoot circuits to isolate a faulty meter movement	18	3	4	8	12	4	20	21	46	14	10	41
A 82	A2-38 Do you perform maintenance on meter movement mechanical parts	13	2	6	4	9	3	15	17	25	9	9	25

0005 I 3. A3 Solid State Circuits and Devices

PRTHOD	Task Title	86	13	2	54	88	49	22	25	66	17	7	71
Tsk		85	13	1	47	82	28	21	25	65	15	6	67
Y Mbr		84	14	1	48	74	24	22	25	68	15	7	73
A 83	A3-1 Do you trace schematic or block diagrams of circuits containing diodes	86	13	2	54	88	49	22	25	66	17	7	71
A 84	A3-2 Do you troubleshoot circuits to isolate a faulty diode	85	13	1	47	82	28	21	25	65	15	6	67
A 85	A3-3 Do you check diodes using an ohmmeter	84	14	1	48	74	24	22	25	68	15	7	73
A 86	A3-4 Do you use diode characteristic curves	17	0	1	3	12	4	4	4	9	2	2	20
A 87	A3-5 Do you use diode substitution information	28	2	0	6	24	4	6	4	15	2	2	27
A 88	A3-6 Do you use diode color codes	19	3	0	8	12	6	7	8	15	3	3	20
A 89	A3-7 Do you trace schematic or block diagrams of circuits containing transistors	90	7	2	44	94	47	15	5	45	8	4	55
A 90	A3-8 Do you troubleshoot circuits to isolate a faulty transistor	88	6	1	37	88	22	12	4	41	4	4	49
A 91	A3-9 Do you check transistors using an ohmmeter	86	7	1	33	85	16	14	4	40	4	6	49
A 92	A3-10 Do you check transistors using transistor testers	60	2	1	11	44	7	8	0	14	1	3	43
A 93	A3-11 Do you use transistor characteristic curves	20	1	1	4	15	3	3	0	7	1	2	18
A 94	A3-12 Do you use transistor substitution information	40	1	0	6	21	4	6	1	10	1	2	25
A 95	A3-13 Do you trace schematic or block diagrams of circuits containing integrated circuits (IC)	84	1	2	15	50	20	13	8	19	5	5	47
A 96	A3-14 Do you troubleshoot circuits to isolate a faulty IC	79	1	1	10	35	13	12	5	17	4	4	43
A 97	A3-15 Do you use IC substitution information	45	0	1	6	18	3	9	3	7	1	2	29
A 98	A3-16 Do you trace schematic or block diagrams of circuits containing solid-state special purpose devices	53	0	1	9	29	14	15	10	18	11	6	35
A 99	A3-17 Do you troubleshoot circuits to isolate a faulty solid-state special purpose device	51	0	0	8	26	11	14	11	18	12	6	37
A 100	A3-18 Do you perform tasks on varactors/varicaps	11	1	1	1	15	2	3	0	2	2	0	12
A 101	A3-19 Do you perform tasks on tunnel diodes	27	1	0	1	9	1	3	1	11	2	1	8
A 102	A3-20 Do you perform tasks on field effect transistors (FET)	33	1	0	2	15	2	7	0	11	2	1	16
A 103	A3-21 Do you perform tasks on unijunction transistors (UJT)	35	1	0	1	15	2	4	0	9	2	1	12
A 104	A3-22 Do you perform tasks on zener diodes	68	1	0	9	47	14	11	1	28	2	2	35

D	T Task	Task Title	306	361	361	362	362	362	542	542	542	542	545	545	545	918
Y Nbr			53	50	51	51	53	54	50	51	52	50	52	73	50	
A 105	A3-23	Do you perform tasks on liquid crystal displays (LCD)	35	1	0	6	15	5	6	1	5	2	1	24	76	
A 106	A3-24	Do you perform tasks on pin diodes	14	1	0	0	3	3	4	0	6	2	1	8	27	
A 107	A3-25	Do you perform tasks on light emitting diodes (LED)	65	1	0	14	26	15	15	1	8	3	1	49	90	
A 108	A3-26	Do you perform tasks on fantail transistors	12	1	0	0	0	1	2	0	3	2	1	8	21	
A 109	A3-27	Do you perform tasks on silicon controlled rectifiers (SCR)	39	1	0	2	15	2	10	3	33	2	2	35	85	
A 110	A3-28	Do you perform tasks on triacs	29	1	0	1	3	1	5	0	2	4	1	16	80	
A 111	A3-29	Do you perform tasks on programmable unijunction transistors (PUT)	7	1	0	0	0	1	2	0	3	2	0	6	75	
A 112	A3-30	Do you perform tasks on silicon controlled switches (SCS)	10	1	0	1	9	1	4	0	6	2	1	14	61	
A 113	A3-31	Do you perform tasks on silicon unilateral switches (SUS)	6	1	0	0	3	0	1	0	3	2	0	6	63	
A 114	A3-32	Do you perform tasks on step recovery diodes (SRD)	6	1	0	0	0	1	2	0	3	2	0	4	17	
A 115	A3-33	Do you perform tasks on field effect diodes (FED)	15	0	0	1	0	1	4	1	5	2	0	12	39	
A 116	A3-34	Do you perform tasks on DIAC (Bi-directional trigger diode)	9	1	0	0	0	0	3	0	2	2	0	8	60	
A 117	A3-35	Do you perform tasks on varistors	46	1	0	15	41	16	7	0	7	2	1	20	58	
A 118	A3-36	Do you perform tasks on metal oxide varistors (MOV)	8	1	0	0	6	2	5	0	4	2	1	16	29	
A 119	A3-37	Do you perform tasks on schottky diodes	9	1	0	1	6	2	3	0	2	2	1	6	50	
0006	I 4.	A4 Tubes														
A 120	A4-1	Do you trace block diagrams of circuits containing electron tubes	11	0	1	9	0	1	1	20	4	1	2	6	36	
A 121	A4-2	Do you trace schematic diagrams of electron tube circuits	9	0	0	7	0	1	1	20	4	1	3	6	35	
A 122	A4-3	Do you troubleshoot circuits to isolate a faulty electron tube	10	0	0	8	0	1	1	22	4	1	3	6	34	
A 123	A4-4	Do you use electron tube characteristic curves	1	0	0	3	0	0	1	0	0	1	0	2	12	
A 124	A4-5	Do you use electron tube substitution manuals or charts	3	0	0	4	0	0	1	1	2	1	0	4	23	
A 125	A4-6	Do you perform tasks on diode tubes	3	0	1	2	0	1	0	9	3	0	0	6	23	
A 126	A4-7	Do you perform tasks on triode tubes	2	0	0	1	0	1	0	0	2	0	1	4	21	
A 127	A4-8	Do you perform tasks on tetrode tubes	2	0	0	1	0	1	0	0	1	0	0	4	17	
A 128	A4-9	Do you perform tasks on pentode tubes	2	0	0	1	0	1	0	1	1	0	0	4	20	
A 129	A4-10	Do you perform tasks on beam power tubes	1	0	0	2	0	1	0	1	0	0	0	4	11	
A 130	A4-11	Do you perform tasks on gas tubes	2	0	0	4	0	1	1	7	2	0	3	2	16	
A 131	A4-12	Do you perform tasks on phantastons	1	0	0	1	0	1	0	0	0	0	2	5		
A 132	A4-13	Do you perform tasks on neon tubes	3	1	1	1	0	1	1	1	1	0	0	2	20	
A 133	A4-14	Do you perform tasks on xenon tubes	0	0	0	0	0	0	0	18	1	0	0	2	10	
A 134	A4-15	Do you perform tasks on nixie tubes	3	0	0	1	0	0	0	1	0	0	0	2	11	
A 135	A4-16	Do you trace block diagrams of circuits containing cathode ray tubes (CRT)	42	1	1	2	12	1	1	4	1	0	2	8	68	
A 136	A4-17	Do you trace schematic diagrams of CRT circuits	42	0	0	3	12	1	1	4	1	0	1	8	67	
A 137	A4-18	Do you troubleshoot to isolate a faulty CRT	44	0	0	2	12	1	1	4	1	0	1	8	61	
A 138	A4-19	Do you adjust or calibrate circuits that control CRT operations	41	0	0	2	12	1	1	4	1	0	0	8	67	

D	T	Task	Y	Nbr	Task Title	306	361	361	362	362	362	542	542	545	545	545	918
						53	50	51	51	53	54	50	51	52	50	52	73
A	139	Do you perform tasks on electrostatic CRT				21	0	1	0	12	1	0	0	1	0	0	6
A	140	Do you perform tasks on electromagnetic CRT				22	1	1	2	12	1	1	2	1	0	8	45

0007 I 5. A5 Soldering or Solderless Connections

A 141	A5-1 Do you solder or desolder hardware connections	95	59	51	88	97	86	67	70	81	59	41	96	94
A 142	A5-2 Do you solder or desolder component connections such as resistors, capacitors, diodes, transformers, etc	94	33	14	66	91	35	44	68	77	40	17	86	94
A 143	A5-3 Do you solder or desolder printed circuit board connections	85	17	7	44	74	19	28	30	51	11	9	71	89
A 144	A5-4 Do you solder or desolder multi-layer circuit board connections	35	9	7	17	26	9	17	8	26	7	5	53	57
A 145	A5-5 Do you perform high reliability soldering	78	28	32	45	71	32	25	30	42	22	12	51	70
A 146	A5-6 Do you use crimping tool to repair or make connections	89	61	89	52	91	78	87	88	85	77	60	94	95
A 147	A5-7 Do you use wire wrap tool to make connections	59	31	81	91	91	89	43	25	31	34	24	45	43
A 148	A5-8 Do you use punch-on tool to make connections	35	23	83	70	71	95	33	22	23	24	16	57	36
A 149	A5-9 Do you repair or fabricate connectors or cables on multiconductor cables	55	47	87	53	50	84	49	67	32	15	7	59	75
A 150	A5-10 Do you repair or fabricate connectors or cables on coaxial cables	46	91	70	19	32	19	31	16	16	7	8	59	77
A 151	A5-11 Do you repair or fabricate connectors or cables on triaxial cables	18	23	14	8	6	7	12	9	10	5	3	16	31
A 152	A5-12 Do you repair or fabricate connectors or cables on ribbon cables	41	4	9	8	3	13	12	5	9	4	4	29	64

0008 II. Test Equipment

0009 II 1. BI Multimeters

8 153	B1-1	Do you use the multimeter to measure DC voltage values	99	76	78	91	97	83	84	77	96	65	53	96
8 154	B1-2	Do you use the multimeter to measure AC voltage values	98	72	61	85	91	81	97	99	95	94	81	96
8 155	B1-3	Do you use the multimeter to extend the range of voltmeters using external shunts	24	9	17	11	35	10	33	40	22	20	13	49
8 156	B1-4	Do you use the multimeter to measure DC current values	85	53	56	67	76	52	70	64	74	54	41	80
8 157	B1-5	Do you use the multimeter to measure AC current values	78	51	40	60	71	49	87	91	77	87	68	89
8 158	B1-6	Do you use the multimeter to extend the range of ammeters using external shunts	16	8	7	8	26	6	32	33	16	21	13	25
8 159	B1-7	Do you use the multimeter to measure circuit resistance	78	65	89	74	85	62	81	83	76	76	58	88
8 160	B1-8	Do you use the multimeter to measure component resistance	89	45	33	64	91	41	72	73	83	86	53	88

D	T Task	Task Title	306	361	362	362	542	542	542	545	545	545	918
Y Nbr			53	50	51	51	53	54	50	51	52	50	73 50
B 187	B4-3	Do you use field strength testers	3	6	2	1	3	2	6	2	4	2	2 14 11
B 188	B4-4	Do you use digital multimeters	95	38	51	81	94	59	58	69	75	44	26 76 96
B 189	B4-5	Do you use digital logic probes	24	2	1	3	24	2	5	0	4	3	1 27 77
B 190	B4-6	Do you use capacitance testers	9	4	3	5	18	7	10	2	6	17	3 24 55
B 191	B4-7	Do you use capacitor substitution boxes	3	2	1	1	3	2	4	0	3	4	1 18 37
B 192	B4-8	Do you use DC restorers (CRT rejuvenators)	2	2	1	0	6	2	3	0	3	2	1 10 10
B 193	B4-9	Do you use logic current tracers	8	2	1	1	6	2	6	1	3	2	1 16 42
B 194	B4-10	Do you use tube testers	4	2	1	1	3	2	4	2	4	2	2 8 19
B 195	B4-11	Do you use logic pulsers	11	2	1	0	15	2	6	0	3	2	2 16 67
B 196	B4-12	Do you use logic analyzers	11	2	1	1	6	2	4	0	3	2	1 18 37
B 197	B4-13	Do you use signature analyzers	3	2	1	0	3	2	3	2	3	2	1 8 20
B 198	B4-14	Do you use reflectometers	2	28	41	1	3	2	4	2	3	2	1 14 11

0013 III. Amplifier Circuits

0014 III 1. Cl Transistor Amplifier Circuits

C 199	Cl-1	Do you trace block diagrams of circuits containing transistor amplifiers	41	0	1	13	76	9	3	0	5	0	1 18 83
C 200	Cl-2	Do you trace schematic diagrams of transistor amplifier circuits	41	0	0	11	71	8	2	0	5	0	1 14 84
C 201	Cl-3	Do you troubleshoot to isolate a faulty transistor amplifier	41	0	0	11	62	6	3	0	4	0	2 16 81
C 202	Cl-4	Do you troubleshoot transistor amplifiers to circuit level components	35	0	0	8	44	2	2	0	3	0	1 18 80
C 203	Cl-5	Do you troubleshoot transistor amplifier distortion	14	0	0	6	41	2	2	0	1	0	1 6 45
C 204	Cl-6	Do you adjust or align transistor amplifiers	16	0	0	12	62	2	1	0	2	0	1 6 50
C 205	Cl-7	Do you measure transistor amplifier voltage, current, or power gain	25	0	0	9	44	2	2	0	2	0	1 10 64
C 206	Cl-8	Do you calculate values of transistor amplifier voltage, current or power gain	10	0	0	6	29	2	2	0	1	0	1 10 42
C 207	Cl-9	Do you work on compound-connected (Darlington Pair) transistor amplifiers	20	0	0	1	9	1	1	1	0	0	0 8 70
C 208	Cl-10	Do you work on cascade-connected transistor amplifiers	10	0	0	1	6	1	1	0	0	0	0 8 42
C 209	Cl-11	Do you work on paraphase transistor amplifiers	5	0	0	1	6	0	0	0	0	0	0 8 20
C 210	Cl-12	Do you work on push-pull transistor amplifiers	19	0	0	1	47	2	2	0	2	0	1 14 70
C 211	Cl-13	Do you work on audio transistor amplifiers	12	0	0	9	65	4	2	0	1	0	0 12 53
C 212	Cl-14	Do you work on wideband transistor amplifiers	3	0	0	3	3	2	1	0	0	0	0 10 27
C 213	Cl-15	Do you work on IF transistor amplifiers	6	0	0	1	3	2	2	0	1	0	0 8 23
C 214	Cl-16	Do you work on RF transistor amplifiers	8	0	0	3	3	2	2	0	2	0	0 12 49
C 215	Cl-17	Do you work on buffer transistor amplifiers	15	0	0	1	6	1	1	0	2	0	0 6 64
C 216	Cl-18	Do you work on complementary symmetry transistor amplifiers	6	0	0	1	3	0	0	0	1	0	0 6 25
C 217	Cl-19	Do you work on DC transistor amplifiers (switching applications)	28	0	0	7	12	4	3	0	3	0	1 16 67

DTY

Task Title

306 361 361 362 362 362 362 542 542 542 545 545 545 918
53 50 51 51 53 54 50 51 52 50 52 73 50

0015 III 2. C2 Transistor Amplifier Stabilization Circuits

C 218	C2-1 Do you trace schematic diagrams of amplifier stabilization circuits	15	0	0	1	24	1	2	0	3	0	0	10	50
C 219	C2-2 Do you troubleshoot amplifier stabilization circuits to circuit level components	15	0	0	1	21	0	2	0	3	0	0	10	49
C 220	C2-3 Do you perform tasks on emitter (swamping) resistor stabilization amplifiers	18	0	0	1	18	1	1	0	4	0	1	12	46
C 221	C2-4 Do you perform tasks on self-bias stabilization amplifiers	13	0	0	1	18	1	1	0	4	0	1	12	38
C 222	C2-5 Do you perform tasks on thermistor stabilization amplifiers	12	0	0	1	21	1	1	0	2	0	1	18	45
C 223	C2-6 Do you perform tasks on diode stabilization amplifiers	17	0	0	2	24	2	2	0	6	0	1	22	49
C 224	C2-7 Do you perform tasks on double diode stabilization amplifiers	10	0	0	1	6	1	1	0	1	0	1	12	29

0016 III 3. C3 Coupling Circuits

Task	Task description	35	2	1	2	29	5	3	1	3	1	0	10	69
C 225	C3-1 Do you trace block diagrams of circuits containing coupling circuits	35	2	1	2	29	5	3	1	3	1	0	10	69
C 226	C3-2 Do you trace schematic diagrams of coupling circuits	35	0	0	2	29	4	3	1	3	1	0	12	72
C 227	C3-3 Do you troubleshoot circuits to isolate a faulty coupling circuit	35	1	1	2	29	3	3	1	3	1	0	12	68
C 228	C3-4 Do you troubleshoot coupling circuits to circuit level components	29	0	0	2	21	2	3	1	1	0	0	10	70
C 229	C3-5 Do you perform tasks on direct coupling circuits	35	2	1	2	21	3	2	1	3	0	0	8	67
C 230	C3-6 Do you perform tasks on capacitive-resistive coupling circuits	29	1	1	2	24	3	2	0	2	0	0	8	61
C 231	C3-7 Do you perform tasks on capacitive-inductive coupling circuits	22	1	0	2	21	3	2	0	2	0	0	8	57
C 232	C3-8 Do you perform tasks on transformer coupling circuits	27	1	0	2	21	3	2	2	2	1	0	10	64
C 233	C3-9 Do you perform tasks on optical coupling circuits	19	0	4	0	6	2	2	0	1	0	0	10	42

0017 III 4. C4 Electron Tube Amplifier Circuits

	C 234	C 235	C 236
Q1	2N7000	2N7000	2N7000
Q2	2N7000	2N7000	2N7000
Q3	2N7000	2N7000	2N7000
Q4	2N7000	2N7000	2N7000
Q5	2N7000	2N7000	2N7000
Q6	2N7000	2N7000	2N7000
Q7	2N7000	2N7000	2N7000
Q8	2N7000	2N7000	2N7000
Q9	2N7000	2N7000	2N7000
Q10	2N7000	2N7000	2N7000
Q11	2N7000	2N7000	2N7000
Q12	2N7000	2N7000	2N7000
Q13	2N7000	2N7000	2N7000
Q14	2N7000	2N7000	2N7000
Q15	2N7000	2N7000	2N7000
Q16	2N7000	2N7000	2N7000
Q17	2N7000	2N7000	2N7000
Q18	2N7000	2N7000	2N7000
Q19	2N7000	2N7000	2N7000
Q20	2N7000	2N7000	2N7000
Q21	2N7000	2N7000	2N7000
Q22	2N7000	2N7000	2N7000
Q23	2N7000	2N7000	2N7000
Q24	2N7000	2N7000	2N7000
Q25	2N7000	2N7000	2N7000
Q26	2N7000	2N7000	2N7000
Q27	2N7000	2N7000	2N7000
Q28	2N7000	2N7000	2N7000
Q29	2N7000	2N7000	2N7000
Q30	2N7000	2N7000	2N7000
Q31	2N7000	2N7000	2N7000
Q32	2N7000	2N7000	2N7000
Q33	2N7000	2N7000	2N7000
Q34	2N7000	2N7000	2N7000
Q35	2N7000	2N7000	2N7000
Q36	2N7000	2N7000	2N7000
Q37	2N7000	2N7000	2N7000
Q38	2N7000	2N7000	2N7000
Q39	2N7000	2N7000	2N7000
Q40	2N7000	2N7000	2N7000
Q41	2N7000	2N7000	2N7000
Q42	2N7000	2N7000	2N7000
Q43	2N7000	2N7000	2N7000
Q44	2N7000	2N7000	2N7000
Q45	2N7000	2N7000	2N7000
Q46	2N7000	2N7000	2N7000
Q47	2N7000	2N7000	2N7000
Q48	2N7000	2N7000	2N7000
Q49	2N7000	2N7000	2N7000
Q50	2N7000	2N7000	2N7000
Q51	2N7000	2N7000	2N7000
Q52	2N7000	2N7000	2N7000
Q53	2N7000	2N7000	2N7000
Q54	2N7000	2N7000	2N7000
Q55	2N7000	2N7000	2N7000
Q56	2N7000	2N7000	2N7000
Q57	2N7000	2N7000	2N7000
Q58	2N7000	2N7000	2N7000
Q59	2N7000	2N7000	2N7000
Q60	2N7000	2N7000	2N7000
Q61	2N7000	2N7000	2N7000
Q62	2N7000	2N7000	2N7000
Q63	2N7000	2N7000	2N7000
Q64	2N7000	2N7000	2N7000
Q65	2N7000	2N7000	2N7000
Q66	2N7000	2N7000	2N7000
Q67	2N7000	2N7000	2N7000
Q68	2N7000	2N7000	2N7000
Q69	2N7000	2N7000	2N7000
Q70	2N7000	2N7000	2N7000
Q71	2N7000	2N7000	2N7000
Q72	2N7000	2N7000	2N7000
Q73	2N7000	2N7000	2N7000
Q74	2N7000	2N7000	2N7000
Q75	2N7000	2N7000	2N7000
Q76	2N7000	2N7000	2N7000
Q77	2N7000	2N7000	2N7000
Q78	2N7000	2N7000	2N7000
Q79	2N7000	2N7000	2N7000
Q80	2N7000	2N7000	2N7000
Q81	2N7000	2N7000	2N7000
Q82	2N7000	2N7000	2N7000
Q83	2N7000	2N7000	2N7000
Q84	2N7000	2N7000	2N7000
Q85	2N7000	2N7000	2N7000
Q86	2N7000	2N7000	2N7000
Q87			

D Y Task Y Nbr	Task Title	306	361	361	362	362	362	542	542	542	542	545	545	545	918
		53	50	51	51	53	54	50	51	52	50	52	73	50	
C 237	C4-4 Do you troubleshoot electron tube amplifiers to circuit level components	1	0	0	3	0	1	1	0	1	0	0	0	2	17
C 238	C4-5 Do you troubleshoot electron tube amplifier distortion	1	0	0	3	0	1	0	0	1	0	0	0	2	10
C 239	C4-6 Do you adjust or align electron tube amplifiers	2	0	0	4	0	1	0	0	1	0	0	0	2	11
C 240	C4-7 Do you measure electron tube amplifier voltage, current, or power gain	2	0	0	4	0	1	0	0	1	0	0	0	2	14
C 241	C4-8 Do you calculate values of electron tube amplifier voltage, current, or power gain	1	0	0	3	0	1	0	0	1	0	0	0	2	9
C 242	C4-9 Do you perform tasks on paraphase electron tube amplifiers	1	0	1	0	0	0	0	0	1	0	0	0	2	6
C 243	C4-10 Do you perform tasks on push-pull electron tube amplifiers	0	0	0	1	0	1	0	0	1	0	0	0	2	11
C 244	C4-11 Do you perform tasks on audio electron tube amplifiers	0	0	0	1	0	1	1	0	0	0	0	0	2	8
C 245	C4-12 Do you perform tasks on voltage regulator electron tube amplifiers	2	0	0	1	0	1	1	2	2	0	1	4	15	
C 246	C4-13 Do you perform tasks on common grid electron tube amplifiers	0	0	0	1	0	1	0	0	1	0	0	0	2	16
C 247	C4-14 Do you perform tasks on common cathode electron tube amplifiers	1	0	0	1	0	1	0	0	1	0	0	0	2	16
C 248	C4-15 Do you perform tasks on cathode follower electron tube amplifiers	1	0	0	1	0	1	0	0	1	0	0	0	2	14

0018 III 5. C5 Operational Amplifiers

C 249	C5-1 Do you trace block or schematic diagrams of circuits containing operational amplifiers (op amps)	30	0	1	5	29	2	4	0	4	0	1	12	85	
C 250	C5-2 Do you troubleshoot to isolate a faulty op amp circuit	26	0	0	4	26	2	3	0	4	0	1	10	83	
C 251	C5-3 Do you calculate op amp gain	8	0	0	1	12	2	3	0	2	0	1	6	53	
C 252	C5-4 Do you adjust op amp bias, offsets, or drift	16	0	1	4	12	1	2	0	2	0	1	6	59	
C 253	C5-5 Do you use or apply operational amplifiers for general purpose (inverting or non-inverting)	25	0	1	3	18	1	3	0	2	0	0	10	77	
C 254	C5-6 Do you use or apply operational amplifiers as differential/comparators	15	0	0	1	0	1	2	0	2	0	0	10	73	
C 255	C5-7 Do you use or apply operational amplifiers for summing	8	0	0	1	3	1	2	0	3	0	0	8	61	
C 256	C5-8 Do you use or apply operational amplifiers for unity gain amplifier (buffer)	8	0	1	2	6	1	2	0	2	0	0	6	68	
C 257	C5-9 Do you use or apply operational amplifiers as active filters	8	0	1	2	6	2	2	0	2	0	0	8	48	
C 258	C5-10 Do you use or apply operational amplifiers as oscillators	19	0	1	2	21	2	2	0	3	0	0	10	61	
C 259	C5-11 Do you use or apply operational amplifiers as integrators	6	0	0	1	0	1	2	0	2	0	0	8	58	
C 260	C5-12 Do you use or apply operational amplifiers for differentiators	9	0	0	1	0	1	2	0	2	0	0	6	56	
C 261	C5-13 Do you use or apply operational amplifiers for power supplies (voltage regulators)	29	0	0	2	18	6	4	1	5	1	0	16	68	

D T Y	Task Nbr	Task Title	306	361	361	362	362	362	542	542	542	545	545	545	918
			53	50	51	51	53	54	50	51	52	50	52	73	50
C 262		C5-14 Do you use or apply operational amplifiers as analog/digital (A/D) digital/analog (D/A) converters	24	1	2	5	9	2	3	0	2	3	2	14	64
C 263		C5-15 Do you use or apply operational amplifiers as multivibrators	27	0	0	1	15	1	2	0	1	1	1	8	59
C 264		C5-16 Do you use or apply operational amplifiers as modulators/demodulators	16	0	0	2	12	1	2	0	1	0	0	8	38

0019 III 6. C6 Magnetic Amplifiers

C 265		C6-1 Do you trace block diagrams of circuits containing magnetic amplifiers	1	0	1	2	0	1	3	1	8	0	0	4	2
C 266		C6-2 Do you trace schematic diagrams of magnetic amplifier circuits	1	0	0	2	0	1	3	1	7	0	0	4	2
C 267		C6-3 Do you troubleshoot to isolate a faulty magnetic amplifier	1	0	0	1	0	0	3	1	7	0	0	4	2
C 268		C6-4 Do you troubleshoot magnetic amplifiers to circuit level components	1	0	0	1	0	0	2	1	4	0	0	2	2
C 269		C6-5 Do you adjust magnetic amplifiers or components	1	0	1	1	0	0	2	1	6	0	0	2	2
C 270		C6-6 Do you trace block diagrams of circuits containing saturable reactors	0	0	1	1	0	0	1	1	9	0	0	2	2
C 271		C6-7 Do you trace schematic diagrams of saturable reactor circuits	0	0	1	1	0	0	1	1	9	0	0	2	2
C 272		C6-8 Do you troubleshoot to isolate a faulty saturable reactor	0	0	1	1	0	0	1	0	8	0	0	2	4
C 273		C6-9 Do you troubleshoot saturable reactors to circuit level components	0	0	1	0	0	0	1	0	8	0	0	2	2
C 274		C6-10 Do you adjust saturable reactor circuits or components	0	0	1	0	0	0	1	0	8	0	1	2	2

0020 IV. Power Supplies

0021 IV 1. D1 Power Supply Circuits

D 275		D1-1 Do you trace block diagrams of circuits containing power supplies	89	8	1	38	91	45	48	39	32	29	21	75	92
D 276		D1-2 Do you trace schematic diagrams of power supply circuits	89	8	1	32	88	37	48	42	32	28	21	75	92
D 277		D1-3 Do you troubleshoot circuits to isolate a faulty power supply	88	7	1	37	85	68	49	43	35	29	25	78	92
D 278		D1-4 Do you troubleshoot power supplies to circuit level components	81	4	1	22	79	22	37	30	27	23	17	61	92
D 279		D1-5 Do you align or adjust power supplies	82	2	1	26	88	19	33	30	23	10	10	45	85
D 280		D1-6 Do you perform tasks on half-wave rectifier power supplies	61	2	1	7	59	5	21	2	29	5	3	39	85

D T Y	Task Title	306	361	361	362	362	542	542	542	542	545	545	545	918
Nbr		53	50	51	51	53	54	50	51	52	50	52	73	50
D 281	D1-7 Do you perform tasks on full-wave rectifier power supplies	66	2	0	17	74	7	23	3	34	7	3	47	87
D 282	D1-8 Do you perform tasks on full-wave bridge rectifier power supplies	66	2	1	8	53	10	25	9	37	10	3	57	91
D 283	D1-9 Do you perform tasks on three-phase rectifier power supplies	17	0	0	13	9	4	17	1	26	8	2	8	50
D 284	D1-10 Do you perform tasks on voltage multipliers (doublers/triplers)	37	1	1	2	21	6	12	6	10	4	2	12	64
D 285	D1-11 Do you perform tasks on DC to DC converters	41	2	1	19	29	9	15	2	10	2	1	16	50
D 286	D1-12 Do you perform tasks on inverters (DC to AC converters)	36	4	1	24	32	13	19	8	15	4	5	20	58
D 287	D1-13 Do you perform tasks on switching power supplies	12	0	1	6	6	6	9	9	5	0	1	4	59

0022 IV 2. D2 Power Supply Filters

D 288	D2-1 Do you trace block diagrams of circuits containing power supply filters	58	0	1	6	47	8	14	2	8	1	1	27	77
D 289	D2-2 Do you trace schematic diagrams of power supply filters	57	0	0	5	47	6	13	1	8	2	1	25	77
D 290	D2-3 Do you troubleshoot circuits to isolate a faulty power supply filter	57	0	1	5	47	7	14	1	8	2	1	24	73
D 291	D2-4 Do you troubleshoot power supply filters to circuit level components	49	1	0	3	35	4	12	1	6	1	1	22	73
D 292	D2-5 Do you perform tasks on capacitive power supply filters	50	0	1	3	47	6	10	1	9	3	1	22	75
D 293	D2-6 Do you perform tasks on inductive power supply filters	38	0	0	3	35	4	6	0	8	1	0	18	61
D 294	D2-7 Do you perform tasks on L-type power supply filters	23	0	0	2	12	1	3	0	3	0	0	14	29
D 295	D2-8 Do you perform tasks on Pi-type power supply filters	19	0	0	2	9	1	2	0	3	0	0	16	26
D 296	D2-9 Do you perform tasks on T-type power supply filters	11	0	1	2	6	1	2	0	2	0	0	10	20
D 297	D2-10 Do you perform tasks on resistive capacitive (RC) power supply filters	46	0	1	3	41	4	8	0	6	1	0	18	69
D 298	D2-11 Do you perform tasks on inductive capacitive (LC) power supply filters	37	0	0	2	35	3	8	0	6	0	0	16	61

0023 IV 3. D3 Power Supply Voltage Regulators

D 299	D3-1 Do you trace block diagrams of circuits containing power supply voltage regulators	68	2	1	8	62	7	19	30	44	6	5	25	86
D 300	D3-2 Do you trace schematic diagrams of power supply voltage regulator circuits	67	1	0	5	62	4	19	32	42	6	5	25	87
D 301	D3-3 Do you troubleshoot circuits to isolate a faulty power supply voltage regulator	66	1	0	8	50	6	18	38	47	5	5	25	84
D 302	D3-4 Do you troubleshoot power supply voltage regulators to circuit level components	59	1	0	5	41	3	16	28	31	4	4	24	82
D 303	D3-5 Do you perform tasks on variable resistor power supply voltage regulators	57	0	1	6	50	3	14	12	32	2	5	20	80

D	T	Task Title	306	361	362	362	542	542	542	542	545	545	545	918
Y	Nbr		53	50	51	51	53	54	50	51	52	50	52	73
D 304		D3-6 Do you perform tasks on zener diode power supply voltage regulators	57	0	1	3	56	3	9	1	20	0	3	14
D 305		D3-7 Do you perform tasks on transistor series power supply voltage regulators	46	0	1	2	50	2	7	2	10	0	3	18
D 306		D3-8 Do you perform tasks on IC power supply voltage regulators	36	0	0	1	6	1	5	3	6	0	2	16
D 307		D3-9 Do you perform tasks on pulse width modulator power supply voltage regulators	15	0	1	0	0	1	2	1	2	0	2	6
D 308		D3-10 Do you perform tasks on transistor series power supply voltage regulators with current limiting	33	0	0	1	24	2	6	3	6	0	2	10
D 309		D3-11 Do you perform tasks on crow bar power supply voltage regulators	13	0	0	0	0	1	2	1	2	0	2	6

0024 V. Reactive Circuits

0025 V 1. E1 Resistive Capacitive Inductive Circuits

E 310	E1-1 Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits	34	0	1	7	26	3	4	0	9	0	0	12	64
E 311	E1-2 Do you troubleshoot RCL circuits to circuit level components	32	0	1	5	21	2	4	0	9	0	0	10	64
E 312	E1-3 Do you trace schematic or block diagrams of circuits containing resonant RCL circuits	23	0	0	4	21	3	4	0	4	0	0	8	52
E 313	E1-4 Do you troubleshoot resonant RCL circuits to circuit level components	21	0	0	3	18	2	4	0	3	0	0	8	52
E 314	E1-5 Do you calculate values of impedance, voltage, or current in RCL circuits	13	0	3	2	21	2	4	1	4	0	0	6	30
E 315	E1-6 Do you calculate phase angle of RCL circuits	7	0	0	2	3	1	2	0	2	0	0	6	21
E 316	E1-7 Do you calculate values of power in RCL circuits	10	0	0	2	3	1	3	1	3	0	0	6	23

0026 V 2. E2 Frequency Sensitive Filters

E 317	E2-1 Do you trace schematic or block diagrams of circuits containing frequency sensitive filters	9	0	1	3	53	3	3	0	3	0	0	4	30
E 318	E2-2 Do you troubleshoot circuits to isolate a faulty frequency sensitive filter	10	0	0	3	53	4	3	0	3	0	0	4	29
E 319	E2-3 Do you troubleshoot frequency sensitive filters to circuit level components	6	0	1	1	32	1	3	0	2	0	0	6	28
E 320	E2-4 Do you align or adjust frequency sensitive filters	8	0	1	2	21	1	2	0	2	0	0	4	22
E 321	E2-5 Do you calculate capacitance or inductance values for specific frequency sensitive filters	3	0	0	0	18	1	1	0	1	0	0	4	16
E 322	E2-6 Do you perform tasks on low pass frequency sensitive filters	10	0	0	1	50	2	2	0	1	0	0	6	33

D	T	Y	Nbr	Task Title	306	361	362	362	362	362	542	542	542	545	545	545	918
					53	50	51	51	53	54	50	51	52	50	52	73	50
E	323			E2-7 Do you perform tasks on high pass frequency sensitive filters	8	1	1	1	1	35	1	2	0	1	0	0	6
E	324			E2-8 Do you perform tasks on band pass frequency sensitive filters	8	1	1	2	26	2	1	0	1	0	0	8	33
E	325			E2-9 Do you perform tasks on band-reject frequency sensitive filters	3	0	0	1	12	2	1	0	0	0	0	6	23
E	326			E2-10 Do you perform tasks on ferrite bead frequency sensitive filters	2	0	0	0	3	0	1	0	0	0	0	6	11

0027 VI. Waveshaping/Generating Circuits

0028 VI 1. Fl Oscillators

F	327			Fl-1 Do you trace block diagrams of circuits containing oscillators	35	0	0	5	65	2	3	0	4	0	0	8	71
F	328			Fl-2 Do you trace schematic diagrams of oscillator circuits	34	0	1	4	56	1	3	0	4	0	0	8	72
F	329			Fl-3 Do you troubleshoot to isolate a faulty oscillator circuit	33	0	1	5	62	1	2	0	4	0	0	6	70
F	330			Fl-4 Do you troubleshoot oscillators to circuit level components	30	1	1	2	18	1	2	0	3	0	0	6	68
F	331			Fl-5 Do you align or adjust oscillator circuits	30	0	1	7	56	2	1	0	3	0	0	6	62
F	332			Fl-6 Do the oscillators you work with use LC tank circuits	14	0	1	2	26	1	4	0	4	0	1	6	57
F	333			Fl-7 Do the oscillators you work with use RC networks	19	0	1	2	29	1	3	0	4	0	1	6	63
F	334			Fl-8 Do the oscillators you work with use crystals	32	1	1	2	6	1	3	0	4	0	0	8	68
F	335			Fl-9 Do the oscillators you work with use phase lock loops (PLL)	9	0	1	2	3	0	1	0	2	0	0	6	15
F	336			Fl-10 Do you perform tasks on series Hartley oscillator circuits	11	0	1	1	12	1	2	0	3	0	0	6	35
F	337			Fl-11 Do you perform tasks on shunt Hartley oscillator circuits	11	0	1	1	12	1	2	0	2	0	0	6	39
F	338			Fl-12 Do you perform tasks on Colpitts oscillator circuits	3	0	1	1	9	1	1	0	1	0	0	6	19
F	339			Fl-13 Do you perform tasks on Clapp oscillator circuits	2	0	0	0	9	1	0	0	1	0	0	4	17
F	340			Fl-14 Do you perform tasks on voltage control oscillators (VCO/VTD)	14	2	0	2	12	1	2	1	3	0	0	6	31
F	341			Fl-15 Do you perform tasks on crystal oscillator circuits	30	1	0	2	9	1	3	0	3	0	0	8	59
F	342			Fl-16 Do you perform tasks on Wien bridge oscillator circuits	6	0	1	1	6	1	1	0	1	0	0	6	48
F	343			Fl-17 Do you perform tasks on pulse generating oscillator circuits	16	0	1	3	29	1	2	0	2	0	0	4	43
F	344			Fl-18 Do you perform tasks on blocked/blocking oscillator circuits	3	0	1	0	0	1	0	0	2	0	0	4	20
F	345			Fl-19 Do you perform tasks on burst generators	2	0	1	1	0	0	0	0	1	0	0	4	17
F	346			Fl-20 Do you perform tasks on RC phase shift oscillators	10	0	1	1	21	0	1	0	3	0	0	6	29

D
T Task
Y Nbr

Task Title

306 361 361 362 362 362 542 542 542 545 545 545 918
53 50 51 51 53 54 50 51 52 50 52 73 50

0031 VI 4. F4 Limiter/Clamper Circuits

F 373	F4-1 Do you trace block diagrams of circuits containing limiters	20	0	0	1	21	1	1	0	1	0	0	4	56
F 374	F4-2 Do you trace schematic diagrams of limiter circuits	20	0	0	2	15	1	1	0	1	0	0	4	58
F 375	F4-3 Do you trace block diagrams of circuits containing clampers	15	0	0	0	12	1	1	0	1	0	0	2	48
F 376	F4-4 Do you trace schematic diagrams of clamper circuits	14	0	0	0	12	1	1	0	1	0	0	2	48
F 377	F4-5 Do you troubleshoot to isolate a faulty limiter circuit	16	2	0	1	15	1	1	0	1	0	0	4	52
F 378	F4-6 Do you troubleshoot limiters to circuit level components	14	0	0	1	12	1	1	0	1	0	0	4	48
F 379	F4-7 Do you troubleshoot to isolate a faulty clamper circuit	14	0	0	1	12	1	1	0	1	0	0	2	45
F 380	F4-8 Do you troubleshoot clampers to circuit level components	12	0	0	0	12	1	1	0	1	0	0	2	44
F 381	F4-9 Do you perform tasks on series diode limiter circuits	14	0	0	2	18	1	1	0	1	0	1	2	49
F 382	F4-10 Do you perform tasks on shunt diode limiter circuits	12	0	0	2	15	1	1	0	1	0	1	2	47
F 383	F4-11 Do you perform tasks on bias limiter circuits	9	0	0	2	9	1	0	0	0	0	0	4	30
F 384	F4-12 Do you perform tasks on zener diode circuits	21	0	0	1	24	1	2	0	0	0	0	4	58
F 385	F4-13 Do you perform tasks on transistor limiter circuits	11	0	0	1	9	1	1	0	0	0	0	2	46
F 386	F4-14 Do you perform tasks on triode limiter circuits	4	0	0	0	9	1	0	0	1	0	0	2	23
F 387	F4-15 Do you perform tasks on diode clamper circuits	11	0	0	1	12	1	1	0	1	0	0	4	41
F 388	F4-16 Do you perform tasks on bias clamper circuits	5	0	0	1	9	1	0	0	1	0	0	2	25

0032 VII. Computers, Digital Circuits, and Devices

0033 VII 1. G1 Digital Logic Numbering Systems and Functions

G 389	G1-1 Do you convert decimal numbers to binary numbers or binary numbers to decimal	42	0	5	23	6	2	3	1	2	1	1	29	39
G 390	G1-2 Do you convert octal numbers to binary or binary numbers to octal	29	0	1	13	0	1	3	1	2	0	0	16	33
G 391	G1-3 Do you convert hexadecimal numbers to binary or binary numbers to hexadecimal	30	0	1	17	3	1	3	1	2	0	1	20	30
G 392	G1-4 Do you convert octal numbers to decimal or decimal numbers to octal	27	0	0	13	0	1	2	0	1	0	0	14	33
G 393	G1-5 Do you convert hexadecimal numbers to decimal or decimal numbers to hexadecimal	29	0	0	16	9	1	3	0	1	0	1	22	29
G 394	G1-6 Do you convert octal numbers to hexadecimal or hexadecimal numbers to octal	24	0	0	11	0	1	2	0	1	0	0	12	27
G 395	G1-7 Do you convert base number fractions to another base numbering system	21	0	1	9	0	1	1	1	2	0	1	10	26
G 396	G1-8 Do you add binary numbers	40	0	4	19	3	3	2	1	2	1	1	27	39

D	T	Task	Task Title	306	361	361	362	362	542	542	542	545	545	545	918
Y	Nbr			53	50	51	51	53	54	50	51	52	50	52	73
G 397		G1-9 Do you subtract binary numbers		35	0	4	17	0	3	2	1	2	1	2	1
G 398		G1-10 Do you multiply binary numbers		24	0	3	12	0	3	2	1	2	1	2	1
G 399		G1-11 Do you divide binary numbers		24	0	2	10	0	3	2	1	2	1	2	1
G 400		G1-12 Do you add octal numbers		24	0	1	9	0	1	2	1	2	2	0	0
G 401		G1-13 Do you subtract octal numbers		23	0	1	9	0	1	2	1	2	2	0	0
G 402		G1-14 Do you add hexadecimal numbers		23	0	0	9	0	1	2	0	2	0	0	16
G 403		G1-15 Do you subtract hexadecimal numbers		23	0	0	9	0	1	2	0	2	0	0	16
G 404		G1-16 Do you use binary coded decimal (BCD)		30	0	4	12	6	1	3	1	1	0	1	24
G 405		G1-17 Do you use gray codes		3	0	0	2	0	1	0	0	0	0	0	4
G 406		G1-18 Do you use ICAO codes		3	0	0	1	0	1	0	0	0	0	0	4
G 407		G1-19 Do you use excess-3 (XS3) codes		3	0	0	2	0	0	0	0	0	0	0	4
G 408		G1-20 Do you use parity bit codes		35	0	0	9	3	1	1	0	0	0	0	4
G 409		G1-21 Do you use biquinary codes		4	0	1	1	0	0	0	0	0	0	0	4
G 410		G1-22 Do you use ASCII codes		62	0	0	6	6	1	2	1	0	0	0	12
G 411		G1-23 Do you use EBCDI codes		6	0	0	3	0	0	0	0	0	0	0	4
G 412		G1-24 Do you trace data flow through logic symbol diagrams		59	0	0	6	15	2	2	1	2	0	0	18
G 413		G1-25 Do you trace data flow through logic schematic diagrams		60	0	0	6	12	2	2	1	3	0	0	16
G 414		G1-26 Do you troubleshoot digital systems to major units		58	0	0	13	9	2	1	0	2	0	0	12
G 415		G1-27 Do you troubleshoot digital systems subassemblies or circuit cards		58	0	0	15	15	2	3	0	2	0	0	12
G 416		G1-28 Do you troubleshoot digital systems, subsystems or circuit cards to circuit level components or IC		50	1	0	5	9	1	2	0	2	0	0	12
G 417		G1-29 Do you trace data flow through circuits using positive logic (High = Binary 1)		52	0	0	4	12	1	3	0	2	0	0	16
G 418		G1-30 Do you trace data flow through circuits using negative logic (High = Binary 0)		44	1	0	4	12	1	2	0	1	0	0	12
G 419		G1-31 Do you perform tasks related to AND gates		59	0	0	10	32	2	4	1	4	0	0	24
G 420		G1-32 Do you perform tasks related to OR gates		59	0	0	10	32	2	4	1	4	0	0	24
G 421		G1-33 Do you perform tasks related to inhibited gates logic functions		46	0	0	9	3	1	2	1	1	0	0	10
G 422		G1-34 Do you perform tasks related to NAND or NOR gates		58	0	0	10	29	2	4	1	4	0	0	24
G 423		G1-35 Do you perform tasks related to exclusive OR/NOR logic functions		54	0	0	10	12	1	4	1	4	0	0	18
G 424		G1-36 Do you perform tasks related to RS flip flops		32	0	0	5	12	1	3	0	3	0	0	10
G 425		G1-37 Do you perform tasks related to D(Data) flip flops		33	0	0	5	9	1	3	0	2	0	0	10
G 426		G1-38 Do you perform tasks related to T(Toggle) flip flops		36	0	0	4	9	1	3	0	2	0	0	10
G 427		G1-39 Do you perform tasks related to JK flip flops		46	0	0	5	6	2	3	0	3	0	0	10
G 428		G1-40 Do you perform tasks related to Schmidt triggers		50	0	0	2	12	1	2	0	1	0	0	10
G 429		G1-41 Do you perform tasks related to delay (One-shot) logic functions		35	0	0	4	3	1	2	0	1	0	0	10
G 430		G1-42 Do you perform tasks related to open collector gates (wired "AND" or wired "OR")		28	0	0	3	0	1	2	0	1	0	0	4
G 431		G1-43 Do you perform tasks related to buffers		41	0	0	8	6	1	3	0	2	0	0	14
G 432		G1-44 Do you perform tasks related to inverters		49	0	1	5	18	1	3	0	3	0	0	18
G 433		G1-45 Do you perform tasks related to complemented flip flops		28	0	0	3	3	1	1	0	0	0	0	6
G 434		G1-46 Do you perform tasks related to complementing flip flops		29	0	0	3	3	1	1	0	0	0	0	6

D	Tsk	Task Title	306	361	361	362	362	362	542	542	542	545	545	545	918
Y	Nbr		53	50	51	51	53	54	50	51	52	50	52	73	50
G 435		G1-47 Do you develop Boolean equations from logic circuits or diagrams	17	0	0	3	0	1	1	0	0	0	0	0	8 17
G 436		G1-48 Do you develop logic diagrams from Boolean equations	14	0	0	3	0	1	1	0	0	0	0	0	6 17
G 437		G1-49 Do you simplify Boolean expressions using Boolean algebra	16	0	0	3	0	1	1	0	0	0	0	0	6 17
G 438		G1-50 Do you perform tasks on RTL (resistor transistor logic formally DCTL)	24	0	0	2	0	1	2	0	1	0	0	0	8 40
G 439		G1-51 Do you perform tasks on DTL (diode transistor logic)	28	0	0	1	0	1	2	0	1	0	0	0	6 41
G 440		G1-52 Do you perform tasks on TTL (transistor transistor logic)	38	0	0	3	6	1	3	0	1	0	0	0	12 61
G 441		G1-53 Do you perform tasks on ECL/CHL (emitter coupled or current mode logic)	13	0	0	1	0	1	1	0	1	0	0	0	6 20
G 442		G1-54 Do you perform tasks on HTL (high threshold logic)	4	0	0	1	0	1	1	0	1	0	0	0	4 18
G 443		G1-55 Do you perform tasks on CMOS (complementary metal oxide semiconductor)	28	0	0	3	3	1	2	0	2	0	0	0	12 52
G 444		G1-56 Do you perform tasks on positive MOS ICs	16	0	0	2	0	1	1	0	1	0	0	0	6 23
G 445		G1-57 Do you perform tasks on negative MOS ICs	11	0	0	2	0	1	1	0	1	0	0	0	8 22
G 446		G1-58 Do you perform tasks on vertical MOS ICs	7	0	0	1	0	0	1	0	1	0	0	0	6 15

0034 VII 2. G2 Computers

G 447		G2-1 Do you trace block or schematic diagrams of computer controlled or computer based systems	41	0	1	14	18	4	3	0	1	0	1	0	1 16 25
G 448		G2-2 Do you load programs	27	0	10	28	21	8	2	1	2	0	1	16	17
G 449		G2-3 Do you write or debug programs	6	0	4	11	6	5	1	1	1	0	1	4	7
G 450		G2-4 Do you troubleshoot computers to a major unit	42	0	2	26	21	6	1	0	1	0	1	6	19
G 451		G2-5 Do you troubleshoot computers to a subassembly or circuit card	43	0	1	26	21	3	3	0	1	0	1	10	16
G 452		G2-6 Do you troubleshoot computer subassembly or circuit card to circuit level components or IC	30	0	1	6	6	2	3	0	1	0	1	8	18
G 453		G2-7 Do you use computer flow charts or diagrams	35	0	4	17	12	3	2	1	1	0	1	12	16
G 454		G2-8 Do you perform tasks on analog computers	18	0	2	6	0	3	2	0	1	0	2	12	16
G 455		G2-9 Do you perform tasks on digital computers	45	0	3	34	21	3	2	0	2	1	1	16	22
G 456		G2-10 Do you use Basic computer language	16	0	5	14	3	5	2	1	2	1	2	12	11
G 457		G2-11 Do you use COBOL computer language	3	0	1	1	0	2	1	1	1	0	1	6	4
G 458		G2-12 Do you use FORTRAN computer language	3	0	1	1	3	1	1	1	1	0	1	6	4
G 459		G2-13 Do you use ADA computer language	0	0	0	0	0	1	1	0	1	0	1	2	3
G 460		G2-14 Do you use ATLAS computer language	1	0	0	0	0	1	1	0	1	0	1	2	4
G 461		G2-15 Do you use ELAN computer language	0	0	0	0	0	1	1	0	1	0	1	2	3
G 462		G2-16 Do you use PASCAL computer language	1	0	1	2	0	1	1	1	1	0	1	4	4
G 463		G2-17 Do you use RPG computer language	0	0	1	0	0	1	1	1	1	0	1	2	3
G 464		G2-18 Do you use Machine computer language	6	0	1	5	0	2	2	0	1	1	1	4	5
G 465		G2-19 Do you use C computer language	1	0	0	0	0	1	1	0	1	0	1	2	4
G 466		G2-20 Do you perform tasks on magnetic (tape, disc, core) computer memories	54	0	7	39	18	7	2	0	2	0	1	14	17
G 467		G2-21 Do you perform tasks on semiconductor (RAM, ROM, EPROM, PROM) computer memories	45	0	3	22	9	6	3	0	1	0	2	12	20

D T Y	Task Nbr	Task Title	306	361	361	362	362	362	542	542	542	545	545	545	918
			53	50	51	51	53	54	50	51	52	50	52	73	50
G 468	G 468	G2-22 Do you perform tasks on paper (tape, punch card) computer memories	44	0	1	8	0	2	1	0	1	0	0	4	15
G 469	G 469	G2-23 Do you perform tasks on advanced technology (bubble, CCD, electron beam, laser, thin film) computer memories	15	0	0	0	0	1	1	0	1	0	0	2	5
G 470	G 470	G2-24 Do you perform tasks on computer keyboards	65	0	14	37	32	8	3	0	2	1	3	24	26
G 471	G 471	G2-25 Do you perform tasks on computer character printers	62	1	7	28	18	6	1	0	1	0	1	16	24
G 472	G 472	G2-26 Do you perform tasks on magnetic tape drives	57	0	3	37	0	3	1	0	1	0	1	10	11
G 473	G 473	G2-27 Do you perform tasks on microprocessor computer terminals	38	0	4	13	0	4	1	0	1	0	1	8	15
G 474	G 474	G2-28 Do you perform tasks on video display unit (VDU/monitors)	58	0	5	28	6	6	1	0	2	0	1	12	15
G 475	G 475	G2-29 Do you perform tasks on paper tape readers/punches	53	0	2	3	0	2	0	0	1	0	1	4	8
G 476	G 476	G2-30 Do you perform tasks on paper card readers/punches	40	0	1	1	0	1	0	0	1	0	1	2	6
G 477	G 477	G2-31 Do you perform tasks on toggle or push button switch inputs	34	0	4	10	0	3	2	0	1	0	1	8	12
G 478	G 478	G2-32 Do you perform tasks on incandescent displays (Nixie tubes, LEDs, LCDs)	38	0	1	10	3	3	2	0	1	0	1	8	17
G 479	G 479	G2-33 Do you perform tasks on modems	42	1	11	26	24	11	2	0	1	0	1	12	10
G 480	G 480	G2-34 Do you perform tasks on line printers	51	0	10	22	15	7	1	1	2	0	2	12	15
G 481	G 481	G2-35 Do you perform tasks on floppy disc drives	35	0	12	19	26	6	1	0	2	0	1	12	13
G 482	G 482	G2-36 Do you perform tasks on removable cartridge disc drives	14	0	2	3	3	3	0	0	1	0	1	4	8
G 483	G 483	G2-37 Do you perform tasks on removable pack disc drives	25	0	1	1	0	2	0	0	1	0	1	6	5
G 484	G 484	G2-38 Do you perform tasks on fixed Winchester type disc drives	6	0	2	17	9	5	1	0	1	0	1	4	10
G 485	G 485	G2-39 Do you trace block or schematic diagrams of microprocessor controlled systems	36	0	0	5	12	2	1	0	1	0	1	14	41
G 486	G 486	G2-40 Do you troubleshoot microprocessor controlled systems to a subassembly or circuit card	37	0	0	5	12	2	3	0	1	0	1	16	41
G 487	G 487	G2-41 Do you troubleshoot microprocessor controlled systems to isolate a faulty microprocessor	26	0	0	2	9	2	2	0	1	0	1	12	36
0035	VII 3.	63 Digital Circuits													
G 488	G 488	G3-1 Do you trace data flow through circuits containing counters	40	1	1	5	6	1	2	0	1	1	1	8	43
G 489	G 489	G3-2 Do you troubleshoot counter circuits to isolate a faulty counter	35	1	2	3	6	1	3	0	0	1	1	6	42
G 490	G 490	G3-3 Do you troubleshoot counters to circuit level components	30	0	1	0	6	1	2	0	0	1	1	6	39
G 491	G 491	G3-4 Do you perform tasks on UP counters in logic circuits	35	0	0	1	3	2	2	0	1	0	0	2	30
G 492	G 492	G3-5 Do you perform tasks on DOWN counters in logic circuits	34	0	0	1	3	2	2	0	1	0	0	2	27
G 493	G 493	G3-6 Do you perform tasks on DECINE counters in logic circuits	16	0	0	0	6	1	2	0	0	0	0	4	34
G 494	G 494	G3-7 Do you perform tasks on ring counters in logic circuits	16	0	0	1	0	0	1	0	0	0	0	2	8

D T Tsk Y Nbr	Task Title	306	361	361	362	362	362	542	542	542	545	545	545	918
		53	50	51	51	53	54	50	51	52	50	52	73	50
G 495	G3-8 Do you perform tasks on modulus counters in logic circuits	5	0	0	0	0	0	0	0	0	0	0	0	2
G 496	G3-9 Do you perform tasks on synchronous (parallel) counters in logic circuits	29	0	0	3	6	1	1	0	1	0	0	4	22
G 497	G3-10 Do you perform tasks on asynchronous (serial) counters in logic circuits	29	0	0	2	3	1	1	0	0	0	0	4	22
G 498	G3-11 Do you trace logic diagrams of circuits containing registers	31	0	0	3	0	1	1	0	1	0	0	8	22
G 499	G3-12 Do you troubleshoot circuits containing registers to isolate a faulty register	27	0	0	2	0	1	1	0	1	0	1	4	22
G 500	G3-13 Do you troubleshoot registers to circuit level components	25	0	0	1	0	1	1	0	0	0	0	4	22
G 501	G3-14 Do you perform tasks on shift registers in logic circuits	35	0	0	2	0	2	1	0	1	0	0	6	26
G 502	G3-15 Do you perform tasks on storage registers in logic circuits	32	0	1	2	3	2	1	0	1	0	0	8	23
G 503	G3-16 Do you trace data flow through combinational logic circuits	24	0	0	5	0	2	2	0	2	0	0	8	30
G 504	G3-17 Do you troubleshoot to isolate a faulty combinational logic circuit	23	0	1	3	0	2	2	0	2	0	0	8	30
G 505	G3-18 Do you troubleshoot combinational logic circuits to circuit level components	19	0	1	2	0	2	2	0	2	0	0	6	27
G 506	G3-19 Do you perform tasks on encoders	23	0	1	5	0	2	2	0	2	0	0	4	27
G 507	G3-20 Do you perform tasks on decoders	23	0	1	5	0	2	2	0	2	0	0	4	28
G 508	G3-21 Do you perform tasks on multiplexers	18	0	1	9	0	1	2	0	2	0	0	12	30
G 509	G3-22 Do you perform tasks on demultiplexers	14	0	1	5	0	1	1	0	1	0	0	4	24
G 510	G3-23 Do you perform tasks on comparators	16	0	1	2	0	1	2	0	2	0	0	6	33
G 511	G3-24 Do you perform tasks on parity generators or checkers	18	0	1	3	0	1	1	0	1	0	0	2	13
G 512	G3-25 Do you perform tasks on code converters	18	0	1	2	0	1	1	0	2	0	0	2	18
G 513	G3-26 Do you perform tasks on adders	16	0	1	2	0	1	1	0	2	0	0	6	26
G 514	G3-27 Do you perform tasks on subtractors	13	0	1	2	0	1	1	0	1	0	0	6	20
G 515	G3-28 Do you perform tasks on count detect circuits	12	0	0	1	3	1	1	0	1	0	0	2	15

0036 VII 4. G4 Digital to Analog (D/A) and Analog to Digital (A/ Converters

G 516	G4-1 Do you trace data flow through A/D converters	22	0	1	6	0	2	2	0	2	0	1	8	45
G 517	G4-2 Do you trace data flow through D/A converters	21	0	1	6	0	2	1	0	2	0	0	6	42
G 518	G4-3 Do you troubleshoot A/D converter circuits	19	0	1	12	0	1	2	0	2	0	1	8	45
G 519	G4-4 Do you troubleshoot D/A converter circuits	19	0	1	12	0	1	1	0	2	0	0	6	42
G 520	G4-5 Do the converters you perform tasks on use flash conversion	1	0	1	1	0	0	1	0	0	0	0	0	7
G 521	G4-6 Do the converters you perform tasks on use successive approximation conversion	3	0	0	2	0	1	1	0	0	0	0	0	11
G 522	G4-7 Do the converters you perform tasks on use ramp conversion	7	0	0	1	0	1	1	0	0	0	0	4	14
G 523	G4-8 Do the converters you perform tasks on use R2R conversion	1	0	0	0	0	0	0	0	0	0	0	2	6

D

T Tsk

Y Nbr

Task Title

306 361 361 362 362 362 542 542 542 545 545 545 918
53 50 51 51 53 54 50 51 52 50 52 73 50

0037 VIII. Transmission/Reception Circuits, Devices, and Systems

0038 VIII 1. H1 Connections

H 524	H1-1 Do you measure electrical length on transmission lines	5	35	35	7	9	6	3	5	1	0	0	16	2
H 525	H1-2 Do you measure physical length on transmission lines	6	50	43	6	6	14	3	10	1	0	0	20	5
H 526	H1-3 Do you measure standing wave ratio (SWR) on transmission lines	2	65	5	1	3	2	2	1	1	0	0	6	0
H 527	H1-4 Do you construct transmission lines	5	65	17	10	6	15	4	17	1	0	0	12	2
H 528	H1-5 Do you match transmission line impedance with loads	6	52	18	9	9	6	2	5	1	0	0	12	2
H 529	H1-6 Do you calculate the characteristic impedance (Z0) of transmission lines	3	30	11	3	3	4	1	2	1	0	0	4	1
H 530	H1-7 Do you troubleshoot transmission lines	14	64	45	38	15	37	6	20	1	0	0	27	3
H 531	H1-8 Do you perform tasks on open-wire transmission lines	7	65	20	21	9	24	3	18	1	0	0	22	1
H 532	H1-9 Do you perform tasks on twisted pair transmission lines	15	31	64	42	15	44	5	4	0	0	0	39	4
H 533	H1-10 Do you perform tasks on twin lead transmission lines	8	25	7	9	6	13	2	4	0	0	0	8	3
H 534	H1-11 Do you perform tasks on flexible coaxial transmission lines	11	83	34	9	3	9	5	2	1	0	0	31	5
H 535	H1-12 Do you perform tasks on rigid coaxial transmission lines	5	76	20	3	3	5	1	2	0	0	0	8	2
H 536	H1-13 Do you perform tasks on fiber-optic transmission lines	4	24	35	5	3	4	1	0	0	0	0	6	2
H 537	H1-14 Do you trace schematic or block diagrams of circuits containing waveguides	1	31	1	1	0	2	0	1	1	0	0	0	2
H 538	H1-15 Do you troubleshoot circuits to isolate a faulty waveguide assembly	1	39	1	1	0	1	0	1	1	0	0	0	1
H 539	H1-16 Do you pressurize or purge waveguide assemblies	0	67	2	1	0	1	0	1	1	0	0	0	2
H 540	H1-17 Do you measure standing wave ratio for waveguide assemblies	0	50	1	1	0	1	0	1	1	0	0	0	1
H 541	H1-18 Do you remove or install waveguide or associated coupling hardware components	1	67	1	1	0	1	0	1	1	0	0	0	1

0039 VIII 2. H2 Microwave Oscillators and Amplifiers

H 542	H2-1 Do you trace schematic or block diagrams of circuits containing microwave oscillators or amplifiers	1	2	0	2	0	1	0	0	0	0	0	0	2
H 543	H2-2 Do you troubleshoot circuits to isolate a faulty microwave oscillator or amplifier	1	3	0	1	0	1	0	0	0	0	0	0	2
H 544	H2-3 Do you tune or adjust microwave oscillators or amplifiers	0	3	0	1	0	2	0	0	0	0	0	0	1
H 545	H2-4 Do you perform tasks on two-cavity klystron microwave oscillators and amplifiers	0	0	0	1	0	1	0	1	0	0	0	0	1

D	T	Task Title	306	361	361	362	362	362	362	542	542	542	545	545	545	918
Y	Nbr		53	50	51	51	53	54	50	51	52	50	52	73	50	
H 546		H2-5 Do you perform tasks on three-cavity klystron microwave oscillators and amplifiers	0	0	0	0	0	1	0	1	0	0	0	0	0	0
H 547		H2-6 Do you perform tasks on reflex klystron microwave oscillators and amplifiers	0	0	0	1	0	1	0	1	1	0	0	0	0	1
H 548		H2-7 Do you perform tasks on traveling wave tube microwave oscillators and amplifiers	0	1	0	1	0	1	0	0	1	0	0	0	0	1
H 549		H2-8 Do you perform tasks on magnetron microwave oscillators and amplifiers	0	0	0	1	0	1	0	0	1	0	0	0	0	4
H 550		H2-9 Do you perform tasks on backward wave oscillator	0	1	0	0	0	1	0	0	0	0	0	0	0	0
H 551		H2-10 Do you perform tasks on parametric amplifiers	0	0	0	0	0	1	0	0	1	0	0	0	0	0
H 552		H2-11 Do you perform tasks on yttrium iron garnet (YIG) tuned microwave oscillators and amplifiers	0	0	0	0	0	1	0	0	0	0	0	0	0	0

0040 VIII 3. H3 Resonant Cavities

H 553		H3-1 Do you trace schematic or block diagrams of circuits containing resonant cavities	0	0	0	1	0	1	0	0	1	0	0	0	0	1
H 554		H3-2 Do you troubleshoot circuits to isolate a faulty resonant cavity	0	0	0	1	0	1	0	0	1	0	0	0	0	1
H 555		H3-3 Do you tune or adjust resonant cavities electrically	0	0	0	1	0	1	0	0	0	0	0	0	0	0
H 556		H3-4 Do you tune or adjust resonant cavities physically	0	0	0	1	0	1	0	0	1	0	0	0	0	2
H 557		H3-5 Do you measure frequency of resonant cavities	0	0	0	1	0	1	0	0	1	0	0	0	0	0
H 558		H3-6 Do you perform tasks on probe resonant cavities	0	0	0	1	0	1	0	0	0	0	0	0	0	1
H 559		H3-7 Do you perform tasks on loop resonant cavities	0	0	1	0	0	1	0	0	0	0	0	0	0	0
H 560		H3-8 Do you perform tasks on aperture (iris/window) resonant cavities	0	0	0	1	0	1	0	0	0	0	0	0	0	0

0041 VIII 4. H4 Transmitters and Receivers

H 561		H4-1 Do you use "AM" modulation principles	1	1	0	1	0	1	0	0	1	0	1	0	0	2
H 562		H4-2 Do you trace block diagrams of AM transmitters	1	0	0	1	0	1	0	0	1	0	1	0	2	2
H 563		H4-3 Do you trace block diagrams of AM transmitter subassemblies or circuit cards	1	0	0	1	0	1	0	0	1	0	0	0	2	3
H 564		H4-4 Do you trace schematic diagrams of AM transmitter subassemblies or circuit cards	1	0	0	1	0	1	0	0	1	0	0	0	2	4
H 565		H4-5 Do you troubleshoot AM transmitters to major units	1	0	0	1	0	1	0	0	1	0	0	0	2	2
H 566		H4-6 Do you troubleshoot AM transmitters to subassemblies or circuit cards	1	0	0	1	0	1	0	0	1	0	0	0	2	2
H 567		H4-7 Do you troubleshoot AM transmitter subassemblies or circuit cards to circuit level components	1	0	0	1	0	1	0	0	1	0	0	0	2	2
H 568		H4-8 Do you align or adjust AM transmitters or circuits	1	0	0	1	0	1	0	0	1	0	0	0	2	2
H 569		H4-9 Do you calculate percentage of modulation for AM transmitters	1	0	0	1	0	1	0	0	1	0	0	0	2	1
H 570		H4-10 Do you use "AM" demodulation principles	1	0	0	1	0	1	0	0	0	0	0	0	2	1
H 571		H4-11 Do you trace block diagrams of AM receivers	1	0	0	1	0	1	0	0	0	0	0	0	2	2

D Task Title 306 361 361 362 362 362 542 542 542 542 545 545 545 918
 Y Nbr 53 50 51 51 53 54 50 51 52 50 52 73 50

0045 IX 2. I2 RF Calculations

I 665 I2-1 Do you calculate RF apparent power 0 6 1 0 0 1 1 0 1 0 1 0 1 4 5
 I 666 I2-2 Do you calculate RF true power 0 7 1 1 0 1 1 0 1 0 1 0 1 2 6
 I 667 I2-3 Do you calculate RF power loss or gain in db 1 18 1 2 0 2 2 0 1 0 1 0 1 2 6

0046 X. Additional Circuits, Devices, Systems, or Items

0047 X 1. J1 Microphones and Speakers

J 668 J1-1 Do you trace block diagrams of circuits containing microphones 3 0 0 3 44 16 2 0 0 0 1 10 26
 J 669 J1-2 Do you trace schematic diagrams of microphone circuits 3 0 0 3 44 13 2 0 0 0 1 10 27
 J 670 J1-3 Do you troubleshoot to isolate a faulty microphone 3 0 0 2 29 7 2 0 0 0 1 10 22
 J 671 J1-4 Do you troubleshoot microphones 2 0 0 1 4 38 15 1 0 0 0 1 6 8
 J 672 J1-5 Do you work on carbon microphones 1 0 1 1 9 2 1 0 0 0 0 0 8 6
 J 673 J1-6 Do you work on capacitor microphones 0 0 1 1 3 1 1 0 0 0 0 1 6 13
 J 674 J1-7 Do you work on crystal microphones 1 0 1 1 26 3 2 0 0 0 0 0 4 6
 J 675 J1-8 Do you work on dynamic microphones 0 0 0 0 3 1 0 0 0 0 0 0 2 1
 J 676 J1-9 Do you work on velocity ribbon microphones 5 1 0 8 50 26 2 0 0 0 1 10 43
 J 677 J1-10 Do you trace block diagrams of circuits containing speakers
 J 678 J1-11 Do you trace schematic diagrams of speaker circuits 5 1 0 6 50 21 2 0 0 0 1 10 45
 J 679 J1-12 Do you troubleshoot to isolate a faulty speaker 6 1 0 9 53 24 3 1 0 0 1 8 45
 J 680 J1-13 Do you troubleshoot speakers 3 0 0 4 41 15 2 0 0 0 1 6 33

0048 X 2. J2 Photosensitive Devices

J 681 J2-1 Do you trace block diagrams of circuits containing photosensitive devices 36 5 1 1 0 2 25 27 1 0 8 14 52
 J 682 J2-2 Do you trace schematic diagrams of photosensitive device circuits 35 5 0 1 0 1 21 30 1 0 8 16 53
 J 683 J2-3 Do you troubleshoot to isolate a faulty photosensitive device 35 12 1 1 0 1 31 47 1 0 13 16 52
 J 684 J2-4 Do you adjust or calibrate photosensitive devices 27 6 1 1 0 1 17 28 0 0 3 12 44
 J 685 J2-5 Do you work on photodiodes 25 0 0 1 0 1 4 1 1 0 1 6 44
 J 686 J2-6 Do you work on phototransistors 22 0 0 1 0 1 4 0 0 0 1 6 38
 J 687 J2-7 Do you work on phototubes 2 0 0 1 0 0 2 0 0 0 2 6 23
 J 688 J2-8 Do you work on photo-SCRs 4 0 0 0 0 0 4 0 0 0 0 6 11

D
 Task Title
 Y Nbr 306 361 361 362 362 362 542 542 542 542 545 545 545 918
 53 50 51 51 53 54 50 51 52 50 52 73 50
 J 689 J2-9 Do you work on photocells (Photoconductive or Photovoltaic) 28 25 1 0 0 0 30 55 1 1 16 14 42

0049 X 3. J3 Storage Type Display Tubes

J 690 J3-1 Do you trace block diagrams of circuits containing display tubes 3 0 0 0 0 0 0 0 0 0 0 0 0 7
 J 691 J3-2 Do you trace schematic diagrams of display tubes or circuits 3 0 0 0 0 0 0 0 0 0 0 0 0 5
 J 692 J3-3 Do you troubleshoot to isolate a faulty display tube 3 0 0 0 0 0 0 0 0 0 0 0 0 7
 J 693 J3-4 Do you adjust or calibrate display tubes or circuits 2 0 0 0 0 0 0 0 0 0 0 0 0 6
 J 694 J3-5 Do you work on direct view storage tubes (DVST) 0 0 0 0 0 0 0 0 0 0 0 0 0 4
 J 695 J3-6 Do you work on multiple mode storage tubes (MMST) 0 0 0 0 0 0 0 0 0 0 0 0 0 3
 J 696 J3-7 Do you work on scan converter tubes (SCT) 0 0 0 0 0 0 0 0 0 0 0 0 0 2

0050 X 4. J4 Television, Laser, and Infrared Systems

J 697 J4-1 Do you trace block diagrams of TV systems or subassemblies 1 0 0 0 0 0 1 0 0 0 0 0 0 4 24
 J 698 J4-2 Do you trace schematic diagrams of TV systems or component circuits 2 0 0 0 0 0 1 0 0 0 0 0 0 4 23
 J 699 J4-3 Do you troubleshoot TV systems to major subassemblies 2 0 0 0 0 0 1 0 0 0 0 0 0 4 24
 J 700 J4-4 Do you troubleshoot TV systems to circuit level components 1 0 0 0 0 0 1 0 0 0 0 0 0 4 23
 J 701 J4-5 Do you adjust or calibrate TV systems or components 2 0 0 0 0 0 1 0 0 0 0 0 0 4 22
 J 702 J4-6 Do you trace block diagrams of laser systems or subassemblies 14 0 0 0 0 0 0 0 0 0 0 0 0 0 13
 J 703 J4-7 Do you trace schematic diagrams of laser systems or component circuits 11 0 0 0 0 0 0 0 0 0 0 0 0 0 12
 J 704 J4-8 Do you troubleshoot laser systems to major subassemblies 14 0 0 0 0 0 0 0 0 0 0 0 0 0 11
 J 705 J4-9 Do you troubleshoot laser systems to circuit level components 9 0 0 0 0 0 0 0 0 0 0 0 0 0 9
 J 706 J4-10 Do you adjust or calibrate laser systems or components 11 0 0 0 0 0 0 0 0 0 0 0 0 0 9
 J 707 J4-11 Do you trace block diagrams of infrared systems or subassemblies 3 0 0 0 0 0 0 1 0 0 0 0 1 6 9
 J 708 J4-12 Do you trace schematic diagrams of infrared systems or component circuits 2 0 0 0 0 0 0 1 0 0 0 0 2 8 8
 J 709 J4-13 Do you troubleshoot infrared systems to major subassemblies 3 0 0 0 0 0 0 1 0 0 0 0 1 8 8
 J 710 J4-14 Do you troubleshoot infrared systems circuit level components 2 0 0 0 0 0 0 1 1 0 0 0 2 8 8

PRTMOD ALL Sheppard TTC AFSCs (Inventory Order)

PM0001

Occupational Analysis Program
USAFOMC (ATC) Randolph AFB TX
Page 30

Page 30

D	T	Tsk	Nbr
---	---	-----	-----

Task Title

[illegible]

J 711 J4-15 Do you inspect, clean, or service infrared systems or components

300002100288

J 712 J4-16 Do you adjust or calibrate infrared systems or components

30000188

0051 **Tasks not referenced**

Report Option Table for Modules

Option	Status
Primary Sort	Inventory Sequence
Secondary Sort	Not Used
Print Suppress	Not Used

Report Option Table for Tasks

Option	Status
Primary Sort	Inventory Sequence
Secondary Sort	Not Used
Print Suppress	Not Used

Description of Reported Module Factors

Col	Factor	Source vector	Title	Module Statement	Number Members	Mean	S.D.	Based on All Tasks Within Range	Max	Min	Valid
1	TITLE										

Description of Reported Task Factors

Col	Factor	Source vector	Title	Task Statement	Number Members	Mean	S.D.	Based on All Tasks Within Range	Max	Min	Valid
1	TITLE										
2	F0026	GP0029/PHP		All DAFSC 30653	237	22.69	24.98		98.73	.00	712
3	F0027	GP0030/PHP		All DAFSC 36150	127	6.76	17.04		91.34	.00	712
4	F0028	GP0031/PHP		All DAFSC 36151	138	3.63	11.81		89.13	.00	712
5	F0029	GP0032/PHP		All DAFSC 36251	172	8.08	15.96		95.35	.00	712
6	F0030	GP0033/PHP		All DAFSC 36253	34	16.51	25.87		100.00	.00	712
7	F0031	GP0034/PHP		All DAFSC 36254	180	5.57	13.93		95.00	.00	712
8	F0032	GP0035/PHP		All DAFSC 54250	187	8.04	17.42		98.93	.00	712
9	F0033	GP0036/PHP		All DAFSC 54251	138	6.51	17.94		98.55	.00	712
10	F0034	GP0037/PHP		All DAFSC 54252	186	9.74	20.06		95.70	.00	712
11	F0035	GP0038/PHP		All DAFSC 54550	211	5.63	17.53		96.21	.00	712
12	F0036	GP0039/PHP		All DAFSC 54552	191	4.25	13.00		89.01	.00	712

PRTMOD All Sheppard TTC AFSCs Matched to EF/A STS

PM0002

Occupational Analysis Program
USAFOMC (ATC) Randolph AFB TX

Page 2

Col	Factor	Source vector	Title	Number Members	----- Mean	Based on All Tasks Within Range S.D.	Max	Min	Valid
13	F0037	GP0040/PHP	All DAFSC 54573	51	14.58	20.63	98.04	.00	712
14	F0041	GP0044/PHP	All DAFSC 91850	132	35.97	30.41	99.24	.00	712

Electronic Principles Inventory (EPI) data for Air Force specialties is presented below in Electronic Fundamentals/Applications order. Data for this report was collected from job incumbents during the period March 1987 - September 1988

Percent members responding "YES" is shown for each specialty listed.

For assistance in using this EPI printout phone USAFOMC/OMYA, at AUTOVON 487-6811.

D	Tsk	Task Title	306	361	362	362	362	542	542	542	545	545	545	918
Y	Nbr		53	50	51	51	53	54	50	51	52	50	52	73

0001 SFS 1 Electronic Fundamentals/
 Applications dated 20 Feb 1987

0002 1. Basic Terms

0003 1a. Metric Notation

A	1	A1-1 Do you use metric terms (example mili, kilo, mega)	66	46	53	55	68	25	70	62	70	42	40	75	95
---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----

0004 1b. DC Terms

A	2	A1-2 Do you use basic DC electrical/electronic terms	97	68	78	95	100	92	84	74	95	72	72	96	99
---	---	--	----	----	----	----	-----	----	----	----	----	----	----	----	----

0005 1c. AC Terms

A	3	A1-3 Do you use basic AC electrical/electronic terms	97	69	64	90	97	88	97	98	95	96	88	98	99
---	---	--	----	----	----	----	----	----	----	----	----	----	----	----	----

0006 2. Basic Circuits

D T Tsk Y Nbr	Task Title	306	361	362	362	542	542	542	545	545	545	918
		53	50	51	51	53	54	50	51	52	50	73 50
A 11	A1-11 Do you calibrate or adjust circuits by using variable resistors	85	11	8	49	88	21	29	38	60	25	12 61 95
0014	4b. Isolate faulty resistors 2b											
A 10	A1-10 Do you troubleshoot circuits to isolate a faulty resistor	89	21	12	62	91	24	36	57	70	31	20 75 96
A 14	A1-14 Do you ohm check resistors	91	31	18	58	91	27	43	58	76	32	23 82 94
0015	4c. Color code B											
A 13	A1-13 Do you determine ohmic value of a resistor using the color code	69	14	5	43	74	13	31	46	42	19	13 78 93
0016	5. Relays/Solenoids											
0017	5a. Relay theory of operation B											
A 15	A1-15 Do you trace schematic or block diagrams of circuits containing relays	78	37	4	78	94	71	75	74	82	91	61 94 96
A 17	A1-17 Do you adjust relays	38	26	5	69	68	42	53	52	53	43	30 63 71
A 18	A1-18 Do you perform tasks on contacts, cores, coils, armatures, or springs	68	21	5	71	68	46	77	69	61	84	42 75 93
0018	5b. Isolate faulty relays 2b											
A 16	A1-16 Do you troubleshoot circuits to isolate a faulty relay	76	36	4	77	91	62	76	77	81	92	66 92 94
A 19	A1-19 Do you continuity check relays	72	35	4	67	88	41	76	72	81	88	54 92 92
0019	5c. Solenoid theory of operation -											
A 77	A2-33 Do you trace schematic or block diagrams of circuits containing solenoids	44	8	10	4	0	4	48	18	73	89	62 84 92
A 79	A2-35 Do you perform maintenance on solenoid component parts	33	6	9	3	0	3	37	17	56	83	47 65 89

D
 T Tsk
 Y Nbr

Task Title

306 361 361 362 362 362 542 542 542 545 545 545 918
 53 50 51 51 53 54 50 51 52 50 52 73 50

0026 7a. Theory of operation B

A 27 Al-27 Do you trace schematic or block diagrams of
 circuits containing capacitors 89 24 11 66 97 58 48 62 63 78 29 73 96
 A 32 Al-32 Do you calibrate or adjust circuits using variable
 capacitors 35 3 4 20 29 7 19 12 24 18 6 22 61

0027 7b. Isolate faulty capacitors 2b

A 28 Al-28 Do you troubleshoot circuits to isolate a faulty
 capacitor 86 19 18 62 91 33 48 59 62 76 29 65 94
 A 33 Al-33 Do you ohm check capacitors 79 19 14 46 82 23 43 50 55 77 27 61 88

0028 7c. Calculations

A 29 Al-29 Do you calculate values of circuit total capacitance 30 3 14 23 44 11 24 21 24 27 10 25 48
 A 30 Al-30 Do you calculate values of circuit or component
 capacitive reactance 24 4 7 20 41 7 23 13 21 22 9 27 43
 A 31 Al-31 Do you calculate values of circuit or component
 voltage or current in circuits containing capacitors 31 6 8 22 47 8 25 25 22 30 8 27 55

0029 7d. Color code B

A 34 Al-34 Do you use capacitor color codes in your present
 job 20 5 3 10 21 7 17 8 19 15 7 27 29

0030 8. Transformers

0031 8a. Theory of operation B

A 35 Al-35 Do you trace schematic or block diagrams of circuits
 containing transformers 87 15 2 28 97 27 77 87 71 82 61 92 95
 A 39 Al-39 Do you calibrate or adjust circuits using variable
 transformers 27 2 0 6 44 3 39 45 30 18 15 37 70

D T Y	Task Nbr	Task Title	306	361	362	362	362	542	542	542	545	545	545	918
			53	50	51	51	53	54	50	51	52	50	52	73 50
A 48	A2-4	Do you perform tasks on DC motor component parts	53	7	7	13	3	1	33	5	49	28	27	31 77
0039	10b.	Isolate faulty DC motors	2b											
A 46	A2-2	Do you troubleshoot circuits to isolate a faulty DC motor	70	15	4	17	6	11	44	7	59	34	37	55 90
0040	10c.	Troubleshoot motors	2b											
A 47	A2-3	Do you troubleshoot DC motor component parts	51	8	7	11	3	1	35	4	47	30	25	39 78
0041	11.	AC Motors												
0042	11a.	Theory of operation	B											
A 49	A2-5	Do you trace schematic or block diagrams of circuits containing AC motors	83	19	11	9	3	10	75	19	58	91	69	73 93
A 52	A2-8	Do you perform tasks on AC motor component parts	70	7	14	6	0	1	52	14	47	80	50	41 81
0043	11b.	Isolate faulty AC motors	2b											
A 50	A2-6	Do you troubleshoot circuits to isolate a faulty AC motor	81	17	10	10	3	10	79	22	59	91	77	71 89
0044	11c.	Troubleshoot motors	2b											
A 51	A2-7	Do you troubleshoot AC motor component parts	71	6	12	6	0	2	58	15	46	85	53	49 81
0045	12.	DC Generators												

D	T	Y	Tsk	Nbr
---	---	---	-----	-----

Task Title

306 361 361 362 362 362 362 542 542 545 545 545 918
53 50 51 51 53 54 50 51 52 50 52 73 50

0046 12a. Theory of operation

A 53 A2-9 Do you trace schematic or block diagrams of circuits containing DC generators

11	3	2	12	6	4	14	2	65	1	7	4	36
11	3	2	12	6	4	14	2	65	1	7	4	36

A 56 A2-12 Do you perform tasks on component parts of DC generators containing AC generators

9 4 1 8 0 1 11 1 59 1 7 4 30

0047 12b. Isolate faulty DC generators

A 54 A2-10 Do you troubleshoot to isolate a faulty DC generator

11	3	0	12	6	2	13	2	62	1	7	4	36
----	---	---	----	---	---	----	---	----	---	---	---	----

0048 12c. Troubleshoot DC generators

A 55 A2-11 Do you troubleshoot DC generator component parts

9 2 0 6 3 2 10 1 59 2 7 4 30

0049 13. AC Generators

0050 13a. Theory of operation

A 57 A2-13 Do you trace schematic or block diagrams of circuits containing AC generators

6 3 1 8 12 4 19 9 75 2 6 4 35

A 60 A2-16 Do you perform tasks on component parts of AC generators

5 2 0 4 0 2 13 4 76 2 8 4 28

0051 13b. Isolate faulty AC generators

A 58 A2-14 Do you troubleshoot circuits to isolate a faulty AC generator

6 3 0 7 12 4 18 7 72 3 7 4 34

0052 13c. Troubleshoot AC generators

A 59 A2-15 Do you troubleshoot AC generator component parts

4	3	0	4	0	2	13	4	75	2	6	4	27
---	---	---	---	---	---	----	---	----	---	---	---	----

D
T Tsk
Y Nbr

Task Title

306 361 361 362 362 362 542 542 542 545 545 545 918
53 50 51 51 53 54 50 51 52 50 52 73 50

0067 18. Meter Movements

0068 18a. Theory of operation B

A 80 A2-36 Do you trace schematic or block diagrams of circuits 19 2 7 8 15 5 21 21 45 15 9 43 74
containing meter movements

A 82 A2-38 Do you perform maintenance on meter movement 13 2 6 4 9 3 15 17 25 9 9 25 53
mechanical parts

0069 18b. Isolate faulty meter movements 2b

A 81 A2-37 Do you troubleshoot circuits to isolate a faulty 18 3 4 8 12 4 20 21 46 14 10 41 73
meter movement

0070 19. Solid State Diodes

0071 19a. Theory of operation B

A 83 A3-1 Do you trace schematic or block diagrams of circuits 86 13 2 54 88 49 22 25 66 17 7 71 95
containing diodes

0072 19b. Isolate faulty solid state diodes 2b

A 84 A3-2 Do you troubleshoot circuits to isolate a faulty diode 85 13 1 47 82 28 21 25 65 15 6 67 93
A 85 A3-3 Do you check diodes using an ohmmeter 84 14 1 48 74 24 22 25 68 15 7 73 92

0073 19c. Specifications B

A 86 A3-4 Do you use diode characteristic curves 17 0 1 3 12 4 4 4 9 2 2 20 36
A 87 A3-5 Do you use diode substitution information 28 2 0 6 24 4 6 4 15 2 2 27 69

D
 T Task
 Y Nbr

Task Title

306 361 361 362 362 362 542 542 542 542 545 545 545 918
 53 50 51 51 53 54 50 51 52 50 52 73 50

0074 19d. Color code B

A 88 A3-6 Do you use diode color codes 19 3 0 8 12 6 7 8 15 3 3 20 24

0075 20. Bipolar Junction Transistors

0076 20a. Theory of operation B

A 89 A3-7 Do you trace schematic or block diagrams of circuits containing transistors 90 7 2 44 94 47 15 5 45 8 4 55 93

0077 20b. Isolate faulty transistors 2b

A 90 A3-8 Do you troubleshoot circuits to isolate a faulty transistor 88 6 1 37 88 22 12 4 41 4 4 49 92
 A 91 A3-9 Do you check transistors using an ohmmeter 86 7 1 33 85 16 14 4 40 4 6 49 89
 A 92 A3-10 Do you check transistors using transistor testers 60 2 1 11 44 7 8 0 14 1 3 43 67

0078 20c. Specifications B

A 93 A3-11 Do you use transistor characteristic curves 20 1 1 4 15 3 3 0 7 1 2 18 37
 A 94 A3-12 Do you use transistor substitution information 40 1 0 6 21 4 6 1 10 1 2 25 81

0079 21. Integrated Circuits

0080 21a. Familiarization B

A 95 A3-13 Do you trace schematic or block diagrams of circuits containing integrated circuits (IC) 84 1 2 15 50 20 13 8 19 5 5 47 92

D														
T	Task	306	361	361	362	362	362	362	362	542	542	545	545	918
Y	Nbr	53	50	51	51	53	54	50	51	52	50	52	73	50
Task Title														

0081 21b. Isolate faulty integrated circuits 2b

A	96	A3-14 Do you troubleshoot circuits to isolate a faulty IC	79	1	1	10	35	13	12	5	17	4	4	43	90
---	----	---	----	---	---	----	----	----	----	---	----	---	---	----	----

0082	21c. Specifications	B
------	---------------------	---

A	97	A3-15	Do you use IC substitution information	45	0	1	6	18	3	9	3	7	1	2	29	80
---	----	-------	--	----	---	---	---	----	---	---	---	---	---	---	----	----

0083 22. Solid State Special Purpose Devices
(SCR, Zener Diode, Tunnel Diode, LED,
LCD, UJT, JFET, MOSFET)

0084 22a. Theory of operation B

A	98	A3-16 Do you trace schematic or block diagrams of circuits containing solid-state special purpose devices	53	0	1	9	29	14	15	10	18	11	6	35	88
A 100	A3-18 Do you perform tasks on varactors/varicaps	11	1	1	1	15	2	3	0	2	2	0	12	42	
A 101	A3-19 Do you perform tasks on tunnel diodes	27	1	0	1	9	1	3	1	11	2	1	8	40	
A 102	A3-20 Do you perform tasks on field effect transistors (FET)	33	1	0	2	15	2	7	0	11	2	1	16	83	
A 103	A3-21 Do you perform tasks on unijunction transistors (UJT)	35	1	0	1	15	2	4	0	9	2	1	12	80	
A 104	A3-22 Do you perform tasks on zener diodes	68	1	0	9	47	14	11	1	28	2	2	35	88	
A 105	A3-23 Do you perform tasks on liquid crystal displays (LCD)	35	1	0	6	15	5	6	1	5	2	1	24	76	
A 106	A3-24 Do you perform tasks on pin diodes	14	1	0	0	3	4	0	6	2	1	8	27		
A 107	A3-25 Do you perform tasks on light emitting diodes (LED)	65	1	0	14	26	15	15	1	8	3	1	49	90	
A 108	A3-26 Do you perform tasks on fantail transistors	12	1	0	0	0	1	2	0	3	2	1	8	21	
A 109	A3-27 Do you perform tasks on silicon controlled rectifiers (SCR)	39	1	0	2	15	2	10	3	33	2	2	35	85	
A 110	A3-28 Do you perform tasks on triacs	29	1	0	1	3	1	5	0	2	4	1	16	80	
A 111	A3-29 Do you perform tasks on programmable unijunction transistors (PUT)	7	1	0	0	0	1	2	0	3	2	0	6	75	
A 112	A3-30 Do you perform tasks on silicon controlled switches (SCS)	10	1	0	1	9	1	4	0	6	2	1	14	61	
A 113	A3-31 Do you perform tasks on silicon unilateral switches (SUS)	6	1	0	0	3	0	1	0	3	2	0	6	63	
A 114	A3-32 Do you perform tasks on step recovery diodes (SRD)	6	1	0	0	0	1	2	0	3	2	0	4	17	
A 115	A3-33 Do you perform tasks on field effect diodes (FED)	15	0	0	1	0	1	4	1	5	2	0	12	39	
A 116	A3-34 Do you perform tasks on DIAC (Bi-directional trigger diode)	9	1	0	0	0	0	3	0	2	2	0	8	60	
A 117	A3-35 Do you perform tasks on varistors	46	1	0	15	41	16	7	0	7	2	1	20	58	
A 118	A3-36 Do you perform tasks on metal oxide varistors (MOV)	8	1	0	0	6	2	5	0	4	2	1	16	29	

D
 T Task
 Y Nbr
 Task Title
 A 119 A3-37 Do you perform tasks on schottky diodes
 306 361 361 362 362 542 542 542 542 545 545 545 918
 53 50 51 51 53 54 50 51 52 50 52 73 50
 9 1 0 1 6 2 3 0 2 2 1 6 50

0085 22b. Isolate faulty special purpose devices 2b

A 99 A3-17 Do you troubleshoot circuits to isolate a faulty solid-state special purpose device
 51 0 0 8 26 11 14 11 18 12 6 37 83

0086 23. Electron Tubes

0087 23a. Theory of operation B

A 120 A4-1 Do you trace block diagrams of circuits containing electron tubes
 11 0 1 9 0 1 1 20 4 1 2 6 36
 A 121 A4-2 Do you trace schematic diagrams of electron tube circuits
 9 0 0 7 0 1 1 20 4 1 3 6 35
 A 125 A4-6 Do you perform tasks on diode tubes
 3 0 1 2 0 1 0 9 3 0 0 6 23
 A 126 A4-7 Do you perform tasks on triode tubes
 2 0 0 1 0 1 0 0 2 0 1 4 21
 A 127 A4-8 Do you perform tasks on tetrode tubes
 2 0 0 1 0 1 0 0 1 0 0 4 17
 A 128 A4-9 Do you perform tasks on pentode tubes
 2 0 0 1 0 1 0 1 1 0 0 4 20
 A 129 A4-10 Do you perform tasks on beam power tubes
 1 0 0 2 0 1 0 1 0 0 0 4 11
 A 130 A4-11 Do you perform tasks on gas tubes
 2 0 0 4 0 1 1 7 2 0 3 2 16
 A 131 A4-12 Do you perform tasks on phantastrons
 1 0 0 1 0 1 0 0 0 0 0 2 5
 A 132 A4-13 Do you perform tasks on neon tubes
 3 1 1 1 0 1 1 1 1 0 0 2 20
 A 133 A4-14 Do you perform tasks on xenon tubes
 0 0 0 0 0 0 0 18 1 0 0 2 10
 A 134 A4-15 Do you perform tasks on nixie tubes
 3 0 0 1 0 0 0 1 0 0 0 2 11

0088 23b. Isolate faulty tubes

A 122 A4-3 Do you troubleshoot circuits to isolate a faulty electron tube
 10 0 0 8 0 1 1 22 4 1 3 6 34

0089 23c. Specifications

A 123 A4-4 Do you use electron tube characteristic curves
 1 0 0 3 0 0 1 0 0 1 0 2 12
 A 124 A4-5 Do you use electron tube substitution manuals or charts
 3 0 0 4 0 0 1 1 2 1 0 4 23

D
 T Task
 Y Nbr
 Task Title
 306 361 361 362 362 362 362 542 542 542 545 545 545 918
 53 50 51 51 53 54 50 51 52 50 52 73 50

0090 24. Cathode Ray Tubes (CRT)

0091 24a. Theory of operation B

A 135 A4-16 Do you trace block diagrams of circuits containing cathode ray tubes (CRT) 42 1 1 2 12 1 1 4 1 0 2 8 68
 A 136 A4-17 Do you trace schematic diagrams of CRT circuits 42 0 0 3 12 1 1 4 1 0 1 8 67
 A 138 A4-19 Do you adjust or calibrate circuits that control CRT operations 41 0 0 2 12 1 1 4 1 0 0 8 67
 A 139 A4-20 Do you perform tasks on electrostatic CRT 21 0 1 0 12 1 0 0 1 0 0 6 33
 A 140 A4-21 Do you perform tasks on electromagnetic CRT 22 1 1 2 12 1 1 1 2 1 0 8 45

0092 24b. Isolate faulty CRTs 2b

A 137 A4-18 Do you troubleshoot to isolate a faulty CRT 44 0 0 2 12 1 1 4 1 0 1 8 61

0093 25. Solder/Desolder

0094 25a. Terminal connections 2b

A 141 A5-1 Do you solder or desolder hardware connections 95 59 51 88 97 86 67 70 81 59 41 96 94
 A 142 A5-2 Do you solder or desolder component connections such as resistors, capacitors, diodes, transformers, etc 94 33 14 66 91 35 44 68 77 40 17 86 94

0095 25b. P C Boards 2b

A 143 A5-3 Do you solder or desolder printed circuit board connections 85 17 7 44 74 19 28 30 51 11 9 71 89
 A 144 A5-4 Do you solder or desolder multi-layer circuit board connections 35 9 7 17 26 9 17 8 26 7 5 53 57
 A 145 A5-5 Do you perform high reliability soldering 78 28 32 45 71 32 25 30 42 22 12 51 70

D T Tsk Task Title 306 361 361 362 362 542 542 542 545 545 545 918
 Y Nbr 53 50 51 51 53 54 50 51 52 50 52 73 50

0096 25c. Multipin connectors 2b

A 149 A5-9 Do you repair or fabricate connectors or cables on 55 47 87 53 50 84 49 67 32 15 7 59 75
 multiconductor cables
 A 152 A5-12 Do you repair or fabricate connectors or cables on 41 4 9 8 3 13 12 5 9 4 4 29 64
 ribbon cables

0097 25d. Coaxial connectors

A 150 A5-10 Do you repair or fabricate connectors or cables on 46 91 70 19 32 19 31 16 16 7 8 59 77
 coaxial cables
 A 151 A5-11 Do you repair or fabricate connectors or cables on 18 23 14 8 6 7 12 9 10 5 3 16 31
 triaxial cables

0098 26. Assemble Solderless Connectors

0099 26a. Crimp 2b

A 146 A5-6 Do you use crimping tool to repair or make connections 89 61 89 52 91 78 87 88 85 77 60 94 95
 A 147 A5-7 Do you use wire wrap tool to make connections 59 31 81 91 91 89 43 25 31 34 24 45 43
 A 148 A5-8 Do you use punch-on tool to make connections 35 23 83 70 71 95 33 22 23 24 16 57 36

0100 26b. Coaxial 2b

A 150 A5-10 Do you repair or fabricate connectors or cables on 46 91 70 19 32 19 31 16 16 7 8 59 77
 coaxial cables
 A 151 A5-11 Do you repair or fabricate connectors or cables on 18 23 14 8 6 7 12 9 10 5 3 16 31
 triaxial cables

0101 26c. Multipin 2b

A 149 A5-9 Do you repair or fabricate connectors or cables on 55 47 87 53 50 84 49 67 32 15 7 59 75
 multiconductor cables
 A 152 A5-12 Do you repair or fabricate connectors or cables on 41 4 9 8 3 13 12 5 9 4 4 29 64
 ribbon cables

D
T Task
Y Nbr

Task Title

306 361 361 362 362 362 542 542 542 542 545 545 545 918
53 50 51 51 53 54 50 51 52 50 52 73 50

0102 27. Use Test Equipment Usage

0103 27a. Multimeter, analog 2b

B 153 B1-1 Do you use the multimeter to measure DC voltage values 99 76 78 91 97 83 84 77 96 65 53 96 98
B 154 B1-2 Do you use the multimeter to measure AC voltage values 98 72 61 85 91 81 97 99 95 94 81 96 99
B 155 B1-3 Do you use the multimeter to extend the range of
volts using external shunts 24 9 17 11 35 10 33 40 22 20 13 31 49
B 156 B1-4 Do you use the multimeter to measure DC current values 85 53 56 67 76 52 70 64 74 54 41 80 93
B 157 B1-5 Do you use the multimeter to measure AC current values 78 51 40 60 71 49 87 91 77 87 68 78 89
B 158 B1-6 Do you use the multimeter to extend the range of
amperes using external shunts 16 8 7 8 26 6 32 33 16 21 13 25 35
B 159 B1-7 Do you use the multimeter to measure circuit resistance 78 65 89 74 85 62 81 83 76 76 58 88 85
B 160 B1-8 Do you use the multimeter to measure component
resistance 89 45 33 64 91 41 72 73 83 86 53 88 96

0104 27b. Oscilloscope 2b

B 161 B2-1 Do you use the oscilloscope to measure time to
determine frequency 69 17 12 20 82 4 6 0 7 0 2 27 92
B 162 B2-2 Do you use the oscilloscope to measure time (rise,
fall, pulse width, etc) 68 8 12 15 79 3 6 0 5 0 3 22 89
B 163 B2-3 Do you use the oscilloscope to measure AC voltage 84 9 4 18 82 7 7 1 9 2 4 29 93
B 164 B2-4 Do you use the oscilloscope to measure DC voltage 89 11 5 20 82 8 7 1 9 0 4 31 95
B 165 B2-5 Do you use the oscilloscope to measure ripple voltages 73 2 2 7 53 2 5 1 6 0 2 22 68
B 166 B2-6 Do you use the oscilloscope to measure phase jitters 23 2 2 7 15 3 3 1 2 0 2 16 26
B 167 B2-7 Do you use the oscilloscope to observe signal/data
patterns 80 12 8 15 59 6 4 1 5 0 2 24 72
B 168 B2-8 Do you use the oscilloscope to observe lissajous
patterns 18 0 3 2 3 2 3 0 1 0 2 14 18
B 169 B2-9 Do you use the oscilloscope to observe phase
relationships 56 0 4 8 56 3 5 1 8 0 2 24 77
B 170 B2-10 Do you use attenuator probes with oscilloscopes 44 2 1 12 24 4 3 1 6 0 1 16 81
B 171 B2-11 Do you use delay time multipliers with
oscilloscopes 27 2 2 3 15 1 3 0 2 0 1 10 35

0105 27c. Signal Generator 2b

B 172 B3-1 Do you use signal generators (SG) to perform
operational checks 51 16 6 29 94 11 4 4 3 0 2 20 71

D T Tsk Y Nbr	Task Title	306	361	362	362	362	542	542	542	545	545	545	918
		53	50	51	51	53	54	50	51	52	50	52	73 50
B 173	B3-2 Do you use SG to perform alignments, adjustments, or calibrations	48	10	4	26	88	9	4	1	2	0	2	20 69
B 174	B3-3 Do you use SG to troubleshoot circuits	45	7	7	30	94	16	4	10	3	0	1	20 64
0106	27d. Frequency counter 2b												
B 185	B4-1 Do you use frequency counters	71	11	15	53	97	11	8	0	24	3	3	24 76
0107	27e. Spectrum Analyzer 2b												
B 186	B4-2 Do you use spectrum analyzers	13	52	2	3	3	2	4	0	3	2	1	8 14
0108	27f. Field strength tester												
B 187	B4-3 Do you use field strength testers	3	6	2	1	3	2	6	2	4	2	2	14 11
0109	27g. Multimeter, digital 2b												
B 188	B4-4 Do you use digital multimeters	95	38	51	81	94	59	58	69	75	44	26	76 96
0110	27h. Digital logic probe 2b												
B 189	B4-5 Do you use digital logic probes	24	2	1	3	24	2	5	0	4	3	1	27 77
0111	27i. Capacitor tester 2b												
B 190	B4-6 Do you use capacitance testers	9	4	3	5	18	7	10	2	6	17	3	24 55
0112	27j. Capacitor substitution box												
B 191	B4-7 Do you use capacitor substitution boxes	3	2	1	1	3	2	4	0	3	4	1	18 37

D	Tsk	Task Title	306	361	362	362	362	362	542	542	542	545	545	545	918
Y	Nbr		53	50	51	53	54	50	51	52	50	52	73	50	
0113	27k.	DC restorer													
B 192	B4-8	Do you use DC restorers (CRT rejuvenators)	2	2	1	0	6	2	3	0	3	2	1	10	10
0114	27l.	Logic current tracer													
B 193	B4-9	Do you use logic current tracers	8	2	1	1	6	2	6	1	3	2	1	16	42
0115	27m.	Tube tester													
B 194	B4-10	Do you use tube testers	4	2	1	1	3	2	4	2	4	2	2	8	19
0116	27n.	Logic pulser													
B 195	B4-11	Do you use logic pulsers	11	2	1	0	15	2	6	0	3	2	2	16	67
0117	27o.	Logic analyzer													
B 196	B4-12	Do you use logic analyzers	11	2	1	1	6	2	4	0	3	2	1	18	37
0118	27p.	Signature analyzer													
B 197	B4-13	Do you use signature analyzers	3	2	1	0	3	2	3	2	3	2	1	8	20
0119	27q.	Reflectometer													
B 198	B4-14	Do you use reflectometers	2	28	41	1	3	2	4	2	3	2	1	14	11
0120	28.	Transistor Amplifier Circuits (Common Emitter, Common Collector, Common Base)													

D
 T Task
 Y Nbr

306 361 361 362 362 362 542 542 542 542 545 545 545 918
 53 50 51 51 53 54 50 51 52 50 52 73 50

Task Title

0124 28a(3). Coupling circuits		B													
C 225	C3-1 Do you trace block diagrams of circuits containing coupling circuits	35	2	1	2	29	5	3	1	3	1	0	10	69	
C 226	C3-2 Do you trace schematic diagrams of coupling circuits	34	0	0	2	29	4	3	1	3	1	0	12	72	
C 229	C3-5 Do you perform tasks on direct coupling circuits	34	2	1	2	21	3	2	1	3	0	0	8	67	
C 230	C3-6 Do you perform tasks on capacitive-resistive coupling circuits	27	1	1	2	24	3	2	0	2	0	0	8	61	
C 231	C3-7 Do you perform tasks on capacitive-inductive coupling circuits	22	1	0	2	21	3	2	0	2	0	0	8	57	
C 232	C3-8 Do you perform tasks on transformer coupling circuits	27	1	0	2	21	3	2	2	2	1	0	10	64	
C 233	C3-9 Do you perform tasks on optical coupling circuits	19	0	4	0	6	2	2	0	1	0	0	10	42	
0125 28b. Isolate faulty amplifier circuits 2b															
C 201	C1-3 Do you troubleshoot to isolate a faulty transistor amplifier	41	0	0	11	62	6	3	0	4	0	2	16	81	
C 205	C1-7 Do you measure transistor amplifier voltage, current, or power gain	25	0	0	9	44	2	2	0	2	0	1	10	64	
C 227	C3-3 Do you troubleshoot circuits to isolate a faulty coupling circuit	33	1	1	2	29	3	3	1	3	1	0	12	68	
0126 28c. Troubleshoot circuits 2b															
C 202	C1-4 Do you troubleshoot transistor amplifiers to circuit level components	35	0	0	8	44	2	2	0	3	0	1	18	80	
C 203	C1-5 Do you troubleshoot transistor amplifier distortion	14	0	0	6	41	2	2	0	1	0	1	6	45	
C 219	C2-2 Do you troubleshoot amplifier stabilization circuits to circuit level components	15	0	0	1	21	0	2	0	3	0	0	10	49	
C 228	C3-4 Do you troubleshoot coupling circuits to circuit level components	29	0	0	2	21	2	3	1	1	0	0	10	70	

D T Task 306 361 361 362 362 362 542 542 542 545 545 545 918
 Y Nbr 53 50 51 51 53 54 50 51 52 50 52 73 50

Task Title

0128 29a. Theory of operation

C 234 C4-1 Do you trace block diagrams of circuits containing
 electron tube amplifiers 2 0 1 4 0 1 1 0 1 0 0 6 18
 C 235 C4-2 Do you trace schematic diagrams of electron tube
 amplifiers 2 0 0 4 0 1 1 0 1 0 0 2 16
 C 239 C4-6 Do you adjust or align electron tube amplifiers
 C 241 C4-8 Do you calculate values of electron tube amplifier
 voltage, current, or power gain 1 0 0 3 0 1 0 0 1 0 0 2 9
 C 242 C4-9 Do you perform tasks on paraphase electron tube
 amplifiers 1 0 1 0 0 0 0 0 1 0 0 2 6
 C 243 C4-10 Do you perform tasks on push-pull electron tube
 amplifiers 0 0 0 1 0 1 0 0 1 0 0 2 11
 C 244 C4-11 Do you perform tasks on audio electron tube amplifiers
 C 245 C4-12 Do you perform tasks on voltage regulator electron
 tube amplifiers 0 0 0 1 0 1 1 0 0 0 0 2 8
 C 246 C4-13 Do you perform tasks on common grid electron tube
 amplifiers 0 0 0 1 0 1 0 0 1 0 0 2 16
 C 247 C4-14 Do you perform tasks on common cathode electron tube
 amplifiers 1 0 0 1 0 1 0 0 1 0 0 2 16
 C 248 C4-15 Do you perform tasks on cathode follower electron tube
 amplifiers 1 0 0 1 0 1 0 0 1 0 0 2 14

0129 29b. Isolate faulty tube amplifiers

C 236 C4-3 Do you troubleshoot to isolate a faulty electron
 tube amplifier 2 0 0 4 0 1 0 0 1 0 0 2 16
 C 240 C4-7 Do you measure electron tube amplifier voltage,
 current, or power gain 2 0 0 4 0 1 0 0 1 0 0 2 14

0130 29c. Troubleshoot circuits

C 237 C4-4 Do you troubleshoot electron tube amplifiers to
 circuit level components 1 0 0 3 0 1 1 0 1 0 0 2 17
 C 238 C4-5 Do you troubleshoot electron tube amplifier dis-
 tortion 1 0 0 3 0 1 0 0 1 0 0 2 10

0131 30. Operational Amplifiers

D
T
Y

Task Title

[illegible][illegible]

0133	30b. Isolate faulty Op Amps	-
C 250	C5-2 Do you troubleshoot to isolate a faulty op amp circuit	26 0 0 4 26 2 3 0 4 0 1 10 83

0134 31. Magnetic Amplifiers

D	T	Task	Y	Nbr
306	301	361	362	362
53	50	51	53	54
50	51	52	50	51
52	50	52	50	52
73	50	52	73	50

[illegible]

D T Task 306 361 361 362 362 362 542 542 542 545 545 545 918
 Y Nbr 53 50 51 51 53 54 50 51 52 50 52 73 50
 Task Title

0141 32c. Troubleshoot circuits

C 273 C6-9 Do you troubleshoot saturable reactors to circuit level components 0 0 1 0 0 0 1 0 8 0 0 2 2

0142 33. Power Supply Circuits (Half-wave, Full-wave, Full-wave bridge)

0143 33a. Theory of operation

0144 33a(1). Rectifiers (Half-wave, Full-wave, B Full-wave bridge)

D 275 D1-1 Do you trace block diagrams of circuits containing power supplies 89 8 1 38 91 45 48 39 32 29 21 75 92
 D 276 D1-2 Do you trace schematic diagrams of power supply circuits 89 8 1 32 88 37 48 42 32 28 21 75 92
 D 279 D1-5 Do you align or adjust power supplies 82 2 1 26 88 19 33 30 23 10 10 45 85
 D 280 D1-6 Do you perform tasks on half-wave rectifier power supplies 61 2 1 7 59 5 21 2 29 5 3 39 85
 D 281 D1-7 Do you perform tasks on full-wave rectifier power supplies 66 2 0 17 74 7 23 3 34 7 3 47 87
 D 282 D1-8 Do you perform tasks on full-wave bridge rectifier power supplies 66 2 1 8 53 10 25 9 37 10 3 57 91
 D 283 D1-9 Do you perform tasks on three-phase rectifier power supplies 17 0 0 13 9 4 17 1 26 8 2 8 50

0145 33a(2). Filters (Capacitive, Inductive, B L-Section, Pi-Section)

D 288 D2-1 Do you trace block diagrams of circuits containing power supply filters 58 0 1 6 47 8 14 2 8 1 1 27 77
 D 289 D2-2 Do you trace schematic diagrams of power supply filters 57 0 0 5 47 6 13 1 8 2 1 25 77
 D 292 D2-5 Do you perform tasks on capacitive power supply filters 50 0 1 3 47 6 10 1 9 3 1 22 75
 D 293 D2-6 Do you perform tasks on inductive power supply filters 38 0 0 3 35 4 6 0 8 1 0 18 61
 D 294 D2-7 Do you perform tasks on L-type power supply filters 23 0 0 2 12 1 3 0 3 0 0 14

D Task Y Nbr	Task Title	306	361	361	362	362	362	542	542	542	545	545	545	918
D 308	D3-10 Do you perform tasks on transistor series power supply voltage regulators with current limiting	33	0	0	1	24	2	6	3	6	0	2	10	55
D 309	D3-11 Do you perform tasks on crow bar power supply voltage regulators	13	0	0	0	0	1	2	1	2	0	2	6	17

0150	34b. Isolate faulty voltage regulators 2b													
D 301	D3-3 Do you troubleshoot circuits to isolate a faulty power supply voltage regulator	66	1	0	8	50	6	18	38	47	5	5	25	84

0151	34c. Troubleshoot circuits 2b													
D 302	D3-4 Do you troubleshoot power supply voltage regulators to circuit level components	59	1	0	5	41	3	16	28	31	4	4	24	82

0152	35. Resistive/Capacitive/Inductive (RCL) Circuits													

0153	35a. Basic operation B													
E 310	E1-1 Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits	34	0	1	7	26	3	4	0	9	0	0	12	64

0154	35b. Resonant operation B													
E 312	E1-3 Do you trace schematic or block diagrams of circuits containing resonant RCL circuits	23	0	0	4	21	3	4	0	4	0	0	8	52

0155	35c. Troubleshoot circuits 2b													
E 311	E1-2 Do you troubleshoot RCL circuits to circuit level components	32	0	1	5	21	2	4	0	9	0	0	10	64
E 313	E1-4 Do you troubleshoot resonant RCL circuits to circuit level components	21	0	0	3	18	2	4	0	3	0	0	8	52

D
T Ysk
Y Nbr
Task Title
306 361 361 362 362 362 542 542 542 542 545 545 545 918
53 50 51 51 53 54 50 51 52 50 52 73 50

0156 35d. Calculations B

E 314 E1-5 Do you calculate values of impedance, voltage, or
current in RCL circuits 13 0 3 2 21 2 4 1 4 0 0 6 30
E 315 E1-6 Do you calculate phase angle of RCL circuits 7 0 0 2 3 1 2 0 2 0 0 6 21
E 316 E1-7 Do you calculate values of power in RCL circuits 10 0 0 2 3 1 3 1 3 0 0 6 23

0157 36. Frequency Sensitive Filters (Low Pass,
High Pass, Band Pass, Band Reject)

0158 36a. Theory of operation B

E 317 E2-1 Do you trace schematic or block diagrams of circuits
containing frequency sensitive filters 9 0 1 3 53 3 3 0 3 0 0 4 30
E 320 E2-4 Do you align or adjust frequency sensitive filters 8 0 1 2 21 1 2 0 2 0 0 4 22
E 322 E2-6 Do you perform tasks on low pass
frequency sensitive filters 10 0 0 1 50 2 2 0 1 0 0 6 33
E 323 E2-7 Do you perform tasks on high pass
frequency sensitive filters 8 1 1 1 35 1 2 0 1 0 0 6 33
E 324 E2-8 Do you perform tasks on band pass
frequency sensitive filters 8 1 1 2 26 2 1 0 1 0 0 8 33
E 325 E2-9 Do you perform tasks on band-reject
frequency sensitive filters 3 0 0 1 12 2 1 0 0 0 0 6 23
E 326 E2-10 Do you perform tasks on ferrite bead
frequency sensitive filters 2 0 0 0 3 0 1 0 0 0 0 6 11

0159 36b. Isolate faulty frequency sensitive 2b
filters

E 318 E2-2 Do you troubleshoot circuits to isolate a faulty
frequency sensitive filter 10 0 0 3 53 4 3 0 3 0 0 4 29

0160 36c. Troubleshoot circuits 2b

E 319 E2-3 Do you troubleshoot frequency sensitive filters to
circuit level components 6 0 1 1 32 1 3 0 2 0 0 6 28

D
 Y Task
 Y Nbr

Task Title

306 361 361 362 362 362 542 542 542 545 545 545 918
 53 50 51 51 53 54 50 51 52 50 52 73 50

0165 37a(2). Multivibrators (Astable, Bistable, B Monostable)

F 347 F2-1 Do you trace block diagrams of circuits containing multivibrators 44 0 0 3 26 2 1 0 2 0 0 6 59
 F 348 F2-2 Do you trace schematic diagrams of multivibrator circuits 42 0 0 3 24 1 1 0 2 0 0 6 59
 F 351 F2-5 Do you adjust or align multivibrator circuits 27 0 0 3 21 1 1 0 2 0 0 6 51
 F 352 F2-6 Do the multivibrators you work with use LC tank circuits 16 0 0 1 12 1 1 0 2 0 0 6 43
 F 353 F2-7 Do the multivibrators you work with use RC networks 32 0 0 1 18 1 1 0 2 0 0 6 54
 F 354 F2-8 Do the multivibrators you work with use Crystals 27 0 0 1 6 1 2 0 1 0 0 4 54
 F 355 F2-9 Do you perform tasks on astable (free running) multivibrators 41 0 0 2 24 2 0 0 1 0 0 6 58
 F 356 F2-10 Do you perform tasks on monostable (one shot) multivibrators 41 0 0 2 24 1 1 0 1 0 0 6 57
 F 357 F2-11 Do you perform tasks on bistable (flip flop) multivibrators 46 0 0 2 29 1 1 0 2 0 0 6 58
 F 358 F2-12 Do you perform tasks on triggered astable multivibrators 26 0 0 1 9 1 1 0 1 0 0 6 48

0166 37a(3). Waveshaping Circuits (Schmitt Trigger, Sawtooth, RC Integ/Diff) B

F 359 F3-1 Do you trace block diagrams of circuits containing waveshaping circuits (WSC) 33 0 0 2 3 2 2 0 1 0 0 2 65
 F 360 F3-2 Do you trace schematic diagrams of WSC 33 0 0 1 3 1 2 0 1 0 0 2 61
 F 363 F3-5 Do you adjust or calibrate WSC 22 0 0 1 3 1 1 0 1 0 0 2 58
 F 364 F3-6 Do you perform tasks on sawtooth wave generator WSC 26 0 0 1 3 1 2 0 2 0 0 2 58
 F 365 F3-7 Do you perform tasks on trapezoidal (ramp) wave generator WSC 14 0 0 1 3 1 1 0 1 0 0 2 55
 F 366 F3-8 Do you perform tasks on RC differentiating WSC 9 0 0 1 0 1 2 0 1 0 0 2 36
 F 367 F3-9 Do you perform tasks on RL differentiating WSC 7 0 0 1 0 1 2 0 1 0 0 2 32
 F 368 F3-10 Do you perform tasks on RC integrating WSC 10 0 0 1 0 1 2 0 1 0 0 2 34
 F 369 F3-11 Do you perform tasks on RL integrating WSC 7 0 0 1 0 1 2 0 0 0 0 2 32
 F 370 F3-12 Do you perform tasks on square wave generator WSC 31 0 0 1 3 2 2 0 2 0 0 2 63
 F 371 F3-13 Do you perform tasks on rectangular wave generator WSC 11 0 0 1 3 1 1 0 0 0 0 2 47
 F 372 F3-14 Do you perform tasks on Schmitt trigger WSC 33 0 0 1 6 1 1 0 1 0 0 4 46

D
 T Task
 Y Nbr
 Task Title
 306 361 361 362 362 362 362 542 542 542 542 545 545 545 918
 53 50 51 51 53 54 50 51 52 50 52 73 50

0167 37b. Isolate faulty wave generating circuits		2b	
F 329	F1-3 Do you troubleshoot to isolate a faulty oscillator circuit	33	0 1 5 62 1 2 0 4 0 0 6 70
F 349	F2-3 Do you troubleshoot to isolate a faulty multivibrator circuit	39	0 0 3 24 1 1 0 2 0 0 6 58
F 361	F3-3 Do you troubleshoot to isolate a faulty WSC	30	0 0 1 3 1 2 0 1 0 0 2 59
0168 37c. Troubleshoot circuits		2b	
F 330	F1-4 Do you troubleshoot oscillators to circuit level components	30	1 1 2 18 1 2 0 3 0 0 6 68
F 350	F2-4 Do you troubleshoot multivibrators to circuit level components	35	0 0 1 21 1 1 0 2 0 0 6 56
F 362	F3-4 Do you troubleshoot WSC to circuit level components	27	0 0 1 3 1 2 0 1 0 0 2 58
0169 38. Limiter Circuits (Diode, Zener Diode, Transistor)			
0170 38a. Theory of operation		B	
F 373	F4-1 Do you trace block diagrams of circuits containing limiters	20	0 0 1 21 1 1 0 1 0 0 4 56
F 374	F4-2 Do you trace schematic diagrams of limiter circuits	20	0 0 2 15 1 1 0 1 0 0 4 58
F 381	F4-9 Do you perform tasks on series diode limiter circuits	14	0 0 2 18 1 1 0 1 0 1 2 49
F 382	F4-10 Do you perform tasks on shunt diode limiter circuits	12	0 0 2 15 1 1 0 1 0 1 2 47
F 383	F4-11 Do you perform tasks on bias limiter circuits	9	0 0 2 9 1 0 0 0 0 0 4 30
F 384	F4-12 Do you perform tasks on zener diode circuits	21	0 0 1 24 1 2 0 0 0 0 4 58
F 385	F4-13 Do you perform tasks on transistor limiter circuits	11	0 0 1 9 1 1 0 0 0 0 2 46
F 386	F4-14 Do you perform tasks on triode limiter circuits	4	0 0 0 9 1 0 0 1 0 0 2 23
0171 38b. Isolate faulty limiters		2b	
F 377	F4-5 Do you troubleshoot to isolate a faulty limiter circuit	16	2 0 1 15 1 1 0 1 0 0 4 52

D
 T Task
 Y Nbr
 Task Title
 306 361 361 362 362 362 362 542 542 542 542 545 545 545 918
 53 50 51 51 51 53 54 50 51 52 50 52 73 50

0172 38c. Troubleshoot circuits 2b

F 378 F4-6 Do you troubleshoot limiters to circuit level components 14 0 0 1 12 1 1 0 1 0 0 4 48

0173 39. Clamper Circuits

0174 39a. Theory of operation B

F 375 F4-3 Do you trace block diagrams of circuits containing clammers 15 0 0 0 12 1 1 0 1 0 0 2 48
 F 376 F4-4 Do you trace schematic diagrams of clamper circuits 14 0 0 0 12 1 1 0 1 0 0 2 48
 F 387 F4-15 Do you perform tasks on diode clamper circuits 11 0 0 1 12 1 1 0 1 0 0 4 41
 F 388 F4-16 Do you perform tasks on bias clamper circuits 5 0 0 1 9 1 0 0 1 0 0 2 25

0175 39b. Isolate faulty clammers 2b

F 379 F4-7 Do you troubleshoot to isolate a faulty clamper circuit 14 0 0 1 12 1 1 0 1 0 0 2 45

0176 39c. Troubleshoot circuits 2b

F 380 F4-8 Do you troubleshoot clammers to circuit level components 12 0 0 0 12 1 1 0 1 0 0 2 44

0177 40. Digital Numbering Systems (Binary, Octal, Hexadecimal)

0178 40a. Conversions B

G 389 G1-1 Do you convert decimal numbers to binary numbers or binary numbers to decimal 42 0 5 23 6 2 3 1 2 1 1 29 39
 G 390 G1-2 Do you convert octal numbers to binary or binary numbers to octal 29 0 1 13 0 1 3 1 2 0 0 16 33

D	T Task	Task Title	306	361	361	362	362	362	542	542	542	545	545	545	918
Y Nbr			53	50	51	51	53	54	50	51	52	50	52	73	50
G 391	G1-3	Do you convert hexadecimal numbers to binary or binary numbers to hexadecimal	30	0	1	17	3	1	3	1	2	0	1	20	30
G 392	G1-4	Do you convert octal numbers to decimal or decimal numbers to octal	27	0	0	13	0	1	2	0	1	0	0	14	33
G 393	G1-5	Do you convert hexadecimal numbers to decimal or decimal numbers to hexadecimal	29	0	0	16	9	1	3	0	1	0	1	22	29
G 394	G1-6	Do you convert octal numbers to hexadecimal or hexadecimal numbers to octal	24	0	0	11	0	1	2	0	1	0	0	12	27
G 395	G1-7	Do you convert base number fractions to another base numbering system	21	0	1	9	0	1	1	1	2	0	1	10	26

0179 40b. Math operations B

G 396	G1-8	Do you add binary numbers	40	0	4	19	3	3	2	1	2	1	1	27	39
G 397	G1-9	Do you subtract binary numbers	35	0	4	17	0	3	2	1	2	1	1	24	39
G 398	G1-10	Do you multiply binary numbers	24	0	3	12	0	3	2	1	2	1	0	10	31
G 399	G1-11	Do you divide binary numbers	24	0	2	10	0	3	2	1	2	1	0	10	30
G 400	G1-12	Do you add octal numbers	24	0	1	9	0	1	2	1	2	0	0	14	32
G 401	G1-13	Do you subtract octal numbers	23	0	1	9	0	1	2	1	2	0	0	14	31
G 402	G1-14	Do you add hexadecimal numbers	23	0	0	9	0	1	2	0	2	0	0	16	27
G 403	G1-15	Do you subtract hexadecimal numbers	23	0	0	9	0	1	2	0	2	0	0	16	27

0180 40c. Binary Code Systems B

G 404	G1-16	Do you use binary coded decimal (BCD)	30	0	4	12	6	1	3	1	1	0	1	24	33
G 405	G1-17	Do you use gray codes	3	0	0	2	0	1	0	0	0	0	0	4	12
G 406	G1-18	Do you use ICAO codes	3	0	0	1	0	1	0	0	0	0	0	4	6
G 407	G1-19	Do you use excess-3 (XS3) codes	3	0	0	2	0	0	0	0	0	0	0	4	7
G 408	G1-20	Do you use parity bit codes	35	0	0	9	3	1	1	0	0	0	0	4	8
G 409	G1-21	Do you use binary codes	4	0	1	1	0	0	0	0	0	0	0	4	5
G 410	G1-22	Do you use ASCII codes	62	0	0	6	6	1	2	1	0	0	0	12	12
G 411	G1-23	Do you use EBCDI codes	6	0	0	3	0	0	0	0	0	0	0	4	8

0181 41. Digital Logic Functions (Main Logic Gates and Flip-Flops)

0182 41a. Theory of operation B

G 412	G1-24	Do you trace data flow through logic symbol diagrams	59	0	0	6	15	2	2	1	2	0	0	18	70
G 413	G1-25	Do you trace data flow through logic schematic diagrams	60	0	0	6	12	2	2	1	3	0	0	16	71

D	T	Task Title	304	361	362	362	362	362	542	542	542	545	545	545	918
Y	Nbr		53	50	51	51	53	54	50	51	52	50	52	73	50
G 417		G1-29 Do you trace data flow through circuits using positive logic (High = Binary 1)	52	0	0	4	12	1	3	0	2	0	0	16	69
G 418		G1-30 Do you trace data flow through circuits using negative logic (High = Binary 0)	44	1	0	4	12	1	2	0	1	0	0	12	51
G 419		G1-31 Do you perform tasks related to AND gates	59	0	0	10	32	2	4	1	4	0	0	24	80
G 420		G1-32 Do you perform tasks related to OR gates	59	0	0	10	32	2	4	1	4	0	0	24	80
G 421		G1-33 Do you perform tasks related to inhibited gates	46	0	0	9	3	1	2	1	1	0	0	10	64
G 422		logic functions													
G 423		G1-34 Do you perform tasks related to NAND or NOR gates	58	0	0	10	29	2	4	1	4	0	0	24	80
G 423		G1-35 Do you perform tasks related to exclusive OR/NOR logic functions	54	0	0	10	12	1	4	1	4	0	0	18	70
G 424		G1-36 Do you perform tasks related to RS flip flops	32	0	0	5	12	1	3	0	3	0	0	10	52
G 425		G1-37 Do you perform tasks related to D(Data) flip flops	33	0	0	5	9	1	3	0	2	0	0	10	46
G 426		G1-38 Do you perform tasks related to T(Toggle) flip flops	36	0	0	4	9	1	3	0	2	0	0	10	48
G 427		G1-39 Do you perform tasks related to JK flip flops	46	0	0	5	6	2	3	0	3	0	0	10	58
G 428		G1-40 Do you perform tasks related to Schmidt triggers	50	0	0	2	12	1	2	0	1	0	0	10	48
G 429		G1-41 Do you perform tasks related to delay (One-shot) logic functions	35	0	0	4	3	1	2	0	1	0	0	10	45
G 430		G1-42 Do you perform tasks related to open collector gates (wired "AND" or wired "OR")	28	0	0	3	0	1	2	0	1	0	0	4	33
G 431		G1-43 Do you perform tasks related to buffers	41	0	0	8	6	1	3	0	2	0	0	14	63
G 432		G1-44 Do you perform tasks related to inverters	49	0	1	5	18	1	3	0	3	0	0	18	72
G 433		G1-45 Do you perform tasks related to complemented flip flops	28	0	0	3	3	1	1	0	0	0	0	6	40
G 434		G1-46 Do you perform tasks related to complementing flip flops	29	0	0	3	3	1	1	0	0	0	0	6	40

0183 41b. Isolate faulty logic function circuits 2b

G 414		G1-26 Do you troubleshoot digital systems to major units	58	0	0	13	9	2	1	0	2	0	0	12	64
G 415		G1-27 Do you troubleshoot digital systems subassemblies or circuit cards	58	0	0	15	15	2	3	0	2	0	0	12	68

0184 41c. Troubleshoot circuits 2b

G 416		G1-28 Do you troubleshoot digital systems, subsystems or circuit cards to circuit level components or IC	50	1	0	5	9	1	2	0	2	0	0	12	67
-------	--	--	----	---	---	---	---	---	---	---	---	---	---	----	----

0185 41d. Logic families (TTL and CMOS) B

G 438		G1-50 Do you perform tasks on RTL (resistor transistor logic formally DCTL)	24	0	0	2	0	1	2	0	1	0	0	8	40
G 439		G1-51 Do you perform tasks on DTL (diode transistor logic)	28	0	0	1	0	1	2	0	1	0	0	6	41

D
 T Tsk
 Y Nbr Task Title
 306 361 361 362 362 362 362 542 542 542 542 545 545 545 918
 53 50 51 51 53 54 50 51 52 50 52 73 50

0192 43b. Load programs 2b

G 448 G2-2 Do you load programs 27 0 10 28 21 8 2 1 2 0 1 16 17

0193 43c. Write/debug programs 2b

G 449 G2-3 Do you write or debug programs 6 0 4 11 6 5 1 1 1 0 1 4 7
 G 453 G2-7 Do you use computer flow charts or diagrams 35 0 4 17 12 3 2 1 1 0 1 12 16

0194 43d. Fault isolation 2b

G 450 G2-4 Do you troubleshoot computers to a major unit 42 0 2 26 21 6 1 0 1 0 1 6 19
 G 451 G2-5 Do you troubleshoot computers to a subassembly or circuit card 43 0 1 26 3 3 0 1 0 1 10 16

0195 43e. Circuit troubleshooting 2b

G 452 G2-6 Do you troubleshoot computer subassembly or circuit card to circuit level components or IC 30 0 1 6 6 2 3 0 1 0 1 8 18

0196 43f. Types of memories B

G 466 G2-20 Do you perform tasks on magnetic (tape, disc, core) computer memories 54 0 7 39 18 7 2 0 2 0 1 14 17
 G 467 G2-21 Do you perform tasks on semiconductor (RAM, ROM, EPROM, PROM) computer memories 45 0 3 22 9 6 3 0 1 0 2 12 20
 G 468 G2-22 Do you perform tasks on paper (tape, punch card) computer memories 44 0 1 8 0 2 1 0 1 0 0 4 15
 G 469 G2-23 Do you perform tasks on advanced technology (bubble, CCD, electron beam, laser, thin film) computer memories 15 0 0 0 0 1 1 0 1 0 0 2 5

0197 43g. Peripheral devices B

G 470 G2-24 Do you perform tasks on computer keyboards 65 0 14 37 32 8 3 0 2 1 3 24 26
 G 471 G2-25 Do you perform tasks on computer character printers 62 1 7 28 18 6 1 0 1 0 1 16 24
 G 472 G2-26 Do you perform tasks on magnetic tape drives 57 0 3 37 0 3 1 0 1 0 1 10 11

D	Tsk	Task Title	306	361	362	362	362	542	542	542	545	545	545	918
Y	Nbr		53	50	51	51	53	54	50	51	52	50	52	73
G 473		G2-27 Do you perform tasks on microprocessor computer terminals	38	0	4	13	0	4	1	0	1	0	1	8
G 474		G2-28 Do you perform tasks on video display unit (VDU/monitors)	58	0	5	28	6	6	1	0	2	0	1	12
G 475		G2-29 Do you perform tasks on paper tape readers/punches	53	0	2	3	0	2	0	0	1	0	1	4
G 476		G2-30 Do you perform tasks on paper card readers/punches	40	0	1	1	0	1	0	0	1	0	1	2
G 477		G2-31 Do you perform tasks on toggle or push button switch inputs	34	0	4	10	0	3	2	0	1	0	1	8
G 478		G2-32 Do you perform tasks on incandescent displays (Nixie tubes, LEDs, LCDs)	38	0	1	10	3	3	2	0	1	0	1	8
G 479		G2-33 Do you perform tasks on modems	42	1	11	26	24	11	2	0	1	0	1	12
G 480		G2-34 Do you perform tasks on line printers	51	0	10	22	15	7	1	1	2	0	2	12
G 481		G2-35 Do you perform tasks on floppy disc drives	35	0	12	19	26	6	1	0	2	0	1	12
G 482		G2-36 Do you perform tasks on removable cartridge disc drives	14	0	2	3	3	3	0	1	0	1	0	4
G 483		G2-37 Do you perform tasks on removable pack disc drives	25	0	1	1	0	2	0	0	1	0	1	6
G 484		G2-38 Do you perform tasks on fixed Winchester type disc drives	6	0	2	17	9	5	1	0	1	0	1	4

0198 43h. Programming languages

G 456		G2-10 Do you use Basic computer language	16	0	5	14	3	5	2	1	2	1	2	12
G 457		G2-11 Do you use COBOL computer language	3	0	1	1	0	2	1	1	1	0	1	6
G 458		G2-12 Do you use FORTRAN computer language	3	0	1	1	3	1	1	1	1	0	1	6
G 459		G2-13 Do you use ADA computer language	0	0	0	0	0	1	1	0	1	0	1	2
G 460		G2-14 Do you use ATLAS computer language	1	0	0	0	0	1	1	0	1	0	1	2
G 461		G2-15 Do you use ELAN computer language	0	0	0	0	0	1	1	0	1	0	1	2
G 462		G2-16 Do you use PASCAL computer language	1	0	1	2	0	1	1	1	1	0	1	4
G 463		G2-17 Do you use RPG computer language	0	0	1	0	0	1	1	1	1	0	1	2
G 464		G2-18 Do you use Machine computer language	6	0	1	5	0	2	2	0	1	1	1	4
G 465		G2-19 Do you use C computer language	1	0	0	0	0	1	1	0	1	0	1	2

0199 44. Microprocessor Controlled Systems

0200 44a. Theory of operation

G 485		G2-39 Do you trace block or schematic diagrams of microprocessor controlled systems	36	0	0	5	12	2	1	0	1	0	1	14
-------	--	---	----	---	---	---	----	---	---	---	---	---	---	----

D
 T Task
 Y Nbr
 G 502 G3-15 Do you perform tasks on storage registers in logic circuits

306 361 361 362 362 362 542 542 542 545 545 545 918
 53 50 51 51 53 54 50 51 52 50 52 73 50
 32 0 1 2 3 2 1 0 1 0 0 8 23

0206 45a(3). Combinational Logic Circuits B
 (Half-adder, Full-adder, encoder,
 Decoder, Multiplexer, Demultiplexer,
 Count Detect)

G 503 G3-16 Do you trace data flow through combinational logic circuits
 G 506 G3-19 Do you perform tasks on encoders
 G 507 G3-20 Do you perform tasks on decoders
 G 508 G3-21 Do you perform tasks on multiplexers
 G 509 G3-22 Do you perform tasks on demultiplexers
 G 510 G3-23 Do you perform tasks on comparators
 G 511 G3-24 Do you perform tasks on parity generators or checkers
 G 512 G3-25 Do you perform tasks on code converters
 G 513 G3-26 Do you perform tasks on adders
 G 514 G3-27 Do you perform tasks on subtractors
 G 515 G3-28 Do you perform tasks on count detect circuits

24 0 0 5 0 2 2 0 2 0 0 8 30
 23 0 1 5 0 2 2 0 2 0 0 4 27
 23 0 1 5 0 2 2 0 2 0 0 4 28
 18 0 1 9 0 1 2 0 2 0 0 12 30
 14 0 1 5 0 1 1 0 1 0 0 4 24
 16 0 1 2 0 1 2 0 2 0 0 6 33
 18 0 1 3 0 1 1 0 1 0 0 2 13
 18 0 1 2 0 1 1 0 2 0 0 2 18
 16 0 1 2 0 1 1 0 2 0 0 6 26
 13 0 1 2 0 1 1 0 1 0 0 6 20
 12 0 0 1 3 1 1 0 1 0 0 2 15

0207 45b. Isolate faulty circuits 2b

G 489 G3-2 Do you troubleshoot counter circuits to isolate a faulty counter
 G 499 G3-12 Do you troubleshoot circuits containing registers to isolate a faulty register
 G 504 G3-17 Do you troubleshoot to isolate a faulty combinational logic circuit

35 1 2 3 6 1 3 0 0 1 1 6 42
 27 0 0 2 0 1 1 0 1 0 1 4 22
 23 0 1 3 0 2 2 0 2 0 0 8 30

0208 45c. Troubleshoot circuits

G 490 G3-3 Do you troubleshoot counters to circuit level components
 G 500 G3-13 Do you troubleshoot registers to circuit level components
 G 505 G3-18 Do you troubleshoot combinational logic circuits to circuit level components

30 0 1 0 6 1 2 0 0 1 1 6 39
 25 0 0 1 0 1 1 0 0 0 0 4 22
 19 0 1 2 0 2 2 0 2 0 0 6 27

D
 T Task
 Y Nbr
 Task Title
 306 361 361 362 362 362 542 542 542 545 545 545 918
 53 50 51 51 53 54 50 51 52 50 52 73 50

0209 46. D/A, A/D Converters (Approx D/A and Ramp A/D)

0210 46a. Theory of operation B

G 516 G4-1 Do you trace data flow through A/D converters 22 0 1 6 0 2 2 0 2 0 1 8 45
 G 517 G4-2 Do you trace data flow through D/A converters 21 0 1 6 0 2 1 0 2 0 0 6 42
 G 520 G4-5 Do the converters you perform tasks on use flash conversion 1 0 1 1 0 0 1 0 0 0 0 0 7
 G 521 G4-6 Do the converters you perform tasks on use successive approximation conversion 3 0 0 2 0 1 1 0 0 0 0 0 11
 G 522 G4-7 Do the converters you perform tasks on use ramp conversion 7 0 0 1 0 1 1 0 0 0 0 4 14
 G 523 G4-8 Do the converters you perform tasks on use R2R conversion 1 0 0 0 0 0 0 0 0 0 0 2 6

0211 46b. Isolate faulty converters 2b

G 518 G4-3 Do you troubleshoot A/D converter circuits 19 0 1 12 0 1 2 0 2 0 1 8 45
 G 519 G4-4 Do you troubleshoot D/A converter circuits 19 0 1 12 0 1 1 0 2 0 0 6 42

0212 47. Transmission Lines

0213 47a. Theory of operation B

H 527 H1-4 Do you construct transmission lines 5 65 17 10 6 15 4 17 1 0 0 12 2
 H 528 H1-5 Do you match transmission line impedance with loads 6 52 18 9 9 6 2 5 1 0 0 12 2
 H 531 H1-8 Do you perform tasks on open-wire transmission lines 7 65 20 21 9 24 3 18 1 0 0 22 1
 H 532 H1-9 Do you perform tasks on twisted pair transmission lines 15 31 64 42 15 44 5 4 0 0 0 39 4
 H 533 H1-10 Do you perform tasks on twin lead transmission lines 8 25 7 9 6 13 2 4 0 0 0 8 3
 H 534 H1-11 Do you perform tasks on flexible coaxial transmission lines 11 83 34 9 3 9 5 2 1 0 0 31 5
 H 535 H1-12 Do you perform tasks on rigid coaxial transmission lines 5 76 20 3 3 5 1 2 0 0 0 8 2
 H 536 H1-13 Do you perform tasks on fiber-optic transmission lines 4 24 35 5 3 4 1 0 0 0 0 6 2

D
 T Task
 Y Nbr

306 361 361 362 362 362 542 542 542 542 545 545 545 918
 53 50 51 51 51 53 54 50 51 52 50 52 73 50

Task Title

0214 47b. Perform Measurements 2b

H 524 H1-1 Do you measure electrical length on transmission lines 5 35 35 7 9 6 3 5 1 0 0 16 2
 H 525 H1-2 Do you measure physical length on transmission lines 6 50 43 6 6 14 3 10 1 0 0 20 5
 H 526 H1-3 Do you measure standing wave ratio (SWR) on trans-
 mission lines 2 65 5 1 3 2 2 1 1 0 0 6 0

0215 47c. Calculations

H 529 H1-6 Do you calculate the characteristic impedance (Z0)
 of transmission lines 3 30 11 3 3 4 1 2 1 0 0 4 1

0216 47d. Isolate faulty transmission lines

H 530 H1-7 Do you troubleshoot transmission lines 14 64 45 38 15 37 6 20 1 0 0 27 3

0217 48. Waveguides

0218 48a. Theory of operation B

H 537 H1-14 Do you trace schematic or block diagrams of circuits
 containing waveguides 1 31 1 1 0 2 0 1 1 0 0 0 2
 H 539 H1-16 Do you pressurize or purge waveguide assemblies 0 67 2 1 0 1 0 1 1 0 0 0 2
 H 540 H1-17 Do you measure standing wave ratio for waveguide
 assemblies 0 50 1 1 0 1 0 1 1 0 0 0 1
 H 541 H1-18 Do you remove or install waveguide or associated
 coupling hardware components 1 67 1 1 0 1 0 1 1 0 0 0 1

0219 48b. Isolate faulty waveguides 2b

H 538 H1-15 Do you troubleshoot circuits to isolate a faulty
 waveguide assembly 1 39 1 1 0 1 0 1 1 0 0 0 1

D
 T Task 306 361 361 362 362 362 542 542 542 542 545 545 545 918
 Y Nbr 53 50 51 51 53 54 50 51 52 50 52 73 50

Task Title

0234 51b. Isolate faulty transmitters

H 565	H4-5 Do you troubleshoot AM transmitters to major units	1	0	0	1	0	1	0	0	1	0	0	1	0	0	2	2
H 566	H4-6 Do you troubleshoot AM transmitters to subassemblies or circuit cards	1	0	0	1	0	1	0	0	1	0	0	1	0	0	2	2
H 581	H4-21 Do you troubleshoot SSB transmitters to major units	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0
H 582	H4-22 Do you troubleshoot SSB transmitters to subassemblies or circuit cards	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0
H 597	H4-37 Do you troubleshoot FM transmitters to major units	2	2	0	1	0	1	2	0	1	0	1	0	1	0	1	12
H 598	H4-38 Do you troubleshoot FM transmitters to subassemblies or circuit cards	2	0	0	1	0	1	1	0	1	0	1	0	1	0	1	12
H 616	H4-56 Do you troubleshoot PM transmitters to major units	1	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0
H 617	H4-57 Do you troubleshoot PM transmitters to subassemblies or circuit cards	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	0

0235 51c. Troubleshoot circuits

H 567	H4-7 Do you troubleshoot AM transmitter subassemblies or circuit cards to circuit level components	1	0	0	1	0	1	0	0	1	0	0	1	0	0	2	2
H 583	H4-23 Do you troubleshoot SSB transmitter subassemblies or circuit cards to circuit level components	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0
H 599	H4-39 Do you troubleshoot FM transmitter subassemblies or circuit cards to circuit level components	1	0	0	1	0	1	1	0	1	0	1	0	1	0	1	12
H 618	H4-58 Do you troubleshoot PM transmitter subassemblies or circuit cards to circuit level components	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0

0236 52. Receivers

0237 52a. Theory of operation

0238 52a(1). Amplitude Modulation

H 570	H4-10 Do you use "AM" demodulation principles	1	0	0	1	0	1	0	0	0	0	0	0	0	0	2	1
H 571	H4-11 Do you trace block diagrams of AM receivers	1	0	0	1	0	1	0	0	0	0	0	0	0	0	2	2
H 572	H4-12 Do you trace block diagrams of AM receiver subassemblies or circuit cards	1	0	0	1	0	1	0	0	0	0	0	0	0	0	2	2

D	Tsk	Y Nbr	Task Title	306	361	361	362	362	362	542	542	542	545	545	545	918	
				53	50	51	51	53	54	50	51	52	50	52	73	50	
M	573		H4-13 Do you trace schematic diagrams of AM receiver subassemblies or circuit cards	1	0	0	1	0	1	0	0	0	0	0	0	2	2
M	577		H4-17 Do you align or adjust AM receivers or circuits	0	1	0	1	0	1	0	0	0	0	0	0	2	2

0239 52a(2). Frequency Modulation

M	603		H4-43 Do you use "FM" demodulation principles	2	0	0	1	0	1	1	0	1	0	1	8	1
M	604		H4-44 Do you trace block diagrams of FM receivers	2	0	0	1	0	1	2	0	1	0	1	8	1
M	605		H4-45 Do you trace block diagrams of FM receiver subassemblies or circuit cards	2	0	0	1	0	1	2	0	1	0	1	8	1
M	606		H4-46 Do you trace schematic diagrams of FM receiver subassemblies or circuit cards	2	0	0	1	0	1	1	0	1	0	1	8	0
M	610		H4-50 Do you align or adjust FM receivers or circuits	1	2	0	1	0	1	1	0	1	0	1	10	0
M	611		H4-51 Do you plot receiver signal level curves (RSL) for FM receivers	1	0	0	1	0	1	1	0	1	0	0	6	0

0240 52a(3). Single Side Band

M	586		H4-26 Do you trace block diagrams of SSB receivers	0	0	0	1	0	0	0	0	0	0	0	0	0
M	587		H4-27 Do you trace block diagrams of SSB receiver subassemblies or circuit cards	0	0	0	1	0	0	0	0	0	0	0	0	0
M	588		H4-28 Do you trace schematic diagrams of SSB receiver subassemblies or circuit cards	0	0	0	1	0	0	0	0	0	0	0	0	1
M	592		H4-32 Do you align or adjust SSB receivers or circuits	0	0	0	1	0	0	0	0	0	0	0	0	0

0241 52a(4). Pulse Modulation

M	622		H4-62 Do you use "PM" demodulation principles	1	2	1	3	0	1	0	1	1	0	0	0	1
M	623		H4-63 Do you trace block diagrams of PM receivers	1	0	0	2	0	1	0	0	1	0	0	0	1
M	624		H4-64 Do you trace block diagrams of PM receiver subassemblies or circuit cards	1	0	0	1	0	1	0	0	1	0	0	0	1
M	625		H4-65 Do you trace schematic diagrams of PM receiver subassemblies or circuit cards	1	0	0	1	0	1	0	0	1	0	0	0	1
M	629		H4-69 Do you align or adjust PM receivers or circuits	0	0	0	1	0	1	0	0	1	0	0	0	1

0242 52b. Isolate faulty receivers

M	574		H4-14 Do you troubleshoot AM receivers to major units	1	0	0	1	0	1	0	0	0	0	0	0	2
M	575		H4-15 Do you troubleshoot AM receivers to subassemblies or circuit cards	0	0	0	1	0	1	0	0	0	0	0	0	2
M	589		H4-29 Do you troubleshoot SSB receivers to major units	0	0	0	1	0	0	0	0	0	0	0	0	0

D	T	Y	Nbr	Task Title	306	361	362	362	362	362	542	542	542	542	545	545	545	918
					53	50	51	51	53	54	50	51	52	50	52	73	50	
H	590			H4-30 Do you troubleshoot SSB receivers to sub-assemblies or circuit cards	0	0	0	1	0	0	0	0	0	0	0	0	0	1
H	607			H4-47 Do you troubleshoot FM receivers to major units	2	0	0	1	0	1	2	0	1	0	1	8	1	
H	608			H4-48 Do you troubleshoot FM receivers to subassemblies or circuit cards	1	0	0	1	0	1	1	0	1	0	1	10	0	
H	626			H4-66 Do you troubleshoot PM receivers to major units	1	0	0	1	0	1	0	0	1	0	0	0	0	1
H	627			H4-67 Do you troubleshoot PM receivers to subassemblies or circuit cards	0	0	0	2	0	1	0	0	1	0	0	0	1	

0243 52c. Troubleshoot circuits

H	576			H4-16 Do you troubleshoot AM receiver subassemblies or circuit cards to circuit level components	0	0	0	1	0	1	0	0	0	0	0	2	2
H	591			H4-31 Do you troubleshoot SSB receiver subassemblies or circuit cards to circuit level components	0	0	0	1	0	0	0	0	0	0	0	0	0
H	609			H4-49 Do you troubleshoot FM receiver subassemblies or circuit cards to circuit level components	1	0	0	1	0	1	1	0	1	0	1	8	1
H	628			H4-68 Do you troubleshoot PM receiver subassemblies or circuit cards to circuit level components	0	0	0	1	0	1	0	0	1	0	0	0	1

0244 53. Transmission Power

0245 53a. Perform measurements B

I	660			I1-1 Do you measure RF power	1	38	1	2	0	1	2	1	1	0	1	2	24
I	661			I1-2 Do you measure RF peak power	1	24	1	1	0	1	1	0	0	0	1	2	17
I	662			I1-3 Do you measure RF average power	1	17	1	1	0	1	1	0	0	0	1	2	18
I	663			I1-4 Do you measure RF effective power	0	17	1	1	0	1	2	1	0	0	1	2	17
I	664			I1-5 Do you measure RF output power using wattmeters	1	52	1	1	0	1	2	1	1	0	1	6	25

0246 53b. Calculations B

I	665			I2-1 Do you calculate RF apparent power	0	6	1	0	0	1	1	0	1	0	1	4	5
I	666			I2-2 Do you calculate RF true power	0	7	1	1	0	1	1	0	1	0	1	2	6
I	667			I2-3 Do you calculate RF power loss or gain in db	1	18	1	2	0	2	2	0	1	0	1	2	6

D
Y Task
Y Nbr

Task Title

306 361 361 362 362 362 362 542 542 542 542 545 545 545 918
53 50 51 51 53 54 50 51 52 50 52 73 50

0250 54c. Isolate faulty antennas

H 632 H5-3 Do you troubleshoot loading of antennas
H 633 H5-4 Do you troubleshoot coupling of antennas
H 635 H5-6 Do you troubleshoot antenna components

0 57 1 0 0 1 1 0 1 0 1 0 1 2 1
0 65 1 0 0 1 1 1 1 0 1 0 1 2 2
1 73 1 1 0 1 2 0 1 0 1 0 1 4 1

0251 55. Microphones

0252 55a. Theory of operation

J 668 J1-1 Do you trace block diagrams of circuits
containing microphones
J 669 J1-2 Do you trace schematic diagrams of microphone circuits
J 672 J1-5 Do you work on carbon microphones
J 673 J1-6 Do you work on capacitor microphones
J 674 J1-7 Do you work on crystal microphones
J 675 J1-8 Do you work on dynamic microphones
J 676 J1-9 Do you work on velocity ribbon microphones

3 0 0 3 44 16 2 0 0 0 0 1 10 26
3 0 0 3 44 13 2 0 0 0 0 1 10 27
2 0 1 4 38 15 1 0 0 0 0 1 6 8
1 0 1 1 9 2 1 0 0 0 0 0 8 6
0 0 1 1 3 1 1 0 0 0 0 1 6 13
1 0 1 1 26 3 2 0 0 0 0 0 4 6
0 0 0 0 3 1 0 0 0 0 0 0 2 1

0253 55b. Isolate faulty microphones

J 670 J1-3 Do you troubleshoot to isolate a faulty microphone

3 0 0 3 47 16 2 0 0 0 0 1 12 26

0254 55c. Troubleshoot circuits

J 671 J1-4 Do you troubleshoot microphones

2 0 0 2 29 7 2 0 0 0 0 1 10 22

0255 56. Speakers

0256 56a. Theory of operation

J 677 J1-10 Do you trace block diagrams of circuits
containing speakers

5 1 0 8 50 26 2 0 0 0 0 1 10 43

D
T Task
Y Nbr

Task Title

306 361 361 362 362 362 542 542 542 545 545 545 918
53 50 51 51 51 53 54 50 51 52 50 52 73 50

0263 58a. Theory of operation

J 690 J3-1 Do you trace block diagrams of circuits containing display tubes 3 0 0 0 0 0 0 0 0 0 0 0 0 7
J 691 J3-2 Do you trace schematic diagrams of display tubes or circuits 3 0 0 0 0 0 0 0 0 0 0 0 0 5
J 693 J3-4 Do you adjust or calibrate display tubes or circuits 2 0 0 0 0 0 0 0 0 0 0 0 0 6
J 694 J3-5 Do you work on direct view storage tubes (DVST) 0 0 0 0 0 0 0 0 0 0 0 0 0 4
J 695 J3-6 Do you work on multiple mode storage tubes (MMST) 0 0 0 0 0 0 0 0 0 0 0 0 0 3
J 696 J3-7 Do you work on scan converter tubes (SCT) 0 0 0 0 0 0 0 0 0 0 0 0 0 2

0264 58b. Isolate faulty display tubes

J 692 J3-3 Do you troubleshoot to isolate a faulty display tube 3 0 0 0 0 0 0 0 0 0 0 0 0 7

0265 59. Support Subjects

0266 59a. Safety applicable to electronics B

0267 59b. First aid for electrical shock B

0268 59c. Electrostatic Discharge (ESD) Control B

0269 Tasks not referenced

B 175 B3-4 Do you use audio sine-wave signal generators 15 0 4 16 79 6 2 7 0 0 0 0 14 30
B 176 B3-5 Do you use audio non-sinusoidal signal generators 7 0 1 1 9 2 1 1 0 0 0 0 6 22
B 177 B3-6 Do you use RF less than 1,000MH signal generators 6 10 1 5 15 3 1 1 0 0 0 1 8 21
B 178 B3-7 Do you use RF greater than 1,000MH signal generators 4 6 1 3 6 3 1 0 0 0 0 1 8 11
B 179 B3-8 Do you use white noise signal generators 4 0 2 2 6 0 0 0 0 0 0 0 6 18
B 180 B3-9 Do you use pattern signal generators 34 0 1 1 3 1 0 0 0 0 0 0 10 25

D	T	Y	Nbr	Task Title	306	361	362	362	362	362	542	542	542	545	545	545	918
					53	50	51	51	53	54	50	51	52	50	52	73	50
B 181				B3-10 Do you use pseudo-random signal generators	10	0	1	1	3	0	0	0	0	0	0	4	8
B 182				B3-11 Do you use time mark signal generators	16	1	1	2	3	1	0	1	0	0	0	10	48
B 183				B3-12 Do you use multi-function (square/sine/triangular) signal generators	14	2	1	2	3	2	1	1	1	0	0	16	69
B 184				B3-13 Do you use TV signal signal generators	4	2	1	0	3	0	0	1	0	0	0	6	17
D 284				D1-10 Do you perform tasks on voltage multipliers (doublers/triplers)	37	1	1	2	21	6	12	6	10	4	2	12	64
D 285				D1-11 Do you perform tasks on DC to DC converters	41	2	1	19	29	9	15	2	10	2	1	16	50
D 286				D1-12 Do you perform tasks on inverters (DC to AC converters)	36	4	1	24	32	13	19	8	15	4	5	20	58
D 287				D1-13 Do you perform tasks on switching power supplies	12	0	1	6	6	6	9	9	5	0	1	4	59
J 697				J4-1 Do you trace block diagrams of TV systems or subassemblies	1	0	0	0	0	1	0	0	0	0	0	4	24
J 698				J4-2 Do you trace schematic diagrams of TV systems or component circuits	2	0	0	0	0	1	0	0	0	0	0	4	23
J 699				J4-3 Do you troubleshoot TV systems to major subassemblies	2	0	0	0	0	1	0	0	0	0	0	4	24
J 700				J4-4 Do you troubleshoot TV systems to circuit level components	1	0	0	0	0	1	0	0	0	0	0	4	23
J 701				J4-5 Do you adjust or calibrate TV systems or components	2	0	0	0	0	1	0	0	0	0	0	4	22
J 702				J4-6 Do you trace block diagrams of laser systems or subassemblies	14	0	0	0	0	0	0	0	0	0	0	0	13
J 703				J4-7 Do you trace schematic diagrams of laser systems or component circuits	11	0	0	0	0	0	0	0	0	0	0	0	12
J 704				J4-8 Do you troubleshoot laser systems to major subassemblies	14	0	0	0	0	0	0	0	0	0	0	0	11
J 705				J4-9 Do you troubleshoot laser systems to circuit level components	9	0	0	0	0	0	0	0	0	0	0	0	9
J 706				J4-10 Do you adjust or calibrate laser systems or components	11	0	0	0	0	0	0	0	0	0	0	0	9
J 707				J4-11 Do you trace block diagrams of infrared systems or subassemblies	3	0	0	0	0	0	1	0	0	0	1	6	9
J 708				J4-12 Do you trace schematic diagrams of infrared systems or component circuits	2	0	0	0	0	0	1	0	0	0	2	8	8
J 709				J4-13 Do you troubleshoot infrared systems to major subassemblies	3	0	0	0	0	0	1	0	0	0	1	8	8
J 710				J4-14 Do you troubleshoot infrared systems circuit level components	2	0	0	0	0	0	1	1	0	0	2	8	8
J 711				J4-15 Do you inspect, clean, or service infrared systems or components	3	0	0	0	0	0	2	1	0	0	2	8	8
J 712				J4-16 Do you adjust or calibrate infrared systems or components	3	0	0	0	0	0	2	0	0	0	1	8	8

Report Option Table for Modules

Option	Status
Primary Sort	Inventory Sequence
Secondary Sort	Not Used
Print Suppress	Not Used

Report Option Table for Tasks

Option	Status
Primary Sort	Inventory Sequence
Secondary Sort	Not Used
Print Suppress	Not Used

Description of Reported Module Factors

Col	Factor	Source	vector	Title	Number Members	Mean	S.D.	Max	Min	Valid
1	TITLE			Module Statement						

Description of Reported Task Factors

Col	Factor	Source	vector	Title	Number Members	Mean	S.D.	Max	Min	Valid
1	TITLE			Task Statement						
2	F0026	GP0029/PMP		All DAFSC 30653	237	22.69	24.98	98.73	.00	712
3	F0029	GP0032/PMP		All DAFSC 36251	172	8.08	15.96	95.35	.00	712
4	F0030	GP0033/PMP		All DAFSC 36253	34	16.51	25.87	100.00	.00	712
5	F0031	GP0034/PMP		All DAFSC 36254	180	5.57	13.93	95.00	.00	712
6	F0041	GP0044/PMP		All DAFSC 91850	132	35.97	30.41	99.24	.00	712

Electronic Principles Inventory (EPI) data for Air Force specialties is presented below in Shepard TTC EP POI order. Data for this report was collected from Job Incumbents during the period March 1987 - September 1988

Percent members responding "YES" is shown for each specialty listed.

For assistance in using this EPI printout phone USAFOMC/OMYA, at AUTOVON 487-6811.

D Y Task Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
0001	POI J3AQR30020 003 ELECTRONIC PRINCIPLES, dated 31 Oct 84, SHEPPARD TECHNICAL TRAINING CENTER Volume 1 of 7 Volumes					
0002	IA. DC Circuits					
0003	IA 1. Orientation and Study Skills		2/0			
0004	IA 2. Safety and First Aid		1.5/0			
0005	IA 2a. From a group of ten statements, select the six that describe safety precautions which should be observed when working on electronic equipment. CTS: 1 MEAS: PC					(.5/0)

D T Task Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
0006	IA 2b. From a group of ten statements, select the six which specify the proper first aid measures used in the treatment of victims of severe electrical shock. CTS: 1 MEAS: PC (.5/0)					
0007	IA 2c. From a listing of the different types of fire extinguishers, select the type of fire extinguisher used on electrical fires. CTS: 1 MEAS: PC (.5/0)					
0008	IA 3. Electronic Mathematics 6.5/4					
0009	IA 3a. Given ten numerical values, convert them to scientific notation, correctly solving six of the ten conversions. CTS: 3 MEAS: PC (1.5/0)					
A 1	Al-1 Do you use metric terms (example milli, kilo, mega)	66	55	68	25	95
0010	IA 3b. Given five problems requiring the addition of two numbers expressed in scientific notation, correctly solve three of the five problems. CTS: 3 MEAS: PC (1/0)					
A 1	Al-1 Do you use metric terms (example milli, kilo, mega)	66	55	68	25	95
0011	IA 3c. Given five addition, five subtraction, five multiplication, and five division problems, use basic arithmetic procedures to correctly solve three problems in each group. CTS: 3 MEAS: PC (0/2)					
A 6	Al-6 Do you calculate values of DC voltage, current, resistance, or power	48	34	68	26	79

D
 T Tsk
 Y Nbr

Task Title

306 362 362 362 918
 53 51 53 54 50

0012 IA 3d. Given five problems requiring the subtraction of two numbers expressed in scientific notation, correctly solve three of the five problems.
 CTS: 3 MEAS: PC (1/0)

A 1 A1-1 Do you use metric terms (example milli, kilo, mega)
 A 6 A1-6 Do you calculate values of DC voltage, current, resistance, or power
 66 55 25 95
 48 34 26 79

0013 IA 3e. Given five problems requiring the multiplication of two numbers expressed in scientific notation, correctly solve three of the five problems. CTS: 3 MEAS: PC (1/0)

A 1 A1-1 Do you use metric terms (example milli, kilo, mega)
 A 6 A1-6 Do you calculate values of DC voltage, current, resistance, or power
 66 55 25 95
 48 34 26 79

0014 IA 3f. Given five problems requiring the division of two numbers expressed in scientific notation, correctly solve three of the five problems.
 CTS: 3 MEAS: PC (1/0)

A 1 A1-1 Do you use metric terms (example milli, kilo, mega)
 A 6 A1-6 Do you calculate values of DC voltage, current, resistance, or power
 66 55 25 95
 48 34 26 79

0015 IA 3g. Given ten numbers expressed in scientific notation, convert the power of ten portion to a metric prefix, correctly solving six of the ten conversion. CTS: 3 MEAS: PC (1/0)

A 1 A1-1 Do you use metric terms (example milli, kilo, mega) 66 55 25 95

D T Task Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
0016	IA 3h. Given sufficient data, solve for the unknown value in given formulas (equations). At least two of three problems must be solved correctly for each of the methods listed. CTS: 3 MEAS: PC (0/2)					
A 6	Al-6 Do you calculate values of DC voltage, current, resistance, or power	48	34	68	26	79
0017	IA 4. Basic Circuit Requirements 10/2					
0018	IA 4a. Given a schematic diagram of a DC circuit containing the approved symbols for a switch, fuse, lamp, battery, and conductor; correctly label at least three of the five devices. CTS: 4a MEAS: PC (1/0)					
A 4	Al-4 Do you trace schematic or block diagrams of circuits containing conductors, fuses, lamps, switches, or batteries	95	92	100	95	98
0019	IA 4b. Given ten terms and ten definitions associated with the electron theory, correctly match at least six of the terms with their definitions. CTS: 4a MEAS: PC (2/0)					
A 2	Al-2 Do you use basic DC electrical/electronic terms	97	95	100	92	99
0020	IA 4c. From a list of eight items, select those that represent the correct definition, symbol, and unit measurement for current. At least two of the three responses must be correct. CTS: 4a MEAS: PC (1/0)					
A 2	Al-2 Do you use basic DC electrical/electronic terms	97	95	100	92	99

D
 T Task
 Y Nbr

Task Title

306 362 362 918
 53 51 53 50

0021 IA 4d. From a list of eight items, select those that represent the correct definition, symbol, and unit of measurement for voltage. At least two of the three responses must be correct. CTS: 4a MEAS: PC (1/0)

A 2 A1-2 Do you use basic DC electrical/electronic terms 97 95 100 92 99

0022 IA 4e. Given a list of the five methods of producing an EMF, a list of five symbols, and a list of five examples; correctly match each symbol and example with its method. At least six of the ten responses must be correct. CTS: 4a MEAS: PC (1/0)

A 2 A1-2 Do you use basic DC electrical/electronic terms 97 95 100 92 99

0023 IA 4f. From a list of eight items, select those that represent the correct definition, symbol, and unit of measurement for resistance. At least two of the three responses must be correct. CTS: 4a MEAS: PC (1/0)

A 2 A1-2 Do you use basic DC electrical/electronic terms 97 95 100 92 99

0024 IA 4g. Given a list of the four factors that affect the resistance of a conductor and five incomplete statements, complete each statement by selecting the correct factor. At least three of the five answers must be correct. CTS: 4a MEAS: PC (1/0)

A 2 A1-2 Do you use basic DC electrical/electronic terms 97 95 100 92 99

0025 IA 4h. Given the schematic symbols for a fixed, tapped, and variable resistor, and a list of their names; correctly match the resistor name with its symbol. All matches must be correct. CTS: 4a MEAS: PC (0/.5)

A 9 A1-9 Do you trace schematic or block diagrams of circuits containing resistors 92 69 97 52 97

D Task Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
A 11	Al-11 Do you calibrate or adjust circuits by using variable resistors	85	49	88	21	95

0026 IA 4i. Given a resistor color code guide and the color coding of ten resistors, determine the ohmic value of each resistor. Six of the ten resistor values must be determined correctly. CTS: 4a MEAS: PC (0/1.5)

A 13	Al-13 Do you determine ohmic value of a resistor using the color code	69	43	74	13	93
------	---	----	----	----	----	----

0027 IA 4j. Given ten problems, each containing two known values, use Ohm's Law to correctly solve for the third or unknown value. At least six of the ten responses must be correct. CTS: 4a MEAS: PC (2/0)

A 6	Al-6 Do you calculate values of DC voltage, current, resistance, or power	48	34	68	26	79
-----	---	----	----	----	----	----

0028 IA 5. Multimeter Uses 7.5/2

0029 IA 5a. Given a multimeter and circuit card PC 130-1A, use the ohmmeter function to correctly measure the value of ten selected resistors. At least six of the ten readings must be within prescribed limits. CTS: 2b MEAS: PC (2/0)

A 14	Al-14 Do you ohm check resistors	91	58	91	27	94
B 160	B1-8 Do you use the multimeter to measure component resistance	89	64	91	41	96

D
 T Task
 Y Nbr

Task Title

306 362 362 362 918
 53 51 53 54 50

0030 IA 5b. Given a multimeter, trainer console, and circuit card PC130-2; use the voltmeter function to correctly measure the voltage drop across eight resistors. At least five of the eight readings must be within prescribed limits. CTS: 2b MEAS: PC (3/0)

B 153 B1-1 Do you use the multimeter to measure DC voltage values 99 91 97 83 98

0031 IA 5c. Given a multimeter, trainer console, and circuit card PC 130-4; use the ammeter function to correctly perform ten different current measurements. At least six of the ten readings must be within prescribed limits. CTS: 2b MEAS: PC (1.5/0)

B 156 B1-4 Do you use the multimeter to measure DC current values 85 67 76 52 93

0032 IA 5d. Given a list of eight terms and a list of eight statements that apply to digital multimeters, correctly match at least five of the terms with the appropriate statement. CTS: 2b MEAS: PC (1/2)

B 188 B4-4 Do you use digital multimeters 95 81 94 59 96

0033 IB. DC Circuits

0034 IB 8. Series Resistive Circuits 8/2

D	T	Task Title	306	362	362	362	918
Y	Nbr		53	51	53	54	50
0035	IB 8a.	Given the applicable formulas and a schematic diagram of a series DC circuit containing three resistors with selected values of resistance, current, voltage, and power shown; correctly solve for at least eight of the twelve unknown values. CTS: 4b MEAS: PC (4/0)					
A 6	Al-6	Do you calculate values of DC voltage, current, resistance, or power	48	34	68	26	79
A 12	Al-12	Do you calculate the value of a resistor required for a circuit	43	29	59	10	65
0036	IB 8b.	Given a trainer console, series DC circuit card, and a multimeter, measure circuit resistance, current, and voltage. At least six of the nine required responses must be within prescribed limits. CTS: 4b MEAS: PC (2/0)					
B 153	B1-1	Do you use the multimeter to measure DC voltage values	99	91	97	83	98
B 156	B1-4	Do you use the multimeter to measure DC current values	85	67	76	52	93
B 159	B1-7	Do you use the multimeter to measure circuit resistance	78	74	85	62	85
0037	IB 8c.	Given five schematic diagrams of series DC circuits containing simulated malfunctions, determine the type of malfunction (short or open) and the malfunctioning component. At least three of the five malfunction conditions must be identified correctly. CTS: 4c MEAS: PC (0/2)					
A 5	Al-5	Do you troubleshoot circuits containing conductors, fuses, lamps, switches, or batteries	97	91	97	94	98
0038	IB 8d.	Given a trainer console, series DC circuit card, a multimeter, and an instructor installed malfunction; determine the malfunctioning component and the type of malfunction (short, open, or changed value). CTS: 4c MEAS: PC (2/0)					
A 5	Al-5	Do you troubleshoot circuits containing conductors, fuses, lamps, switches, or batteries	97	91	97	94	98
A 10	Al-10	Do you troubleshoot circuits to isolate a faulty resistor	89	62	91	24	96

D
 T Tsk
 Y Nbr

Task Title

306 362 362 918
 53 51 53 50

0039 IB 9. Parallel Resistive Circuits 6/4

0040 IB 9a. Given the applicable formulas and a schematic diagram of a parallel DC circuit containing three resistors with selected values of resistance, current, voltage, and power shown; correctly solve for at least eight of the twelve unknown values.
 CTS: 4b MEAS: PC (2.5/0)

A 6 A1-6 Do you calculate values of DC voltage, current, resistance, or power 48 34 68 26 79
 A 12 A1-12 Do you calculate the value of a resistor required for a circuit 43 29 59 10 65

0041 IB 9b. Given a trainer console, parallel DC circuit card, and a multimeter; measure circuit resistance, current, and voltage. At least six of the nine required responses must be within prescribed limits.
 CTS: 4b MEAS: PC (1.5/0)

B 153 B1-1 Do you use the multimeter to measure DC voltage values 99 91 97 83 98
 B 156 B1-4 Do you use the multimeter to measure DC current values 85 67 76 52 93
 B 159 B1-7 Do you use the multimeter to measure circuit resistance 78 74 85 62 85

0042 IB 9c. Given the schematic diagrams of four bridge circuits, with component values shown and the ratio formula; determine whether each circuit is balanced or unbalanced. At least three of the four responses must be correct. CTS: 4b MEAS: PC (0/2)

A 12 A1-12 Do you calculate the value of a resistor required for a circuit 43 29 59 10 65

D								
T	Task							
Y	Nbr							
	Task Title							

0043 IB 9d. Given a trainer console, parallel DC circuit card, a multimeter, and an instructor installed malfunction; determine the malfunctioning component and the type of malfunction (short, open, or changed value). CTS:4c MEAS: PC (2/0)

A	10	Al-10 Do you troubleshoot circuits to isolate a faulty resistor	89	62	91	24	96
---	----	---	----	----	----	----	----

0044 IB 9e. Given three schematic diagrams of parallel DC circuits containing simulated malfunctions, determine the type of malfunction (short or open) and the malfunctioning component. At least two of the three malfunction conditions must be identified correctly. CTS: 4c MEAS: PC (0/2)

A	10	Al-10 Do you troubleshoot circuits to isolate a faulty resistor	89	62	91	24	96
---	----	---	----	----	----	----	----

0045 IB 10. Series-Parallel Resistive Circuits 10/2

0046 IB 10a. Given the applicable formulas and a schematic diagram of a series-parallel DC circuit containing three resistors with selected values of resistance, current, voltage, and power shown; correctly solve for at least ten of the fifteen unknown values. CTS: 4b MEAS: PC (2.5/0)

A	6	Al-6 Do you calculate values of DC voltage, current, resistance, or power	48	34	68	26	79
---	---	---	----	----	----	----	----

D
 T Task
 Y Nbr

Task Title

306 362 362 362 918
 53 51 53 54 50

0047

IB 10b. Given a trainer console, series-parallel DC circuit card, and a multimeter; measure circuit resistance, current, and voltage. At least eight of the eleven required responses must be within prescribed limits. CTS: 4b MEAS: PC (1.5/0)

B 156
 B 159

B1-4 Do you use the multimeter to measure DC current values
 B1-7 Do you use the multimeter to measure circuit resistance

85 76 67 362 52 93
 78 85 74 51 54 85

0048

IB 10c. Given a trainer console, voltage divider circuit card, and a multimeter; determine the voltage changes when a load is added. At least four of the six required responses must be within prescribed limits. CTS: 4b MEAS: PC (3/0)

A 6
 A 12

A1-6 Do you calculate values of DC voltage, current, resistance, or power
 A1-12 Do you calculate the value of a resistor required for a circuit

48 34 29 362 26 79
 43 29 59 10 65

0049

IB 10d. Given a trainer console, series-parallel DC circuit card, a multimeter, and an instructor installed malfunction; determine the malfunctioning component and the type of malfunction (short, open, or changed value). CTS: 4c MEAS: PC (3/0)

A 10

A1-10 Do you troubleshoot circuits to isolate a faulty resistor

89 62 91 24 96

0050

IB 10e. Given three schematic diagrams of series-parallel DC circuits containing simulated malfunctions, determine the type of malfunction (short or open) and the malfunctioning component. At least two of the three malfunction conditions must be identified correctly. CTS: 4c MEAS: PC (0/2)

A 10

A1-10 Do you troubleshoot circuits to isolate a faulty resistor

89 62 91 24 96

D	T	Task	306	362	362	362	918
Y	Nbr	Title	53	51	53	54	50

0051 IB 11. Magnetism and Relays 3.5/0

0052 IB 11a. Given a list of four statements and/or functions, and a list of four terms related to magnetism, correctly match at least three of the terms with its statement/function. CTS: 4d MEAS: PC (1/0)

A 15 A1-15 Do you trace schematic or block diagrams of circuits containing relays 78 78 94 71 96

0053 IB 11b. Given a list of five statements and/or functions, and a list of five terms related to relay construction and operation, correctly match at least three of the terms with its statement/function. CTS: 4e MEAS: PC (1/0)

A 15 A1-15 Do you trace schematic or block diagrams of circuits containing relays 78 78 94 71 96

0054 IB 11c. Given a schematic diagram of a relay control circuit and selected circuit conditions, trace current in the circuit to determine relay/component condition. Three of the five given circuit conditions must be solved correctly. CTS: 4e MEAS: PC (1.5/0)

A 16 A1-16 Do you troubleshoot circuits to isolate a faulty relay 76 77 91 62 94
 A 19 A1-19 Do you continuity check relays 72 67 88 41 92

0055 ELECTRONIC PRINCIPLES Volume 2 of 7 Volumes

0056 IIA. AC Circuits

D
 T Task
 Y Nbr

Task Title

306 362 362 362 918
 53 51 53 54 50

0057 IIA 1. AC Terms and Values

4/0

0058 IIA 1a. Given a pictorial diagram of an AC waveform and a list of ten terms, label the waveform with the proper term in the appropriate space. Eight of the ten required responses must be correct. CIS: 5a Meas: PC (1/0)

A 3 A1-3 Do you use basic AC electrical/electronic terms

97 90 97 88 99

0059 IIA 1b. Given five problems, the required formulas, and the effective, average, peak, or peak-to-peak voltage values; correctly solve for two of the three unknown voltage values in each problem CIS: 5a Meas: PC (1.5/0)

A 7 A1-7 Do you calculate values of AC effective voltage, average voltage, or peak-to-peak voltage

49 24 68 17 67

0060 IIA 1c. Given the frequency, period (time), or wavelength for five AC waveforms, correctly solve for the unknown values for three of the five given waveforms. CIS: 5a Meas: PC (1.5/0)

A 8 A1-8 Do you calculate values of frequency, phase relationship, or wave length

47 28 71 11 70

0061 IIA 2. Generators and Motors

2/4

D T Tsk Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
0062	IIA 2a. Given a list of five terms and a list of five statements/functions related to AC generators, correctly match at least three of the terms with its statement/function. CTS: 5b Meas: PC (1/0)					
A 57	A2-13 Do you trace schematic or block diagrams of circuits containing AC generators	6	8	12	4	35
A 60	A2-16 Do you perform tasks on component parts of AC generators	5	4	0	2	28
0063	IIA 2b. Given a list of five terms and a list of five statements/functions related to DC generators, correctly match at least three of the terms with its statement/function. CTS: 5b Meas: PC (1/0)					
A 53	A2-9 Do you trace schematic or block diagrams of circuits containing DC generators	11	12	6	4	36
A 56	A2-12 Do you perform tasks on component parts of DC generators	9	8	0	1	30
0064	IIA 2c. Given three multiple-choice questions related to AC motors, each question having four options, correctly answer at least two of the three questions. CTS: 5c Meas: PC (0/2)					
A 49	A2-5 Do you trace schematic or block diagrams of circuits containing AC motors	83	9	3	10	93
A 52	A2-8 Do you perform tasks on AC motor component parts	70	6	0	1	81
0065	IIA 2d. Given three multiple-choice questions related to DC motors, each question having four options, correctly answer at least two of the three question. CTS: 5c Meas: PC (0/2)					
A 45	A2-1 Do you trace schematic or block diagrams of circuits containing DC motors	70	17	6	12	92
A 48	A2-4 Do you perform tasks on DC motor component parts	53	13	3	1	77

D	T Tsk	Y Nbr	Task Title	306	362	362	362	918
				53	51	53	54	50

0066 IIA 3. Oscilloscopes and Oscilloscope Applications 6/0

0067 IIA 3a. Given ten statements associated with the front panel controls of an oscilloscope, match each statement to the front panel control it describes. Eight of the ten statements/controls must be matched correctly. CTS: 2a Meas: PC (2/0)

B 161	B2-1 Do you use the oscilloscope to measure time to determine frequency	69	20	82	4	92
B 162	B2-2 Do you use the oscilloscope to measure time (rise, fall, pulse width, etc)	68	15	79	3	89
B 163	B2-3 Do you use the oscilloscope to measure AC voltage	84	18	82	7	93
B 164	B2-4 Do you use the oscilloscope to measure DC voltage	89	20	82	8	95
B 165	B2-5 Do you use the oscilloscope to measure ripple voltages	73	7	53	2	68
B 166	B2-6 Do you use the oscilloscope to measure phase jitters	23	7	15	3	26
B 167	B2-7 Do you use the oscilloscope to observe signal/data patterns	80	15	59	6	72
B 168	B2-8 Do you use the oscilloscope to observe lissajous patterns	18	2	3	2	18
B 169	B2-9 Do you use the oscilloscope to observe phase relationships	56	8	56	3	77
B 170	B2-10 Do you use attenuator probes with oscilloscopes	44	12	24	4	81
B 171	B2-11 Do you use delay time multipliers with oscilloscopes	27	3	15	1	35

0068 IIA 3b. Given an oscilloscope, trainer console, and circuit card 10, determine the amplitude of five selected AC voltages. Three of the five measured values must be within prescribed limits. CTS: 2a Meas: PC (1.5/0)

B 163	B2-3 Do you use the oscilloscope to measure AC voltage	84	18	82	7	93
B 164	B2-4 Do you use the oscilloscope to measure DC voltage	89	20	82	8	95

D
T Tsk
Y Nbr

Task Title

306 362 362 362 918
53 51 53 54 50

0069 IIA 3c. Given an oscilloscope and a signal source, determine the frequency of five selected AC waveforms. At least three of the five frequencies measured must be within prescribed limits. CTS: 2a Meas: PC (1.5/0)

B 161 B2-1 Do you use the oscilloscope to measure time to determine frequency 69 20 4 92
B 162 B2-2 Do you use the oscilloscope to measure time (rise, fall, pulse width, etc) 68 15 3 89

0070 IIA 3d. Given an oscilloscope, a trainer console, and circuit card 12, determine the phase angle between two waveforms. The measurement must be within prescribed limits. CTS: 2a Meas: PC (1/0)

B 165 B2-5 Do you use the oscilloscope to measure ripple voltages 73 7 53 2 68
B 166 B2-6 Do you use the oscilloscope to measure phase jitters 23 7 15 3 26
B 167 B2-7 Do you use the oscilloscope to observe signal/data patterns 80 15 59 6 72
B 168 B2-8 Do you use the oscilloscope to observe lissajous patterns 18 2 3 2 18
B 169 B2-9 Do you use the oscilloscope to observe phase relationships 56 8 56 3 77

0071 IIA 4. Inductance and Inductive Reactance 5/0

0072 IIA 4a. Given a schematic diagram of an inductive circuit with selected circuit values, solve for total inductance. Five of the eight given problems must be solved correctly. CTS: 5a Meas: PC (1/0)

A 20 A1-20 Do you trace schematic or block diagrams of circuits containing inductors, chokes, or choke coils 60 22 71 19 84
A 22 A1-22 Do you calculate values of circuit total inductance 17 8 35 4 39
A 24 A1-24 Do you calculate values of circuit total voltage or current in circuits containing inductors 22 8 32 4 43
A 25 A1-25 Do you calibrate or adjust circuits by using variable inductors 30 9 32 3 59

D
 T Task
 Y Nbr

Task Title

306 362 362 362 918
 53 51 53 54 50

0073 IIA 4b. Given a schematic diagram of an inductive circuit with selected circuit values and the signal frequency, solve for total inductive reactance. Five of the eight given problems must be solved correctly. (1/0)
 CTS: 5e Meas: PC

A 23 A1-23 Do you calculate values of circuit or component inductive reactance 15 8 35 4 36
 A 24 A1-24 Do you calculate values of circuit voltage or current in circuits containing inductors 22 8 32 4 43

0074 IIA 4c. Given an oscilloscope, signal generator, trainer console, and circuit card 13, determine the effect on inductive reactance in a circuit when either the signal frequency or inductance is varied. Three of the four readings obtained must be within prescribed limits. CTS: 5e Meas: PC (13/0)

A 20 A1-20 Do you trace schematic or block diagrams of circuits containing inductors, chokes, or choke coils 60 22 71 19 84
 A 25 A1-25 Do you calibrate or adjust circuits by using variable inductors 30 9 32 3 59

0075 IIA 5. Transformers 4/2

0076 IIA 5a. Given a list of ten terms and ten definitions/statements associated with the principles of transformers, match the terms with the appropriate definition/statement. Six of the ten required responses must be correct. CTS: 5d Meas: PC (1/0)

A 35 A1-35 Do you trace schematic or block diagrams of circuits containing transformers 87 28 97 27 95
 A 39 A1-39 Do you calibrate or adjust circuits using variable transformers 27 6 44 3 70

D	T Task	Y Nbr	Task Title	306	362	362	362	918
				53	51	53	54	50

0077 IIA 5b. Given five multiple-choice questions related to transformer troubleshooting, each question having four options, correctly answer at least three of the five questions. CTS: 5d Meas: PC (0/2)

A 36	Al-36 Do you troubleshoot circuits to isolate a faulty transformer	83	22	94	23	93
A 40	Al-40 Do you ohm check transformers	71	16	76	11	83
A 41	Al-41 Do you measure transformer output voltage	78	20	71	22	92

0078 IIA 5c. Given four schematic diagrams of a conventional transformer connected to a resistive load, the input voltage, and the primary to secondary turns ratio; determine the secondary voltage and current. Six of the eight required responses must be correct. CTS: 5d Meas: PC (1/0)

A 37	Al-37 Do you calculate transformer voltage or current step-up or step-down ratios	39	5	50	7	63
A 38	Al-38 Do you calculate impedance of transformers	22	5	38	3	39

0079 IIA 5d. Given the schematic symbols for a power transformer, an audio frequency transformer, a radio frequency transformer, and an auto transformer, match the schematic symbol to the type of transformer. Three of the four required responses must be correct. CTS: 5d Meas: PC (1/0)

A 35	Al-35 Do you trace schematic or block diagrams of circuits containing transformers	87	28	97	27	95
A 39	Al-39 Do you calibrate or adjust circuits using variable transformers	27	6	44	3	70

0080 IIA 5e. Given a multimeter, trainer console, and circuit card 21, determine the malfunctioning transformer and the type of malfunction (short or open). Three of the four given malfunctions must be diagnosed correctly. CTS: 5d Meas: PC (1/0)

A 36	Al-36 Do you troubleshoot circuits to isolate a faulty transformer	83	22	94	23	93
------	--	----	----	----	----	----

D T Tsk Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
A 40	Al-40 Do you ohm check transformers	71	16	76	11	83
A 41	Al-41 Do you measure transformer output voltage	78	20	71	22	92
0001	IIA 6. Capacitance and Capacitive Reactance	6.5/2				
0002	IIA 6a. Given a list of eight terms and a list of eight statements/functions associated with the basic principles pertaining to the electrical and physical properties of capacitors, correctly match at least six of the terms with their statement/function. CTS: 5a Meas: PC	(1/0)				
A 27	Al-27 Do you trace schematic or block diagrams of circuits containing capacitors	89	66	97	58	96
A 32	Al-32 Do you calibrate or adjust circuits using variable capacitors	35	20	29	7	61
0003	IIA 6b. Given a schematic diagram of a capacitive circuit with selected circuit values, solve for total capacitance. Five of the eight given problems must be solved correctly. CTS: 5e Meas: PC	(1/0)				
A 29	Al-29 Do you calculate values of circuit total capacitance	30	23	44	11	48
A 31	Al-31 Do you calculate values of circuit or component voltage or current in circuits containing capacitors	31	22	47	8	55
0004	IIA 6c. Given a schematic diagram of capacitive circuit with selected circuit values and the signal frequency, solve for the total capacitive reactance. Five of the eight given problems must be solved correctly. CTS: 5e Meas: PC	(1/0)				
A 30	Al-30 Do you calculate values of circuit or component capacitive reactance	24	20	41	7	43

D T Y	Task Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
0085		IIA 6d. Given six capacitors, six inductors, and an ohmmeter, test each capacitor and each inductor to determine its condition. The condition of at least four capacitors and four inductors must be identified correctly. CTS: 5g Meas: PC (0/2)					
A 28		Al-28 Do you troubleshoot circuits to isolate a faulty capacitor	86	62	91	33	94
A 33		Al-33 Do you ohm check capacitors	79	46	82	23	88
0086		IIA 6e. Given an oscilloscope, signal generator, trainer console, and circuit card 12, determine the effect on capacitive reactance in a circuit when either the signal frequency or capacitance is varied. Three of the four readings obtained must be within prescribed limits. CTS: 5e Meas: PC (3.5/0)					
A 27		Al-27 Do you trace schematic or block diagrams of circuits containing capacitors	89	66	97	58	96
A 32		Al-32 Do you calibrate or adjust circuits using variable capacitors	35	20	29	7	61
0087		IIB. AC Circuits					
0088		IIB 9. Series RCL Circuits and Resonance					
0089		IIB 9a. Given the schematic diagram of a series RC circuit with component values, applied voltage and frequency, and the appropriate formulas; solve for total impedance, total current, component voltage drops and approximate phase angle. At least three of the five required responses must be correct. CTS: 5e Meas: PC (1.5/0)					
E 310		El-1 Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits	34	7	26	3	64

D	T Task	Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
E 314	E1-5 Do you calculate values of impedance, voltage, or current in RCL circuits	13		2	21	2	30	
E 315	E1-6 Do you calculate phase angle of RCL circuits	7		2	3	1	21	
E 316	E1-7 Do you calculate values of power in RCL circuits	10		2	3	1	23	

0090 IIB 9b. Given the schematic diagram of a series RL circuit with component values, applied voltage and frequency, and the appropriate formulas; solve for total impedance, total current, component voltage drops and approximate phase angle. At least three of the five required responses must be correct. CIS: 5e
 Meas: PC (1.5/0)

E 310	E1-1 Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits	34		7	26	3	64
E 314	E1-5 Do you calculate values of impedance, voltage, or current in RCL circuits	13		2	21	2	30
E 315	E1-6 Do you calculate phase angle of RCL circuits	7		2	3	1	21
E 316	E1-7 Do you calculate values of power in RCL circuits	10		2	3	1	23

0091 IIB 9c. Given the schematic diagram of a series RCL circuit with component values, applied voltage and frequency, and the appropriate formulas; solve for total impedance, total current, component voltage drops and approximate phase angle. At least four of the six required responses must be correct. CIS: 5e
 Meas: PC (2/0)

E 310	E1-1 Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits	34		7	26	3	64
E 314	E1-5 Do you calculate values of impedance, voltage, or current in RCL circuits	13		2	21	2	30
E 315	E1-6 Do you calculate phase angle of RCL circuits	7		2	3	1	21
E 316	E1-7 Do you calculate values of power in RCL circuits	10		2	3	1	23

D
T Tsk
Y Nbr

Task Title

306 362 362 918
53 51 53 54 50

0092 IIB 9d. Given a list of ten statements, select those statements that correctly describe series RCL circuit behavior/characteristics as the circuit approaches resonance, when the circuit is at resonance, or as the circuit departs from resonance. At least four of the six required responses must be correct. CTS: 5f Meas: PC (3/0)

E 312 E1-3 Do you trace schematic or block diagrams of circuits containing resonant RCL circuits 23 4 21 3 52

0093 IIB 9e. Given a chart specifying parameter changes in a series RCL circuit, indicate the effect (increase, decrease, remain the same) on total impedance, total current, and phase angle when the circuit is at, above or below resonance. At least eight of the twelve required responses must be correct. CTS: 5f Meas: PC (0/2)

E 312 E1-3 Do you trace schematic or block diagrams of circuits containing resonant RCL circuits 23 4 21 3 52

0094 IIB 10. Parallel RCL Circuits and Resonance 6/2

0095 IIB 10a. Given the schematic diagram of a parallel RC circuit with component values, applied voltage and frequency, and the appropriate formulas; solve for total impedance, total current branch currents and approximate phase angle. At least three of the five required responses must be correct. CTS: 5e Meas: PC (1/0)

E 310 E1-1 Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits 34 7 26 3 64
E 314 E1-5 Do you calculate values of impedance, voltage, or current in RCL circuits 13 2 21 2 30
E 315 E1-6 Do you calculate phase angle of RCL circuits 7 2 3 1 21
E 316 E1-7 Do you calculate values of power in RCL circuits 10 2 3 1 23

D
 T Task
 Y Nbr

Task Title

306 362 362 362 918
 53 51 53 54 50

0096 IIB 10b. Given the schematic diagram of a parallel RL circuit with component values, applied voltage and frequency and the appropriate formulas; solve for total impedance, total current, branch currents and approximate phase angle. At least three of the five required responses must be correct. CTS: 5e Meas: PC (1/0)

E 310 E1-1 Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits current in RCL circuits 34 7 26 3 64
 E 314 E1-5 Do you calculate values of impedance, voltage, or current in RCL circuits 13 2 21 2 30
 E 315 E1-6 Do you calculate phase angle of RCL circuits 7 2 3 1 21
 E 316 E1-7 Do you calculate values of power in RCL circuits 10 2 3 1 23

0097 IIB 10c. Given a digital multimeter, signal generator, circuit card, and a schematic diagram of a parallel RCL circuits with applied voltage and frequency, correctly solve for capacitive reactance and inductive reactance. Response must be within + or - 1k ohms. CTS: 5e Meas: PC (2/0)

E 310 E1-1 Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits current in RCL circuits 34 7 26 3 64
 E 314 E1-5 Do you calculate values of impedance, voltage, or current in RCL circuits 13 2 21 2 30
 E 315 E1-6 Do you calculate phase angle of RCL circuits 7 2 3 1 21
 E 316 E1-7 Do you calculate values of power in RCL circuits 10 2 3 1 23

0098 IIB 10d. Given a chart specifying parameter changes in a parallel RCL circuit, indicate the effect (increase, decrease, remain the same) on total impedance, total current, and phase angle when the circuit is at, above or below resonance. At least eight of the twelve required responses must be correct. CTS: 5f Meas: PC (0/2)

E 312 E1-3 Do you trace schematic or block diagrams of circuits containing resonant RCL circuits 23 4 21 3 52

D	T Task	Y Nbr	Task Title	306	362	362	362	918
				53	51	53	54	50

0099 IIB 10e. Given a list of ten statements, select those statements that correctly describe parallel RCL circuit behavior/characteristics as the circuit approaches resonance, when the circuit is at resonance, or as the circuit departs from resonance. At least four of the six required responses must be correct. CTS: 5f
 Meas: PC (2/0)

E 312 E1-3 Do you trace schematic or block diagrams of circuits containing resonant RCL circuits 23 4 21 3 52

0100 IIB 11. Frequency Select/Reject Filters 7/2

0101 IIB 11a. Given a list of ten items (statements, schematics, frequency response curves) pertaining to filters, correctly indicate which item describes low-pass, high-pass, band-pass or band-reject filter operation. At least six of the ten required responses must be correct. CTS: 5a Meas: PC (4/0)

E 317	E2-1 Do you trace schematic or block diagrams of circuits containing frequency sensitive filters	9	3	53	3	30
E 320	E2-4 Do you align or adjust frequency sensitive filters	8	2	21	1	22
E 322	E2-6 Do you perform tasks on low pass frequency sensitive filters	10	1	50	2	33
E 323	E2-7 Do you perform tasks on high pass frequency sensitive filters	8	1	35	1	33
E 324	E2-8 Do you perform tasks on band pass frequency sensitive filters	8	2	26	2	33
E 325	E2-9 Do you perform tasks on band-reject frequency sensitive filters	3	1	12	2	23
E 326	E2-10 Do you perform tasks on ferrite bead frequency sensitive filters	2	0	3	0	11

D	T Task	Y Nbr	Task Title	306	362	362	362	918
				53	51	53	54	50

0102 IIB 11b. Given an oscilloscope, signal generator, trainer console and circuit cards 16A, 16B, 18A, 20A, and 20B, identify the type of filter circuit by observing the output waveform of specified circuits. At least four of the six specified filters must be identified correctly. CTS: 5f Meas: PC (3/0)

E 317	E2-1 Do you trace schematic or block diagrams of circuits containing frequency sensitive filters	9	3	53	3	30
E 320	E2-4 Do you align or adjust frequency sensitive filters	8	2	21	1	22
E 322	E2-6 Do you perform tasks on low pass frequency sensitive filters	10	1	50	2	33
E 323	E2-7 Do you perform tasks on high pass frequency sensitive filters	8	1	35	1	33
E 324	E2-8 Do you perform tasks on band pass frequency sensitive filters	8	2	26	2	33
E 325	E2-9 Do you perform tasks on band-reject frequency sensitive filters	3	1	12	2	23
E 326	E2-10 Do you perform tasks on ferrite bead frequency sensitive filters	2	0	3	0	11

0103 IIB 11c. Given the schematic diagrams of five filter circuits using resistor elements and a list of the five filter types, match at least three of the five filter circuits with the correct type. CTS: 5a Meas: PC (0/2)

E 317	E2-1 Do you trace schematic or block diagrams of circuits containing frequency sensitive filters	9	3	53	3	30
E 320	E2-4 Do you align or adjust frequency sensitive filters	8	2	21	1	22
E 322	E2-6 Do you perform tasks on low pass frequency sensitive filters	10	1	50	2	33
E 323	E2-7 Do you perform tasks on high pass frequency sensitive filters	8	1	35	1	33
E 324	E2-8 Do you perform tasks on band pass frequency sensitive filters	8	2	26	2	33
E 325	E2-9 Do you perform tasks on band-reject frequency sensitive filters	3	1	12	2	23
E 326	E2-10 Do you perform tasks on ferrite bead frequency sensitive filters	2	0	3	0	11

D	T Task	Y Nbr	Task Title	306	362	362	362	918
				53	51	53	54	50

0104 IIB 12. Time Constants 6.5/2

0105 IIB 12a. Given five series RC networks with the specified time allowed, component values, and a Universal Time Constant Chart, determine the percent of charge or discharge of the capacitor. At least three of the five given problems must be answered correctly. (2/0)
 CTS: 5h Meas: PC

E 310	E1-1 Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits	34	7	26	3	64
E 314	E1-5 Do you calculate values of impedance, voltage, or current in RCL circuits	13	2	21	2	30
E 315	E1-6 Do you calculate phase angle of RCL circuits	7	2	3	1	21

0106 IIB 12b. Given five series RL networks with the specified time allowed, component values, and a Universal Time Constant Chart, determine the percent of current build-up or current decay in the circuit. At least three of the five given problems must be answered correctly. CTS: 5h Meas: PC (2/0)

E 310	E1-1 Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits	34	7	26	3	64
E 314	E1-5 Do you calculate values of impedance, voltage, or current in RCL circuits	13	2	21	2	30
E 315	E1-6 Do you calculate phase angle of RCL circuits	7	2	3	1	21

0107 IIB 12c. Given four multiple-choice questions, each with four options, dealing with classification of time constants, correctly answer at least three of the four questions. CTS: 5h Meas: PC (0/2)

E 310	E1-1 Do you trace schematic or block diagrams of circuits containing resistive capacitive inductive (RCL) circuits	34	7	26	3	64
-------	--	----	---	----	---	----

D	T Tsk	Y Nbr	Task Title	306	362	362	362	918
				53	51	53	54	50

0108 IIB 12d. Given four multiple-choice questions, each with four options, associated with differentiated and integrated waveforms, correctly answer at least three of the four questions. CTS: 5h Meas: PC (2.5/0)

F 359	F3-1 Do you trace block diagrams of circuits containing waveshaping circuits (WSC)	33	2	3	2	65
F 360	F3-2 Do you trace schematic diagrams of WSC	33	1	3	1	61
F 363	F3-5 Do you adjust or calibrate WSC	22	1	3	1	58
F 366	F3-8 Do you perform tasks on RC differentiating WSC	9	1	0	1	36
F 367	F3-9 Do you perform tasks on RL differentiating WSC	7	1	0	1	32
F 368	F3-10 Do you perform tasks on RC integrating WSC	10	1	0	1	34
F 369	F3-11 Do you perform tasks on RL integrating WSC	7	1	0	1	32

0109 ELECTRONIC PRINCIPLES Volume 3 of 7 Volumes

0110 III. Solid State Devices

0111 III 1. PN Junctions and Diodes 4/0

0112 III 1a. Given four multiple-choice questions, with four options each, pertaining to semiconductor materials, correctly answer at least three of the four questions. CTS: 6b(1) Meas: PC (2/0)

A 83	A3-1 Do you trace schematic or block diagrams of circuits containing diodes	86	54	88	49	95
------	---	----	----	----	----	----

D	Tsk	Task Title	306	362	362	362	918
V	Nbr		53	51	53	54	50

0113		III 1b. Given a trainer, test equipment and a schematic diagram, determine the forward/reverse bias condition of at least three out of four diodes through voltage measurementst. CTS: 6b(1) Meas: PC (2/0)					
A	83	A3-1 Do you trace schematic or block diagrams of circuits containing diodes	86	54	88	49	95
A	85	A3-3 Do you check diodes using an ohmmeter	84	48	74	24	92

0114		III 2. Rectifiers and Filters 4/2					

0115		III 2a. Given a list of ten characteristics and a list of rectifier circuits, match the characteristics to the proper circuits. At least six of the matches must be correct. CTS: 6b(4) Meas: PC (2/0)					
D	275	DI-1 Do you trace block diagrams of circuits containing power supplies	89	38	91	45	92
D	276	DI-2 Do you trace schematic diagrams of power supply circuits	89	32	88	37	92
D	279	DI-5 Do you align or adjust power supplies	82	26	88	19	85
D	280	DI-6 Do you perform tasks on half-wave rectifier power supplies	61	7	59	5	85
D	281	DI-7 Do you perform tasks on full-wave rectifier power supplies	66	17	74	7	87
D	282	DI-8 Do you perform tasks on full-wave bridge rectifier power supplies	66	8	53	10	91

0116		III 2b. Given three multiple-choice questions, with four options each, pertaining to three-phase rectifiers, correctly answer at least two of the three questions. CTS: 6b(4) Meas: PC (0/2)					
D	275	DI-1 Do you trace block diagrams of circuits containing power supplies	89	38	91	45	92
D	276	DI-2 Do you trace schematic diagrams of power supply circuits	89	32	88	37	92
D	283	DI-9 Do you perform tasks on three-phase rectifier power supplies	17	13	9	4	50

D	Tsk	Task Title	306	362	362	362	918
Y	Nbr		53	51	53	54	50

0117 III 2c. Given oscilloscope, a trainer and a bridge rectifier circuit card, determine the effects on ripple amplitude by changing values of the resistor/capacitor components. At least three of the four response must be correct. CTS: 6b(4) Meas: PC (2/0)

D 288	D2-1	Do you trace block diagrams of circuits containing power supply filters	58	6	47	8	77
D 289	D2-2	Do you trace schematic diagrams of power supply filters	57	5	47	6	77
D 292	D2-5	Do you perform tasks on capacitive power supply filters	50	3	47	6	75
D 293	D2-6	Do you perform tasks on inductive power supply filters	38	3	35	4	61
D 294	D2-7	Do you perform tasks on L-type power supply filters	23	2	12	1	29
D 295	D2-8	Do you perform tasks on pi-type power supply filters	19	2	9	1	26
D 296	D2-9	Do you perform tasks on T-type power supply filters	11	2	6	1	20
D 297	D2-10	Do you perform tasks on resistive capacitive (RC) power supply filters	46	3	41	4	69
D 298	D2-11	Do you perform tasks on inductive capacitive (LC) power supply filters	37	2	35	3	61

0118 III 3. Transistor Principles 2/0

0119 III 3a. Given a list of ten characteristics and a list of ten terms or symbols pertaining to transistor construction, operation, biasing and symbols; correctly match at least six of the characteristics with its term or symbol. CTS: 6b(2) Meas: PC

A 89	A3-7	Do you trace schematic or block diagrams of circuits containing transistors	90	44	94	47	93
------	------	---	----	----	----	----	----

0120 III 4. Transistor Amplifiers 8/4

D	T Task	Y Nbr	Task Title	306	362	362	362	918
				53	51	53	54	50
0121	III 4a. From a list of ten characteristics, correctly identify at least four of the six that pertain to a common emitter amplifier circuit. CTS: 6b(2) Meas: PC (3/0)							
C 199	C1-1 Do you trace block diagrams of circuits containing transistor amplifiers	41	13	76	9	83		
C 200	C1-2 Do you trace schematic diagrams of transistor amplifier circuits	41	11	71	8	84		
C 204	C1-6 Do you adjust or align transistor amplifiers	16	12	62	2	50		
C 206	C1-8 Do you calculate values of transistor amplifier voltage, current or power gain	10	6	29	2	42		
C 207	C1-9 Do you work on compound-connected (Darlington Pair) transistor amplifiers	20	1	9	1	70		
C 208	C1-10 Do you work on cascade-connected transistor amplifiers	10	1	6	1	42		
C 209	C1-11 Do you work on paraphase transistor amplifiers	5	1	6	0	20		
C 210	C1-12 Do you work on push-pull transistor amplifiers	19	1	47	2	70		
C 211	C1-13 Do you work on audio transistor amplifiers	12	9	65	4	53		
C 212	C1-14 Do you work on wideband transistor amplifiers	3	3	3	2	27		
C 213	C1-15 Do you work on IF transistor amplifiers	6	1	3	2	23		
C 214	C1-16 Do you work on RF transistor amplifiers	8	3	3	2	49		
C 215	C1-17 Do you work on buffer transistor amplifiers	15	1	6	1	64		
C 216	C1-18 Do you work on complementary symmetry transistor amplifiers	6	1	3	0	25		
C 217	C1-19 Do you work on DC transistor amplifiers (switching applications)	28	7	12	4	67		
0122	III 4b. Given a common emitter amplifier circuit schematic, three trouble symptoms and four probable causes, correctly match at least two of the symptoms with its probable cause. CTS: 6b(2) Meas: PC (0/2)							
C 201	C1-3 Do you troubleshoot to isolate a faulty transistor amplifier	41	11	62	6	81		
C 202	C1-4 Do you troubleshoot transistor amplifiers to circuit level components	35	8	44	2	80		
C 203	C1-5 Do you troubleshoot transistor amplifier distortion	14	6	41	2	45		
C 205	C1-7 Do you measure transistor amplifier voltage, current, or power gain	25	9	44	2	64		
C 219	C2-2 Do you troubleshoot amplifier stabilization circuits to circuit level components	15	1	21	0	49		
C 227	C3-3 Do you troubleshoot circuits to isolate a faulty coupling circuit	33	2	29	3	68		
C 228	C3-4 Do you troubleshoot coupling circuits to circuit level components	29	2	21	2	70		

D T Task
Y Nbr Task Title 306 362 362 918
53 51 54 50

0123 III 4c. From a list of ten characteristics, correctly identify at least four of the six that pertain to a common base amplifier circuit. CTS: 6b(2) Meas: PC (3/0)

C 199	C1-1 Do you trace block diagrams of circuits containing transistor amplifiers	41	13	76	9	83
C 200	C1-2 Do you trace schematic diagrams of transistor amplifier circuits	41	11	71	8	84
C 204	C1-6 Do you adjust or align transistor amplifiers	16	12	62	2	50
C 206	C1-8 Do you calculate values of transistor amplifier voltage, current or power gain	10	6	29	2	42
C 207	C1-9 Do you work on compound-connected (Darlington Pair) transistor amplifiers	20	1	9	1	70
C 208	C1-10 Do you work on cascade-connected transistor amplifiers	10	1	6	1	42
C 209	C1-11 Do you work on paraphase transistor amplifiers	5	1	6	0	20
C 210	C1-12 Do you work on push-pull transistor amplifiers	19	1	47	2	70
C 211	C1-13 Do you work on audio transistor amplifiers	12	9	65	4	53
C 212	C1-14 Do you work on wideband transistor amplifiers	3	3	3	2	27
C 213	C1-15 Do you work on IF transistor amplifiers	6	1	3	2	23
C 214	C1-16 Do you work on RF transistor amplifiers	8	3	3	2	49
C 215	C1-17 Do you work on buffer transistor amplifiers	15	1	6	1	64
C 216	C1-18 Do you work on complementary symmetry transistor amplifiers	6	1	3	0	25
C 217	C1-19 Do you work on DC transistor amplifiers (switching applications)	28	7	12	4	67

0124 III 4d. Given a common collector amplifier circuit card, trainer console, and test equipment, complete at least three of the five items pertaining to circuit characteristics. CTS: 6b(2) Meas: PC (2/0)

C 199	C1-1 Do you trace block diagrams of circuits containing transistor amplifiers	41	13	76	9	83
C 200	C1-2 Do you trace schematic diagrams of transistor amplifier circuits	41	11	71	8	84
C 204	C1-6 Do you adjust or align transistor amplifiers	16	12	62	2	50
C 206	C1-8 Do you calculate values of transistor amplifier voltage, current or power gain	10	6	29	2	42
C 207	C1-9 Do you work on compound-connected (Darlington Pair) transistor amplifiers	20	1	9	1	70
C 208	C1-10 Do you work on cascade-connected transistor amplifiers	10	1	6	1	42
C 209	C1-11 Do you work on paraphase transistor amplifiers	5	1	6	0	20
C 210	C1-12 Do you work on push-pull transistor amplifiers	19	1	47	2	70
C 211	C1-13 Do you work on audio transistor amplifiers	12	9	65	4	53
C 212	C1-14 Do you work on wideband transistor amplifiers	3	3	3	2	27

D	Tsk	Task Title	306	362	362	362	918
Y	Nbr		53	51	53	54	50
C 213		Cl-15 Do you work on IF transistor amplifiers	6	1	3	2	23
C 214		Cl-16 Do you work on RF transistor amplifiers	8	3	3	2	49
C 215		Cl-17 Do you work on buffer transistor amplifiers	15	1	6	1	64
C 216		Cl-18 Do you work on complementary symmetry transistor amplifiers	6	1	3	0	25
C 217		Cl-19 Do you work on DC transistor amplifiers (switching applications)	28	7	12	4	67

0125	III 4e.	Given six diagrams showing an ohmmeter connected to a good transistor, determine if the meter should indicate a low resistance or a high resistance. Four of the six response must be correct. CTS: 6b(2) MEAS: PC (0/2)					
A 90	A3-8	Do you troubleshoot circuits to isolate a faulty transistor	88	37	88	22	92
A 91	A3-9	Do you check transistors using an ohmmeter	86	33	85	16	89

0126	III 5.	Amplifier Principles 3/0					

0127	III 5a.	Given a list of ten characteristics/statements and a list of amplifier principle terms, correctly match at least six of the characteristics/statements with the proper term. CTS: 6b(2) Meas: PC (3/0)					

C 199	Cl-1	Do you trace block diagrams of circuits containing transistor amplifiers	41	13	76	9	83
C 200	Cl-2	Do you trace schematic diagrams of transistor amplifier circuits	41	11	71	8	84
C 204	Cl-6	Do you adjust or align transistor amplifiers	16	12	62	2	50
C 206	Cl-8	Do you calculate values of transistor amplifier voltage, current or power gain	10	6	29	2	42
C 207	Cl-9	Do you work on compound-connected (Darlington Pair) transistor amplifiers	20	1	9	1	70
C 208	Cl-10	Do you work on cascade-connected transistor amplifiers	10	1	6	1	42
C 209	Cl-11	Do you work on paraphase transistor amplifiers	5	1	6	0	20
C 210	Cl-12	Do you work on push-pull transistor amplifiers	19	1	47	2	70
C 211	Cl-13	Do you work on audio transistor amplifiers	12	9	65	4	53
C 212	Cl-14	Do you work on wideband transistor amplifiers	3	3	3	2	27
C 213	Cl-15	Do you work on IF transistor amplifiers	6	1	3	2	23
C 214	Cl-16	Do you work on RF transistor amplifiers	8	3	3	2	49
C 215	Cl-17	Do you work on buffer transistor amplifiers	15	1	6	1	64

D T Y	Task Title	306 53	362 51	362 53	362 54	918 50
C 216	C1-18 Do you work on complementary symmetry transistor amplifiers	6	1	3	0	25
C 217	C1-19 Do you work on DC transistor amplifiers (switching applications)	28	7	12	4	67
C 218	C2-1 Do you trace schematic diagrams of amplifier stabilization circuits	15	1	24	1	50
C 220	C2-3 Do you perform tasks on emitter (swamping) resistor stabilization amplifiers	18	1	18	1	46
C 221	C2-4 Do you perform tasks on self-bias stabilization amplifiers	13	1	18	1	38
C 222	C2-5 Do you perform tasks on thermistor stabilization amplifiers	12	1	21	1	45
C 223	C2-6 Do you perform tasks on diode stabilization amplifiers	17	2	24	2	49
C 224	C2-7 Do you perform tasks on double diode stabilization amplifiers	10	1	6	1	29
C 225	C3-1 Do you trace block diagrams of circuits containing coupling circuits	35	2	29	5	69
C 226	C3-2 Do you trace schematic diagrams of coupling circuits	34	2	29	4	72
C 229	C3-5 Do you perform tasks on direct coupling circuits	34	2	21	3	67
C 230	C3-6 Do you perform tasks on capacitive-resistive coupling circuits	27	2	24	3	61
C 231	C3-7 Do you perform tasks on capacitive-inductive coupling circuits	22	2	21	3	57
C 232	C3-8 Do you perform tasks on transformer coupling circuits	27	2	21	3	64

0128 III 6. Special Purpose Devices 3/2

0129 III 6a. Given four multiple-choice questions, each with four options, pertaining to field effect transistors, correctly answer at least three of the four questions. (1/0)
 CTS: 6b13) Meas: PC

A 98	A3-16 Do you trace schematic or block diagrams of circuits containing solid-state special purpose devices	53	9	29	14	88
A 102	A3-20 Do you perform tasks on field effect transistors (FET)	33	2	15	2	83

D
T Tsk
Y Nbr

Task Title

306	362	362	362	918
53	51	53	54	50

0130 III 6b. Given six multiple-choice questions, each with four options, pertaining to special purpose semiconductor devices, correctly answer at least four of the six questions. CTS: 6b(3) Meas: PC (2/0)

A 98	A3-16 Do you trace schematic or block diagrams of circuits containing solid-state special purpose devices	53	9	29	14	88
A 100	A3-18 Do you perform tasks on varactors/varicaps	11	1	15	2	42
A 103	A3-21 Do you perform tasks on unijunction transistors (UJT)	35	1	15	2	80
A 105	A3-23 Do you perform tasks on liquid crystal displays (LCD)	35	6	15	5	76
A 107	A3-25 Do you perform tasks on light emitting diodes (LED)	65	14	26	15	90
J 681	J2-1 Do you trace block diagrams of circuits containing photosensitive devices	36	1	0	2	52
J 685	J2-5 Do you work on photodiodes	25	1	0	1	44
J 686	J2-6 Do you work on phototransistors	22	1	0	1	38

0131 III 6c. Given four multiple-choice questions, each with four options, pertaining to SCR devices, correctly answer at least three of the four questions. CTS: 6b(3) Meas: PC (0/2)

A 98	A3-16 Do you trace schematic or block diagrams of circuits containing solid-state special purpose devices	53	9	29	14	88
A 109	A3-27 Do you perform tasks on silicon controlled rectifiers (SCR)	39	2	15	2	85
A 112	A3-30 Do you perform tasks on silicon controlled switches (SCS)	10	1	9	1	61

0132 III 7. Voltage regulators 3.5/0

0133 III 7a. Given a schematic diagram of a Zener diode voltage regulator and five incomplete statements, correctly complete at least three of the statements on circuit operation. CTS: 6b(5) Meas: PC (1.5/0)

A 98	A3-16 Do you trace schematic or block diagrams of circuits containing solid-state special purpose devices	53	9	29	14	88
A 104	A3-22 Do you perform tasks on zener diodes	68	9	47	14	88
D 299	D3-1 Do you trace block diagrams of circuits containing power supply voltage regulators	68	8	62	7	86

D T Task Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
D 300	D3-2 Do you trace schematic diagrams of power supply voltage regulator circuits	67	5	62	4	87
D 304	D3-6 Do you perform tasks on zener diode power supply voltage regulators	57	3	56	3	83

0134 III 7b. Given a voltage regulator circuit card, trainer console and an oscilloscope, measure DC output voltages of a voltage regulator circuit when variations in load (currents) occur. CTS: 6b(5) Meas: PC (2/0)

D 299	D3-1 Do you trace block diagrams of circuits containing power supply voltage regulators	68	8	62	7	86
D 300	D3-2 Do you trace schematic diagrams of power supply voltage regulator circuits	67	5	62	4	87
D 303	D3-5 Do you perform tasks on variable resistor power supply voltage regulators	57	6	50	3	80
D 305	D3-7 Do you perform tasks on transistor series power supply voltage regulators	46	2	50	2	72

0135 ELECTRONIC PRINCIPLES Volume 4 of 7 Volumes

0136 IV. Solid State Amplifiers and Oscillators

0137 IV 1. Amplifiers 9.5/2

0138 IV 1a. Given a trainer console, circuit card and schematic diagram of a two-stage RC coupled amplifier, measure and record operational characteristics (gain/phasing) of the amplifier. CTS: 6b(6) Meas: PC (3/0)

C 199	CI-1 Do you trace block diagrams of circuits containing transistor amplifiers	41	13	76	9	83
C 200	CI-2 Do you trace schematic diagrams of transistor amplifier circuits	41	11	71	8	84
C 204	CI-6 Do you adjust or align transistor amplifiers	16	12	62	2	50

D Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
C 206	Cl-8 Do you calculate values of transistor amplifier voltage, current or power gain	10	6	29	2	42
C 208	Cl-10 Do you work on cascade-connected transistor amplifiers	10	1	6	1	42
C 211	Cl-13 Do you work on audio transistor amplifiers	12	9	65	4	53

0139 IV 1b. Given the schematic diagram of a paraphase push-pull amplifier and five incomplete statements describing circuit operation, correctly complete at least three of the statements. CTS: 6b(6) Meas: PC (2/0)

C 200	Cl-2 Do you trace schematic diagrams of transistor amplifier circuits	41	11	71	8	84
C 204	Cl-6 Do you adjust or align transistor amplifiers	16	12	62	2	50
C 206	Cl-8 Do you calculate values of transistor amplifier voltage, current or power gain	10	6	29	2	42
C 208	Cl-10 Do you work on cascade-connected transistor amplifiers	10	1	6	1	42
C 209	Cl-11 Do you work on paraphase transistor amplifiers	5	1	6	0	20
C 210	Cl-12 Do you work on push-pull transistor amplifiers	19	1	47	2	70

0140 IV 1c. Given a schematic diagram and five multiple choice questions with four options each, describing basic complementary and driver operation, correctly answer at least three of the five questions. CTS: 6b(6) Meas: PC (0/2)

C 199	Cl-1 Do you trace block diagrams of circuits containing transistor amplifiers	41	13	76	9	83
C 200	Cl-2 Do you trace schematic diagrams of transistor amplifier circuits	41	11	71	8	84
C 204	Cl-6 Do you adjust or align transistor amplifiers	16	12	62	2	50
C 206	Cl-8 Do you calculate values of transistor amplifier voltage, current or power gain	10	6	29	2	42
C 208	Cl-10 Do you work on cascade-connected transistor amplifiers	10	1	6	1	42
C 216	Cl-18 Do you work on complementary symmetry transistor amplifiers	6	1	3	0	25

0141 IV 1d. Given five multiple choice questions with four options each, and a schematic diagram of a differential amplifier, correctly answer at least three of the five questions on circuit operation. CTS: 9c(2) Meas: PC (2/0)

C 199	Cl-1 Do you trace block diagrams of circuits containing transistor amplifiers	41	13	76	9	83
-------	---	----	----	----	---	----

D T Y	Tsk Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
C	200	C1-2 Do you trace schematic diagrams of transistor amplifier circuits	41	11	71	8	84
C	204	C1-6 Do you adjust or align transistor amplifiers	16	12	62	2	50
C	206	C1-8 Do you calculate values of transistor amplifier voltage, current or power gain	10	6	29	2	42
C	249	C5-1 Do you trace block or schematic diagrams of circuits containing operational amplifiers (op amps)	30	5	29	2	85
C	252	C5-4 Do you adjust op amp bias, offsets, or drift	16	4	12	1	59
C	254	C5-6 Do you use or apply operational amplifiers as differential/comparators	15	1	0	1	73

0142 IV 1e. Given a schematic diagram, schematic symbol, and five multiple choice questions with four options each, describing basic operational amplifier operations, correctly answer at least three of the five questions.
CTS: 9c(2) Meas: PC (2.5/0)

C	249	C5-1 Do you trace block or schematic diagrams of circuits containing operational amplifiers (op amps)	30	5	29	2	85
C	251	C5-3 Do you calculate op amp gain	8	1	12	2	53
C	252	C5-4 Do you adjust op amp bias, offsets, or drift	16	4	12	1	59
C	253	C5-5 Do you use or apply operational amplifiers for general purpose (inverting or non-inverting)	25	3	18	1	77
C	254	C5-6 Do you use or apply operational amplifiers as differential/comparators	15	1	0	1	73
C	255	C5-7 Do you use or apply operational amplifiers for summing	8	1	3	1	61
C	256	C5-8 Do you use or apply operational amplifiers for unity gain amplifier (buffer)	8	2	6	1	68

0143 IV 2. LC Oscillators 2.5/2

0144 IV 2a. Given a trainer console, circuit card and schematic diagram of a series-fed hartley oscillator, determine the operational characteristics (output frequency/phasing) of the oscillator. CTS: 6b(7) Meas: PC (2.5/0)

F	327	F1-1 Do you trace block diagrams of circuits containing oscillators	35	5	65	2	71
F	328	F1-2 Do you trace schematic diagrams of oscillator circuits	34	4	56	1	72
F	331	F1-5 Do you align or adjust oscillator circuits	30	7	56	2	62
F	332	F1-6 Do the oscillators you work with use LC tank circuits	14	2	26	1	57

D T Tsk Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
F 336	F1-10 Do you perform tasks on series Hartley oscillator circuits	11	1	12	1	35

0145 IV 2b. Given a schematic diagram of a shunt fed Hartley, clapp, and colpitts oscillator and a list of oscillator components, select the components that make up the frequency determining device, forward bias network, and the regenerative feedback path of each oscillator. At least seven of the nine responses must be correct
 CTS: 6b(7) Meas: PC (0/2)

F 327	F1-1 Do you trace block diagrams of circuits containing oscillators	35	5	65	2	71
F 328	F1-2 Do you trace schematic diagrams of oscillator circuits	34	4	56	1	72
F 331	F1-5 Do you align or adjust oscillator circuits	30	7	56	2	62
F 332	F1-6 Do the oscillators you work with use LC tank circuits	14	2	26	1	57
F 337	F1-11 Do you perform tasks on shunt Hartley oscillator circuits	11	1	12	1	39
F 338	F1-12 Do you perform tasks on Colpitts oscillator circuits	3	1	9	1	19
F 339	F1-13 Do you perform tasks on Clapp oscillator circuits	2	0	9	1	17

0146 IV 3. RC Oscillators 4/0

0147 IV 3a. Given a schematic diagram of a phase shift oscillator and five incomplete statements describing circuit operation, correctly complete at least three of the statements. CTS: 6b(7) Meas: PC (2/0)

F 327	F1-1 Do you trace block diagrams of circuits containing oscillators	35	5	65	2	71
F 328	F1-2 Do you trace schematic diagrams of oscillator circuits	34	4	56	1	72
F 331	F1-5 Do you align or adjust oscillator circuits	30	7	56	2	62
F 333	F1-7 Do the oscillators you work with use RC networks	19	2	29	1	63
F 346	F1-20 Do you perform tasks on RC phase shift oscillators	10	1	21	0	29

D	T Task	Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
0148	IV 3b.		Given a schematic diagram of a Wien bridge oscillator and five incomplete statements describing circuit operation, correctly complete at least three of the statements. CTS: 6b(7) Meas: PC (2/0)					
F 327	Fl-1		Do you trace block diagrams of circuits containing oscillators	35	5	65	2	71
F 328	Fl-2		Do you trace schematic diagrams of oscillator circuits	34	4	56	1	72
F 331	Fl-5		Do you align or adjust oscillator circuits	30	7	56	2	62
F 333	Fl-7		Do the oscillators you work with use RC networks	19	2	29	1	63
F 342	Fl-16		Do you perform tasks on Wien bridge oscillator circuits	6	1	6	1	48
0149	IV 4.		Crystal Oscillators					
0150	IV 4a.		Given a schematic diagram of a crystal oscillator and five incomplete statements describing circuit operation, correctly complete at least three of the statements. CTS: 6a(1) Meas: PC (2/0)					
F 327	Fl-1		Do you trace block diagrams of circuits containing oscillators	35	5	65	2	71
F 328	Fl-2		Do you trace schematic diagrams of oscillator circuits	34	4	56	1	72
F 331	Fl-5		Do you align or adjust oscillator circuits	30	7	56	2	62
F 334	Fl-8		Do the oscillators you work with use crystals	32	2	6	1	68
F 341	Fl-15		Do you perform tasks on crystal oscillator circuits	30	2	9	1	59
0151	IV 4b.		Given schematic diagrams of a Pierce oscillator, crystal controlled Hartley oscillator, and a common base amplifier with a crystal oscillator and a list of ten statements/phrases, correctly match at least six of the statements/phrases with the correct schematic diagram. CTS: 6a(1) Meas: PC (0/2)					
F 327	Fl-1		Do you trace block diagrams of circuits containing oscillators	35	5	65	2	71
F 328	Fl-2		Do you trace schematic diagrams of oscillator circuits	34	4	56	1	72
F 331	Fl-5		Do you align or adjust oscillator circuits	30	7	56	2	62
F 334	Fl-8		Do the oscillators you work with use crystals	32	2	6	1	68
F 341	Fl-15		Do you perform tasks on crystal oscillator circuits	30	2	9	1	59

D	Tsk	Y Nbr	Task Title	306	362	362	362	918
				53	51	53	54	50

0152 IV 5. Multivibrators (9.5/2)

0153 IV 5a. Given a schematic diagram of an astable multivibrator, five incomplete statements concerning circuit operation, and a list of components/networks, correctly complete at least three of the statements using components/networks from the list provided.
 CTS: 6b(8) Meas: PC (3/0)

C 217	C1-19 Do you work on DC transistor amplifiers (switching applications)	28	7	12	4	67
F 347	F2-1 Do you trace block diagrams of circuits containing multivibrators	44	3	26	2	59
F 348	F2-2 Do you trace schematic diagrams of multivibrator circuits	42	3	24	1	59
F 351	F2-5 Do you adjust or align multivibrator circuits	27	3	21	1	51
F 353	F2-7 Do the multivibrators you work with use RC networks	32	1	18	1	54
F 355	F2-9 Do you perform tasks on astable (free running) multivibrators	41	2	24	2	58
F 359	F3-1 Do you trace block diagrams of circuits containing waveshaping circuits (WSC)	33	2	3	2	65
F 360	F3-2 Do you trace schematic diagrams of WSC	33	1	3	1	61
F 363	F3-5 Do you adjust or calibrate WSC	22	1	3	1	58
F 370	F3-12 Do you perform tasks on square wave generator WSC	31	1	3	2	63
F 371	F3-13 Do you perform tasks on rectangular wave generator WSC	11	1	3	1	47

0154 IV 5b. Given a schematic diagram of a monostable multivibrator, five incomplete statements concerning circuit operation, and a list of components/networks, correctly complete at least three of the statements using components/networks from the list provided.
 CTS: 6b(8) Meas: PC (3/0)

C 217	C1-19 Do you work on DC transistor amplifiers (switching applications)	28	7	12	4	67
F 347	F2-1 Do you trace block diagrams of circuits containing multivibrators	44	3	26	2	59
F 348	F2-2 Do you trace schematic diagrams of multivibrator circuits	42	3	24	1	59
F 351	F2-5 Do you adjust or align multivibrator circuits	27	3	21	1	51
F 353	F2-7 Do the multivibrators you work with use RC networks	32	1	18	1	54

D	T	Task Title	306 53	362 51	362 53	362 54	918 50
F 356		F2-10 Do you perform tasks on monostable (one shot) multivibrators	41	2	24	1	57
F 359		F3-1 Do you trace block diagrams of circuits containing waveshaping circuits (WSC)	33	2	3	2	65
F 360		F3-2 Do you trace schematic diagrams of WSC	33	1	3	1	61
F 363		F3-5 Do you adjust or calibrate WSC	22	1	3	1	58
F 370		F3-12 Do you perform tasks on square wave generator WSC	31	1	3	2	63
F 371		F3-13 Do you perform tasks on rectangular wave generator WSC	11	1	3	1	47
0155		IV 5c. Given a schematic diagram of a schmitt trigger circuit and five incomplete statements concerning circuit operation, correctly complete at least three of the statements. CTS: 6a(3) Meas: PC (0/2)					
C 217		C1-19 Do you work on DC transistor amplifiers (switching applications)	28	7	12	4	67
F 359		F3-1 Do you trace block diagrams of circuits containing waveshaping circuits (WSC)	33	2	3	2	65
F 360		F3-2 Do you trace schematic diagrams of WSC	33	1	3	1	61
F 363		F3-5 Do you adjust or calibrate WSC	22	1	3	1	58
F 370		F3-12 Do you perform tasks on square wave generator WSC	31	1	3	2	63
F 371		F3-13 Do you perform tasks on rectangular wave generator WSC	11	1	3	1	47
F 372		F3-14 Do you perform tasks on Schmitt trigger WSC	33	1	6	1	46
0156		IV 5d. Given a trainer console, circuit card and schematic diagram of a bistable multivibrator, measure and record the operational characteristics (output voltage levels/state of flip flops) of the multivibrator. CTS: 6b8 Meas: PC (3.5/0)					
C 217		C1-19 Do you work on DC transistor amplifiers (switching applications)	28	7	12	4	67
F 347		F2-1 Do you trace block diagrams of circuits containing multivibrators	44	3	26	2	59
F 348		F2-2 Do you trace schematic diagrams of multivibrator circuits	42	3	24	1	59
F 351		F2-5 Do you adjust or align multivibrator circuits	27	3	21	1	51
F 353		F2-7 Do the multivibrators you work with use RC networks	32	1	18	1	54
F 357		F2-11 Do you perform tasks on bistable (flip flop) multivibrators	46	2	29	1	58
F 359		F3-1 Do you trace block diagrams of circuits containing waveshaping circuits (WSC)	33	2	3	2	65
F 360		F3-2 Do you trace schematic diagrams of WSC	33	1	3	1	61
F 363		F3-5 Do you adjust or calibrate WSC	22	1	3	1	58
F 370		F3-12 Do you perform tasks on square wave generator WSC	31	1	3	2	63
F 371		F3-13 Do you perform tasks on rectangular wave generator WSC	11	1	3	1	47

D T Tsk Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50

0157	ELECTRONIC PRINCIPLES Volume 5 of 7 Volumes					

0158	V. Solid State Waveshaping Circuits and Soldering					

0159	V 1. Pulsed and Blocking Oscillators	4/2				

0160	V 1a. Given the schematic diagrams of four pulsed oscillators and a list of input gates/output waveforms, correctly match at least three of the input gates/output waveforms with the correct oscillator. CTS: 6a(2) Meas: PC (2/0)					

F 327	F1-1 Do you trace block diagrams of circuits containing oscillators	35	5	65	2	71
F 328	F1-2 Do you trace schematic diagrams of oscillator circuits	34	4	56	1	72
F 331	F1-5 Do you align or adjust oscillator circuits	30	7	56	2	62
F 332	F1-6 Do the oscillators you work with use LC tank circuits	14	2	26	1	57
F 343	F1-17 Do you perform tasks on pulse generating oscillator circuits	16	3	29	1	43

0161	V 1b. Given six multiple choice questions, with four options each, concerning blocking oscillator operation, correctly answer at least four of the questions. CTS: 6b(9) Meas: PC (2/0)					

F 327	F1-1 Do you trace block diagrams of circuits containing oscillators	35	5	65	2	71
F 328	F1-2 Do you trace schematic diagrams of oscillator circuits	34	4	56	1	72
F 331	F1-5 Do you align or adjust oscillator circuits	30	7	56	2	62
F 332	F1-6 Do the oscillators you work with use LC tank circuits	14	2	26	1	57
F 344	F1-18 Do you perform tasks on blocked/blocking oscillator circuits	3	0	0	1	20

D
 T Task
 Y Nbr

Task Title

306 362 362 918
 53 51 53 50

0162 V 1c. Given three multiple choice questions with four options each, circuit schematic diagram and input, base and output waveforms for a triggered blocking oscillator, correctly answer at least two of the questions. CTS: 6b(9) Meas: PC (0/1)

F 327 F1-1 Do you trace block diagrams of circuits containing oscillators 35 5 65 2 71
 F 328 F1-2 Do you trace schematic diagrams of oscillator circuits 34 4 56 1 72
 F 331 F1-5 Do you align or adjust oscillator circuits 30 7 56 2 62
 F 332 F1-6 Do the oscillators you work with use LC tank circuits 14 2 26 1 57
 F 344 F1-18 Do you perform tasks on blocked/blocking oscillator circuits 3 0 0 1 20

0163 V 1d. Given a schematic diagram of a free-running blocking oscillator and the symptoms of three malfunctions, write the correct cause of the malfunction in the space provided. CTS: 6b(9) Meas: PC (0/1)

F 329 F1-3 Do you troubleshoot to isolate a faulty oscillator circuit 33 5 62 1 70
 F 330 F1-4 Do you troubleshoot oscillators to circuit level components 30 2 18 1 68
 F 332 F1-6 Do the oscillators you work with use LC tank circuits 14 2 26 1 57
 F 344 F1-18 Do you perform tasks on blocked/blocking oscillator circuits 3 0 0 1 20

0164 V 2. Sawtooth and Trapezoidal Generators 5/0

0165 V 2a. Given an oscilloscope, trainer console, signal generator, and circuit card, determine the effect on linearity when component size and/or input frequency is changed. CTS: 6b(9) Meas: PC (4/0)

A 98 A3-16 Do you trace schematic or block diagrams of circuits containing solid-state special purpose devices 53 9 29 14 88
 A 103 A3-21 Do you perform tasks on unijunction transistors (UJT) 35 1 15 2 80
 F 359 F3-1 Do you trace block diagrams of circuits containing waveshaping circuits (WSC) 33 2 3 2 65
 F 360 F3-2 Do you trace schematic diagrams of WSC 33 1 3 1 61

D	Tsk	Task Title	306	362	362	362	918
Y	Nbr		53	51	53	54	50
F 363		F3-5 Do you adjust or calibrate WSC	22	1	3	1	58
F 364		F3-6 Do you perform tasks on sawtooth wave generator WSC	26	1	3	1	58

0166 V 2b. Given three multiple choice questions, with four options each, concerning trapezoidal wave generators, correctly answer at least two of the questions. CTS: 6b(9) Meas: PC (1/0)

F 359		F3-1 Do you trace block diagrams of circuits containing waveshaping circuits (WSC)	33	2	3	2	65
F 360		F3-2 Do you trace schematic diagrams of WSC	33	1	3	1	61
F 363		F3-5 Do you adjust or calibrate WSC	22	1	3	1	58
F 365		F3-7 Do you perform tasks on trapezoidal (ramp) wave generator WSC	14	1	3	1	55

0167 V 3. Limiters and Clampers 9/2

0168 V 3a. Given the schematic diagrams of the series, shunt, biased shunt, and double diode limiters, and a list of limiter output waveforms, correctly match the waveform to the schematic diagram. At least five of the nine matches must be correct. CTS: 6b(10) Meas: PC (3/0)

F 373		F4-1 Do you trace block diagrams of circuits containing limiters	20	1	21	1	56
F 374		F4-2 Do you trace schematic diagrams of limiter circuits	20	2	15	1	58
F 381		F4-9 Do you perform tasks on series diode limiter circuits	14	2	18	1	49
F 382		F4-10 Do you perform tasks on shunt diode limiter circuits	12	2	15	1	47
F 383		F4-11 Do you perform tasks on bias limiter circuits	9	2	9	1	30

0169 V 3b. Given five load line graphs and five circuit schematic diagrams, plot a load line for each circuit. At least three of the load lines must be plotted correctly. CTS: 6b(10) Meas: PC (0/2)

A 93		A3-11 Do you use transistor characteristic curves	20	4	15	3	37
------	--	---	----	---	----	---	----

D
 T Task
 Y Nbr

Task Title

306 362 362 362 918
 53 53 51 54 50

0170 V 3c. Given the schematic diagrams, input waveforms, output waveforms, and a list of the transistor limiter circuit names, correctly match the circuit name to the proper schematic diagram. At least four of the six matches must be correct. CTS: 6b(10) Meas: PC (2/0)

F 373 F4-1 Do you trace block diagrams of circuits containing limiters 20 1 21 1 56
 F 374 F4-2 Do you trace schematic diagrams of limiter circuits 20 2 15 1 58
 F 385 F4-13 Do you perform tasks on transistor limiter circuits 11 1 9 1 46

0171 V 3d. Given an oscilloscope, trainer console, circuit card and a list of clamper circuit terms, determine the types of clamper circuits by observing the output waveforms. At least four of the six responses must be correct. CTS: 6b(10) Meas: PC (4/0)

F 375 F4-3 Do you trace block diagrams of circuits containing clammers 15 0 12 1 48
 F 376 F4-4 Do you trace schematic diagrams of clamper circuits 14 0 12 1 48
 F 387 F4-15 Do you perform tasks on diode clamper circuits 11 1 12 1 41
 F 388 F4-16 Do you perform tasks on bias clamper circuits 5 1 9 1 25

0172 V 4. Soldering Techniques 9.5/4

0173 V 4a. Given a list of 14 statements pertaining to soldering procedures and a list of 14 items (tools, materials, type of solder, flux, and characteristics of a properly soldered connection), correctly match at least nine of the statements with the proper items. CTS: 7a Meas: PC (1/2)

A 141 A5-1 Do you solder or desolder hardware connections 95 88 97 86 94
 A 142 A5-2 Do you solder or desolder component connections such as resistors, capacitors, diodes, transformers, etc 94 66 91 35 94

D Task Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
0174	V 4b. Given tools and materials, correctly solder at least three of the four connections to bifurcated and turret terminals. CTS: 7a Meas: PC (3/0)					
A 141	A5-1 Do you solder or desolder hardware connections	95	88	97	86	94
A 142	A5-2 Do you solder or desolder component connections such as resistors, capacitors, diodes, transformers, etc	94	66	91	35	94
0175	V 4c. Given the tools and materials, correctly desolder at least three of the four bifurcated and turret terminal connections. CTS: 7a Meas: PC (2/0)					
A 141	A5-1 Do you solder or desolder hardware connections	95	88	97	86	94
A 142	A5-2 Do you solder or desolder component connections such as resistors, capacitors, diodes, transformers, etc	94	66	91	35	94
0176	V 4d. Given four multiple choice questions, with four options each, pertaining to soldering on printed circuit boards, correctly answer at least three of the questions. CTS: 7b Meas: PC (0/2)					
A 143	A5-3 Do you solder or desolder printed circuit board connections	85	44	74	19	89
0177	V 4e. Given tools and materials, solder at least 20 of the 23 circuit board connections. CTS: 7b Meas: PC (2/0)					
A 143	A5-3 Do you solder or desolder printed circuit board connections	85	44	74	19	89
0178	V 4f. Given tools and materials, correctly desolder a resistor from a circuit board. CTS: 7b Meas: PC (1.5/0)					
A 143	A5-3 Do you solder or desolder printed circuit board connections	85	44	74	19	89

D
 Y Tsk
 Y Nbr

Task Title

306 362 362 362 918
 53 51 53 54 50

0179 ELECTRONIC PRINCIPLES Volume 6 of 7 Volumes

0180 VI. Digital Techniques

0181 VI 1. Numbering Systems

6/2

0182 VI 1a. Given 36 problems, correctly convert at least two out of the three whole numbers from decimal, binary, octal, and hexadecimal to their equivalent in each of the other numbering systems. CTS: 8a
 Meas: PC (2/0)

G 389 G1-1 Do you convert decimal numbers to binary numbers or binary numbers to decimal 42 23 6 2 39
 G 390 G1-2 Do you convert octal numbers to binary or binary numbers to octal 29 13 0 1 33
 G 391 G1-3 Do you convert hexadecimal numbers to binary or binary numbers to hexadecimal 30 17 3 1 30
 G 392 G1-4 Do you convert octal numbers to decimal or decimal numbers to octal 27 13 0 1 33
 G 393 G1-5 Do you convert hexadecimal numbers to decimal or decimal numbers to hexadecimal 29 16 9 1 29
 G 394 G1-6 Do you convert octal numbers to hexadecimal or hexadecimal numbers to octal 24 11 0 1 27

0183 VI 1b. Solve at least three of five given binary addition problems. CTS: 8a Meas: PC (1/0)

G 396 G1-8 Do you add binary numbers 40 19 3 3 39

D T Y	Task Title	306 53	362 51	362 53	362 54	918 50
0184	VI 1c. Solve at least three of five given binary subtraction problems. CTS: 8a Meas: PC (1/0)					
G 397	GI-9 Do you subtract binary numbers	35	17	0	3	39
0185	VI 1d. Solve at least three of five given octal addition problems. CTS: 8a Meas: PC (1/0)					
G 400	GI-12 Do you add octal numbers	24	9	0	1	32
0186	VI 1e. Solve at least three of five given octal subtraction problems. CTS: 8a Meas: PC (1/0)					
G 401	GI-13 Do you subtract octal numbers	23	9	0	1	31
0187	VI 1f. Solve at least three of five given binary multiplication problems. CTS: 8a Meas: PC (0/1)					
G 398	GI-10 Do you multiply binary numbers	24	12	0	3	31
0188	VI 1g. Solve at least three of five given binary division problems. CTS: 8a Meas: PC (0/1)					
G 399	GI-11 Do you divide binary numbers	24	10	0	3	30
0189	VI 2. Logic Functions and Boolean Equations 8/2					
0190	VI 2a. Given a schematic diagram and/or logic symbol of a diode AND, OR, and EXCLUSIVE OR gate, construct a two input truth table for each gate. CTS: 8b Meas: PC (5/0)					
G 412	GI-24 Do you trace data flow through logic symbol diagrams	59	6	15	2	70

D T Y	Task Title	306 53	362 51	362 53	362 54	918 50
G 413	G1-25 Do you trace data flow through logic schematic diagrams	60	6	12	2	71
G 417	G1-29 Do you trace data flow through circuits using positive logic (High = Binary 1)	52	4	12	1	69
G 418	G1-30 Do you trace data flow through circuits using negative logic (High = Binary 0)	44	4	12	1	51
G 419	G1-31 Do you perform tasks related to AND gates	59	10	32	2	80
G 420	G1-32 Do you perform tasks related to OR gates	59	10	32	2	80
G 421	G1-33 Do you perform tasks related to inhibited gates logic functions	46	9	3	1	64
G 422	G1-34 Do you perform tasks related to NAND or NOR gates	58	10	29	2	80
G 432	G1-44 Do you perform tasks related to inverters	49	5	18	1	72
0191	VI 2b. Given the diagrams of NPN and PNP, series and parallel, direct coupled transistor logic circuits, construct a truth table for each circuit. CTS: 8b Meas: PC					
G 413	G1-25 Do you trace data flow through logic schematic diagrams	60	6	12	2	71
0192	VI 2c. Given a schematic diagram of a current mode logic circuit, complete a truth table. At least 12 of the 16 responses must be correct. CTS: 8b Meas: PC					
G 441	G1-53 Do you perform tasks on ECL/CML (emitter coupled or current mode logic)	13	1	0	1	20
0193	VI 2d. Given three logic diagrams, develop the Boolean equation (consisting of three to six gates) for each. At least two of the equations must be correct. CTS: 8c Meas: PC					
G 435	G1-47 Do you develop Boolean equations from logic circuits or diagrams	17	3	0	1	17

D	Tsk	Task Title	306	362	362	362	918
Y	Nbr		53	51	53	54	50
0194		VI 2e. Given three Boolean equations, develop the logic diagrams (consisting of three to six gates) for each. At least two of the diagrams must be correct. CTS: 8c Meas: PC (0/2)					
G 436		G1-48 Do you develop logic diagrams from Boolean equations	14	3	0	1	17
0195		VI 3. Logic Circuits					
0196		VI 3a. Given the logic diagram of a serial half adder and a serial full adder and selected input conditions, determine the SUM and CARRY outputs for each input condition. At least five of the eight responses must be correct. CTS: 8d Meas: PC (2/0)					
G 503		G3-16 Do you trace data flow through combinational logic circuits	24	5	0	2	30
G 513		G3-26 Do you perform tasks on adders	16	2	0	1	26
0197		VI 3b. Given the logic diagram of a four bit parallel adder with a selected input, determine the SUM and CARRY outputs. At least three of the five responses must be correct. CTS: 8d Meas: PC (2/0)					
G 503		G3-16 Do you trace data flow through combinational logic circuits	24	5	0	2	30
G 513		G3-26 Do you perform tasks on adders	16	2	0	1	26
0198		VI 3c. Given the logic diagram of a J-K flip-flop circuit, construct a truth table. CTS: 8d Meas: PC (0/2)					
G 427		G1-39 Do you perform tasks related to JK flip flops	46	5	6	2	58

D	T Task	Task Title	306	362	362	362	918
Y	Nbr		53	51	53	54	50

0199 VI 3d. Given the schematic diagrams of the astable, monostable, and bistable multivibrators and Schmitt trigger and a list of statements describing their application in digital circuits, match at least three of the four circuits with its application.
 CTS: 8d Meas: PC (2/0)

G 413	G1-25 Do you trace data flow through logic schematic diagrams	60	6	12	2	71
G 433	G1-45 Do you perform tasks related to complemented flip flops	28	3	3	1	40
G 434	G1-46 Do you perform tasks related to complementing flip flops	29	3	3	1	40

0200 VI 4. Counters and Registers 7.5/2

0201 VI 4a. Given the logic diagram of a four-stage serial up-counter or down-counter having complementing flip-flops, write the binary count in the counter after a clear or set pulse and a given number of clock pulses have passed. At least three of four conditions must be answered correctly. CTS: 8d. Meas: PC (1.5/0)

G 412	G1-24 Do you trace data flow through logic symbol diagrams	59	6	15	2	70
G 434	G1-46 Do you perform tasks related to complementing flip flops	29	3	3	1	40
G 488	G3-1 Do you trace data flow through circuits containing counters	40	5	6	1	43
G 491	G3-4 Do you perform tasks on UP counters in logic circuits	35	1	3	2	30
G 492	G3-5 Do you perform tasks on DOWN counters in logic circuits	34	1	3	2	27
G 497	G3-10 Do you perform tasks on asynchronous (serial) counters in logic circuits	29	2	3	1	22

D

T Task
Y Nbr

Task Title

306	362	362	362	918
53	51	53	54	50

0202

VI 4b. Given the logic diagram of a four-stage serial up-counter and down-counter having complemented flip-flops, determine the state of the flip-flops after a clear or set pulse is applied and a given number of clock pulses have passed. At least five of the eight flip-flops must be labeled correctly. CTS: 8d
Meas: PC (1.5/0)

G 412	G1-24 Do you trace data flow through logic symbol diagrams	59	6	15	2	70
G 433	G1-45 Do you perform tasks related to complemented flip flops	28	3	3	1	40
G 488	G3-1 Do you trace data flow through circuits containing counters	40	5	6	1	43
G 491	G3-4 Do you perform tasks on UP counters in logic circuits	35	1	3	2	30
G 492	G3-5 Do you perform tasks on DOWN counters in logic circuits	34	1	3	2	27
G 496	G3-9 Do you perform tasks on synchronous (parallel) counters in logic circuits	29	3	6	1	22
G 497	G3-10 Do you perform tasks on asynchronous (serial) counters in logic circuits	29	2	3	1	22

0203

VI 4c. Given the logic diagram of a four-stage ring counter, write the state of each flip-flop after a clear pulse and a given number of input pulse have passed. At least three of the four flip-flops must be labeled correctly. CTS: 8d Meas: PC (1/0)

G 412	G1-24 Do you trace data flow through logic symbol diagrams	59	6	15	2	70
G 488	G3-1 Do you trace data flow through circuits containing counters	40	5	6	1	43
G 494	G3-7 Do you perform tasks on ring counters in logic circuits	16	1	0	0	8

0204

VI 4d. Given the logic diagram of a decade counter, determine the state (Hi/Low) of the flip-flops after a clear pulse and a selected number of trigger pulses are applied. At least three of the four responses must be correct. CTS: 8d Meas: PC (0/2)

G 412	G1-24 Do you trace data flow through logic symbol diagrams	59	6	15	2	70
G 488	G3-1 Do you trace data flow through circuits containing counters	40	5	6	1	43

D	T	Y	Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
G	493			G3-6 Do you perform tasks on DECADE counters in logic circuits	16	0	6	1	34

0205 VI 4e. Given the logic diagram of a count detect circuit, determine the state of the flip-flops when a specific count is reached. At least two of the three problems must be answered correctly. CIS: 8d Meas: PC (1.5/0)

G	503			G3-16 Do you trace data flow through combinational logic circuits	24	5	0	2	30
G	515			G3-28 Do you perform tasks on count detect circuits	12	1	3	1	15

0206 VI 4f. Given the logic diagram of a serial up-counter, containing a specified count, feeding a parallel storage register, write the binary count stored in the storage register after a read-in pulse has passed. At least two of the three problems must be answered correctly. CIS: 8d Meas: PC (1/0)

G	498			G3-11 Do you trace logic diagrams of circuits containing registers	31	3	0	1	22
G	502			G3-15 Do you perform tasks on storage registers in logic circuits	32	2	3	2	23

0207 VI 4g. Given the logic diagram of a three-stage shift register containing a specified count, write the state of each flip-flop after a specified number of shift pulses have passed. At least two of the three problems must be answered correctly. CIS: 8d Meas: PC (1/0)

G	498			G3-11 Do you trace logic diagrams of circuits containing registers	31	3	0	1	22
G	501			G3-14 Do you perform tasks on shift registers in logic circuits	35	2	0	2	26

0208 ELECTRONIC PRINCIPLES Volume 7 of 7 Volumes

D	T	Y	Nbr	Task Title	306	362	362	362	918
					53	51	53	54	50

0209 VII. Integrated Circuits/Devices

0210 VII 1. Introduction to Integrated Circuits 3.5/0

0211 VII 1a. From a list of ten characteristics, select those that apply to integrated circuits. CTS: 9a Meas: PC (2/0)

A 95	A3-13 Do you trace schematic or block diagrams of circuits containing integrated circuits (IC)	84	15	50	20	92
G 438	G1-50 Do you perform tasks on RTL (resistor transistor logic formally DCTL)	24	2	0	1	40
G 439	G1-51 Do you perform tasks on DTL (diode transistor logic)	28	1	0	1	41
G 440	G1-52 Do you perform tasks on TTL (transistor transistor logic)	38	3	6	1	61
G 441	G1-53 Do you perform tasks on ECL/CML (emitter coupled or current mode logic)	13	1	0	1	20
G 442	G1-54 Do you perform tasks on HTL (high threshold logic)	4	1	0	1	18
G 443	G1-55 Do you perform tasks on CMOS (complementary metal oxide semiconductor)	28	3	3	1	52
G 444	G1-56 Do you perform tasks on positive MOS ICs	16	2	0	1	23
G 445	G1-57 Do you perform tasks on negative MOS ICs	11	2	0	1	22
G 446	G1-58 Do you perform tasks on vertical MOS ICs	7	1	0	0	15

0212 VII 1b. From a list of ten statements, select those that pertain to electrostatic sensitive devices.
 CTS: 9a Meas: PC (1.5/0)

0213 VII 2. Computer Related Logic Circuit 7/2

D
 T Task
 Y Nbr

Task Title

306 362 362 362 918
 53 51 53 54 50

0214 VII 2a. From a list of ten statements, choose those describing computer related logic circuits. CTS: 9a
 Meas: PC (0/2)

G 412	G1-24 Do you trace data flow through logic symbol diagrams	59	6	15	2	70
G 424	G1-36 Do you perform tasks related to RS flip flops	32	5	12	1	52
G 425	G1-37 Do you perform tasks related to D(Data) flip flops	33	5	9	1	46
G 426	G1-38 Do you perform tasks related to T(Toggle) flip flops	36	4	9	1	48
G 503	G3-16 Do you trace data flow through combinational logic circuits	24	5	0	2	30
G 506	G3-19 Do you perform tasks on encoders	23	5	0	2	27
G 507	G3-20 Do you perform tasks on decoders	23	5	0	2	28
G 508	G3-21 Do you perform tasks on multiplexers	18	9	0	1	30
G 509	G3-22 Do you perform tasks on demultiplexers	14	5	0	1	24
G 516	G4-1 Do you trace data flow through A/D converters	22	6	0	2	45
G 517	G4-2 Do you trace data flow through D/A converters	21	6	0	2	42
G 521	G4-6 Do the converters you perform tasks on use successive approximation conversion	3	2	0	1	11
G 523	G4-8 Do the converters you perform tasks on use R2R conversion	1	0	0	0	6

0215 VII 2b. From a list of ten characteristics/symbols, select those that apply to computer related logic circuits. CTS: 9a Meas: PC (6/0)

G 412	G1-24 Do you trace data flow through logic symbol diagrams	59	6	15	2	70
G 424	G1-36 Do you perform tasks related to RS flip flops	32	5	12	1	52
G 425	G1-37 Do you perform tasks related to D(Data) flip flops	33	5	9	1	46
G 426	G1-38 Do you perform tasks related to T(Toggle) flip flops	36	4	9	1	48
G 503	G3-16 Do you trace data flow through combinational logic circuits	24	5	0	2	30
G 506	G3-19 Do you perform tasks on encoders	23	5	0	2	27
G 507	G3-20 Do you perform tasks on decoders	23	5	0	2	28
G 508	G3-21 Do you perform tasks on multiplexers	18	9	0	1	30
G 509	G3-22 Do you perform tasks on demultiplexers	14	5	0	1	24
G 516	G4-1 Do you trace data flow through A/D converters	22	6	0	2	45
G 517	G4-2 Do you trace data flow through D/A converters	21	6	0	2	42
G 521	G4-6 Do the converters you perform tasks on use successive approximation conversion	3	2	0	1	11
G 523	G4-8 Do the converters you perform tasks on use R2R conversion	1	0	0	0	6

D T Tsk Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
0216	VII 2c. Given a logic trainer, logic diagram, and necessary supporting data, construct a selected, operable computer related logic circuit. CTS: 9a Meas: PC (1/0)					
G 412	G1-24 Do you trace data flow through logic symbol diagrams	59	6	15	2	70
G 424	G1-36 Do you perform tasks related to RS flip flops	32	5	12	1	52
G 503	G3-16 Do you trace data flow through combinational logic circuits	24	5	0	2	30
G 508	G3-21 Do you perform tasks on multiplexers	18	9	0	1	30
0217	VII 3. Introduction to Computers 3/2					
0218	VII 3a. Given a list of ten computers related terms and a list of definitions, match each term with its proper definitions. CTS: 9b Meas: PC (0/2)					
G 447	G2-1 Do you trace block or schematic diagrams of computer controlled or computer based systems	41	14	18	4	25
G 455	G2-9 Do you perform tasks on digital computers	45	34	21	3	22
0219	VII 3b. Given a list of the five basic digital computer units and a list of functions, match each computer unit with its function. CTS: 9b Meas: PC (3/0)					
G 447	G2-1 Do you trace block or schematic diagrams of computer controlled or computer based systems	41	14	18	4	25
G 455	G2-9 Do you perform tasks on digital computers	45	34	21	3	22
G 470	G2-24 Do you perform tasks on computer keyboards	65	37	32	8	26
G 471	G2-25 Do you perform tasks on computer character printers	62	28	18	6	24
G 472	G2-26 Do you perform tasks on magnetic tape drives	57	37	0	3	11
G 474	G2-28 Do you perform tasks on video display unit (VDU/monitors)	58	28	6	6	15
G 475	G2-29 Do you perform tasks on paper tape readers/punches	53	3	0	2	8
G 476	G2-30 Do you perform tasks on paper card readers/punches	40	1	0	1	6
G 479	G2-33 Do you perform tasks on modems	42	26	24	11	10
G 480	G2-34 Do you perform tasks on line printers	51	22	15	7	15
G 481	G2-35 Do you perform tasks on floppy disc drives	35	19	26	6	13
G 483	G2-37 Do you perform tasks on removable pack disc drives	25	1	0	2	5

D T Tsk Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
G 484	G2-38 Do you perform tasks on fixed winchester type disc drives	6	17	9	5	10

0220 VII 4. Microprocessors 4.5/2

0221 VII 4a. Given a list of microprocessor sections and a list of their functions, match the microprocessor sections with their respective function. CTS: 9c(1) Meas: PC (4.5/0)

G 485 G2-39 Do you trace block or schematic diagrams of microprocessor controlled systems 36 5 12 2 41

0222 VII 4b. From a list of ten statements, correctly identify those that apply to microprocessor operating principles. CTS: 9c(1) Meas: PC (0/2)

G 485 G2-39 Do you trace block or schematic diagrams of microprocessor controlled systems 36 5 12 2 41

0223 VII 5. Computer Memories 3/2

0224 VII 5a. Given a list of magnetic storage devices and a list of characteristics, match the characteristics with the correct storage device. CTS: 9b Meas: PC (1.5/0)

G 466 G2-20 Do you perform tasks on magnetic (tape, disc, core) computer memories 54 39 18 7 17

0225 VII 5b. Given a list of memory device characteristics, correctly select at least eight of ten that apply to semiconductor memory devices. CTS: 9b Meas: PC (1.5/0)

G 467 G2-21 Do you perform tasks on semiconductor (RAM, ROM, EPROM, PROM) computer memories 45 22 9 6 20

D	T	Y	Nbr	Task Title	306	362	362	362	918
					53	51	53	54	50

0226 VII 5c. Given a formula and selected memory dimensions, calculate the total storage capacity of a semiconductor memory device. CTS: 9b Meas: PC (0/2)

G 467	G2-21	Do you perform tasks on semiconductor (RAM, ROM, EPROM, PROM) computer memories	45	22	9	6	20
-------	-------	---	----	----	---	---	----

0227 VII 6. Microcomputer Fundamentals 6.5/0

0228 VII 6a. From a list of ten statements, correctly identify those that apply to microcomputer operating characteristics. CTS: 9b Meas: PC (6.5/0)

G 447	G2-1	Do you trace block or schematic diagrams of computer controlled or computer based systems	41	14	18	4	25
G 448	G2-2	Do you load programs	27	28	21	8	17
G 453	G2-7	Do you use computer flow charts or diagrams	35	17	12	3	16
G 455	G2-9	Do you perform tasks on digital computers	45	34	21	3	22
G 456	G2-10	Do you use Basic computer language	16	14	3	5	11
G 457	G2-11	Do you use COBOL computer language	3	1	0	2	4
G 458	G2-12	Do you use FORTRAN computer language	3	1	3	1	4
G 462	G2-16	Do you use PASCAL computer language	1	2	0	1	4
G 464	G2-18	Do you use Machine computer language	6	5	0	2	5

Tasks not referenced

A 17	A1-17	Do you adjust relays	38	69	68	42	71
A 18	A1-18	Do you perform tasks on contacts, cores, coils, armatures, or springs	68	71	68	46	93
A 21	A1-21	Do you troubleshoot circuits to isolate a faulty inductor, choke, or choke coil	58	20	65	8	80
A 26	A1-26	Do you ohm check inductors	54	19	62	5	74
A 34	A1-34	Do you use capacitor color codes in your present job	20	10	21	7	29
A 42	A1-42	Do you trace schematic or block diagrams of circuits containing three phase transformers	31	9	26	5	68
A 43	A1-43	Do you troubleshoot circuits to isolate a faulty three phase transformer	28	6	24	2	58
A 44	A1-44	Do you adjust three phase transformers	17	5	18	3	39

D T Y	Task Title	306 53	362 51	362 53	362 54	918 50
A 46	A2-2 Do you troubleshoot circuits to isolate a faulty DC motor	70	17	6	11	90
A 47	A2-3 Do you troubleshoot DC motor component parts	51	11	3	1	78
A 50	A2-6 Do you troubleshoot circuits to isolate a faulty AC motor	81	10	3	10	89
A 51	A2-7 Do you troubleshoot AC motor component parts	71	6	0	2	81
A 54	A2-10 Do you troubleshoot to isolate a faulty DC generator	11	12	6	2	36
A 55	A2-11 Do you troubleshoot DC generator component parts	9	6	3	2	30
A 58	A2-14 Do you troubleshoot circuits to isolate a faulty AC generator	6	7	12	4	34
A 59	A2-15 Do you troubleshoot AC generator component parts	4	4	0	2	27
A 61	A2-17 Do you trace schematic or block diagrams of circuits containing alternators	7	0	3	1	9
A 62	A2-18 Do you troubleshoot circuits to isolate a faulty alternator	7	0	3	1	8
A 63	A2-19 Do you troubleshoot alternator component parts	4	0	0	1	8
A 64	A2-20 Do you perform tasks on component parts of alternators	4	0	0	1	8
A 65	A2-21 Do you trace schematic or block diagrams of circuits containing synchros or servos	22	1	0	1	53
A 66	A2-22 Do you troubleshoot circuits to isolate a faulty synchro or servo	22	1	0	1	52
A 67	A2-23 Do you troubleshoot synchro or servo component parts	16	1	0	1	42
A 68	A2-24 Do you perform tasks on component parts of synchros or servos	16	1	0	1	41
A 69	A2-25 Do you trace schematic or block diagrams of circuits containing choppers	3	0	3	0	27
A 70	A2-26 Do you troubleshoot circuits to isolate a faulty chopper	3	1	3	0	25
A 71	A2-27 Do you measure chopper coil excitation frequency	2	0	3	0	17
A 72	A2-28 Do you measure chopper coil voltage-current phase relationship	3	0	3	0	12
A 73	A2-29 Do you trace schematic or block diagrams of circuits containing transducers	5	1	3	1	62
A 74	A2-30 Do you troubleshoot circuits to isolate a faulty transducer	5	1	3	1	64
A 75	A2-31 Do you calibrate or adjust transducers	4	1	0	1	51
A 76	A2-32 Do you repair, clean or lubricate transducers	3	0	0	0	48
A 77	A2-33 Do you trace schematic or block diagrams of circuits containing solenoids	44	4	0	4	92
A 78	A2-34 Do you troubleshoot circuits to isolate a faulty solenoid	43	4	0	3	92
A 79	A2-35 Do you perform maintenance on solenoid component parts	33	3	0	3	89
A 80	A2-36 Do you trace schematic or block diagrams of circuits containing meter movements	19	8	15	5	74
A 81	A2-37 Do you troubleshoot circuits to isolate a faulty meter movement	18	8	12	4	73
A 82	A2-38 Do you perform maintenance on meter movement mechanical parts	13	4	9	3	53
A 84	A3-2 Do you troubleshoot circuits to isolate a faulty diode	85	47	82	28	93
A 86	A3-4 Do you use diode characteristic curves	17	3	12	4	36

D	T Task	Task Title	306 53	362 51	362 53	362 54	918 50
	Y Nbr						
A	87	A3-5 Do you use diode substitution information	28	6	24	4	69
A	88	A3-6 Do you use diode color codes	19	8	12	6	24
A	92	A3-10 Do you check transistors using transistor testers	60	11	44	7	67
A	94	A3-12 Do you use transistor substitution information	40	6	21	4	81
A	96	A3-14 Do you troubleshoot circuits to isolate a faulty IC	79	10	35	13	90
A	97	A3-15 Do you use IC substitution information	45	6	18	3	80
A	99	A3-17 Do you troubleshoot circuits to isolate a faulty solid-state special purpose device	51	8	26	11	83
A	101	A3-19 Do you perform tasks on tunnel diodes	27	1	9	1	40
A	106	A3-24 Do you perform tasks on pin diodes	14	0	3	3	27
A	108	A3-26 Do you perform tasks on fantail transistors	12	0	0	1	21
A	110	A3-28 Do you perform tasks on triacs	29	1	3	1	80
A	111	A3-29 Do you perform tasks on programmable unijunction transistors (PUT)	7	0	0	1	75
A	113	A3-31 Do you perform tasks on silicon unilateral switches (SUS)	6	0	3	0	63
A	114	A3-32 Do you perform tasks on step recovery diodes (SRD)	6	0	0	1	17
A	115	A3-33 Do you perform tasks on field effect diodes (FED)	15	1	0	1	39
A	116	A3-34 Do you perform tasks on DIAC (Bi-directional trigger diode)	9	0	0	0	60
A	117	A3-35 Do you perform tasks on varistors	46	15	41	16	58
A	118	A3-36 Do you perform tasks on metal oxide varistors (MOV)	8	0	6	2	29
A	119	A3-37 Do you perform tasks on schottky diodes	9	1	6	2	50
A	120	A4-1 Do you trace block diagrams of circuits containing electron tubes	11	9	0	1	36
A	121	A4-2 Do you trace schematic diagrams of electron tube circuits	9	7	0	1	35
A	122	A4-3 Do you troubleshoot circuits to isolate a faulty electron tube	10	8	0	1	34
A	123	A4-4 Do you use electron tube characteristic curves	1	3	0	0	12
A	124	A4-5 Do you use electron tube substitution manuals or charts	3	4	0	0	23
A	125	A4-6 Do you perform tasks on diode tubes	3	2	0	1	23
A	126	A4-7 Do you perform tasks on triode tubes	2	1	0	1	21
A	127	A4-8 Do you perform tasks on tetrode tubes	2	1	0	1	17
A	128	A4-9 Do you perform tasks on pentode tubes	2	1	0	1	20
A	129	A4-10 Do you perform tasks on beam power tubes	1	2	0	1	11
A	130	A4-11 Do you perform tasks on gas tubes	2	4	0	1	16
A	131	A4-12 Do you perform tasks on phantastons	1	1	0	1	5
A	132	A4-13 Do you perform tasks on neon tubes	3	1	0	1	20
A	133	A4-14 Do you perform tasks on xenon tubes	0	0	0	0	10
A	134	A4-15 Do you perform tasks on nixie tubes	3	1	0	0	11
A	135	A4-16 Do you trace block diagrams of circuits containing cathode ray tubes (CRT)	42	2	12	1	68
A	136	A4-17 Do you trace schematic diagrams of CRT circuits	42	3	12	1	67
A	137	A4-18 Do you troubleshoot to isolate a faulty CRT	44	2	12	1	61
A	138	A4-19 Do you adjust or calibrate circuits that control CRT operations	41	2	12	1	67
A	139	A4-20 Do you perform tasks on electrostatic CRT	21	0	12	1	33
A	140	A4-21 Do you perform tasks on electromagnetic CRT	22	2	12	1	45

D T Task Y Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
A 144	A5-4 Do you solder or desolder multi-layer circuit board connections	35	17	26	9	57
A 145	A5-5 Do you perform high reliability soldering	78	45	71	32	70
A 146	A5-6 Do you use crimping tool to repair or make connections	89	52	91	78	95
A 147	A5-7 Do you use wire wrap tool to make connections	59	91	91	89	43
A 148	A5-8 Do you use punch-on tool to make connections	35	70	71	95	36
A 149	A5-9 Do you repair or fabricate connectors or cables on multiconductor cables	55	53	50	84	75
A 150	A5-10 Do you repair or fabricate connectors or cables on coaxial cables	46	19	32	19	77
A 151	A5-11 Do you repair or fabricate connectors or cables on triaxial cables	18	8	6	7	31
A 152	A5-12 Do you repair or fabricate connectors or cables on ribbon cables	41	8	3	13	64
B 154	B1-2 Do you use the multimeter to measure AC voltage values	98	85	91	81	99
B 155	B1-3 Do you use the multimeter to extend the range of voltmeters using external shunts	24	11	35	10	49
B 157	B1-5 Do you use the multimeter to measure AC current values	78	60	71	49	89
B 158	B1-6 Do you use the multimeter to extend the range of ammeters using external shunts	16	8	26	6	35
B 172	B3-1 Do you use signal generators (SG) to perform operational checks	51	29	94	11	71
B 173	B3-2 Do you use SG to perform alignments, adjustments, or calibrations	48	26	88	9	69
B 174	B3-3 Do you use SG to troubleshoot circuits	45	30	94	16	64
B 175	B3-4 Do you use audio sine-wave signal generators	15	16	79	6	30
B 176	B3-5 Do you use audio non-sinusoidal signal generators	7	1	9	2	22
B 177	B3-6 Do you use RF less than 1,000MH signal generators	6	5	15	3	21
B 178	B3-7 Do you use RF greater than 1,000MH signal generators	4	3	6	3	11
B 179	B3-8 Do you use white noise signal generators	4	2	6	0	18
B 180	B3-9 Do you use pattern signal generators	34	1	3	1	25
B 181	B3-10 Do you use pseudo-random signal generators	10	1	3	0	8
B 182	B3-11 Do you use time mark signal generators	16	2	3	1	48
B 183	B3-12 Do you use multi-function (square/sine/triangular) signal generators	14	2	3	2	69
B 184	B3-13 Do you use TV signal generators	4	0	3	0	17
B 185	B4-1 Do you use frequency counters	71	53	97	11	76
B 186	B4-2 Do you use spectrum analyzers	13	3	3	2	14
B 187	B4-3 Do you use field strength testers	3	1	3	2	11
B 189	B4-5 Do you use digital logic probes	24	3	24	2	77
B 190	B4-6 Do you use capacitance testers	9	5	18	7	55
B 191	B4-7 Do you use capacitor substitution boxes	3	1	3	2	37
B 192	B4-8 Do you use DC restorers (CRT rejuvenators)	2	0	6	2	10
B 193	B4-9 Do you use logic current tracers	8	1	6	2	42
B 194	B4-10 Do you use tube testers	4	1	3	2	19
B 195	B4-11 Do you use logic pulsers	11	0	15	2	67
B 196	B4-12 Do you use logic analyzers	11	1	6	2	37
B 197	B4-13 Do you use signature analyzers	3	0	3	2	20
B 198	B4-14 Do you use reflectometers	2	1	3	2	11
C 233	C3-9 Do you perform tasks on optical coupling circuits	19	0	6	2	42

D	T	Task Title	306 53	362 51	362 53	362 54	918 50
C 234	T	C4-1 Do you trace block diagrams of circuits containing electron tube amplifiers	2	4	0	1	18
C 235	Y	C4-2 Do you trace schematic diagrams of electron tube amplifiers	2	4	0	1	16
C 236		C4-3 Do you troubleshoot to isolate a faulty electron tube amplifier	2	4	0	1	16
C 237		C4-4 Do you troubleshoot electron tube amplifiers to circuit level components	1	3	0	1	17
C 238		C4-5 Do you troubleshoot electron tube amplifier distortion	1	3	0	1	10
C 239		C4-6 Do you adjust or align electron tube amplifiers	2	4	0	1	11
C 240		C4-7 Do you measure electron tube amplifier voltage, current, or power gain	2	4	0	1	14
C 241		C4-8 Do you calculate values of electron tube amplifier voltage, current, or power gain	1	3	0	1	9
C 242		C4-9 Do you perform tasks on paraphase electron tube amplifiers	1	0	0	0	6
C 243		C4-10 Do you perform tasks on push-pull electron tube amplifiers	0	1	0	1	11
C 244		C4-11 Do you perform tasks on audio electron tube amplifiers	0	1	0	1	8
C 245		C4-12 Do you perform tasks on voltage regulator electron tube amplifiers	2	1	0	1	15
C 246		C4-13 Do you perform tasks on common grid electron tube amplifiers	0	1	0	1	16
C 247		C4-14 Do you perform tasks on common cathode electron tube amplifiers	1	1	0	1	16
C 248		C4-15 Do you perform tasks on cathode follower electron tube amplifiers	1	1	0	1	14
C 250		C5-2 Do you troubleshoot to isolate a faulty op amp circuit	26	4	26	2	83
C 257		C5-9 Do you use or apply operational amplifiers as active filters	8	2	6	2	48
C 258		C5-10 Do you use or apply operational amplifiers as oscillators	19	2	21	2	61
C 259		C5-11 Do you use or apply operational amplifiers as integrators	6	1	0	1	58
C 260		C5-12 Do you use or apply operational amplifiers for differentiators	9	1	0	1	56
C 261		C5-13 Do you use or apply operational amplifiers for power supplies (voltage regulators)	29	2	18	6	68
C 262		C5-14 Do you use or apply operational amplifiers as analog/digital (A/D) digital/analog (D/A) converters	24	5	9	2	64
C 263		C5-15 Do you use or apply operational amplifiers as multivibrators	27	1	15	1	59
C 264		C5-16 Do you use or apply operational amplifiers as modulators/demodulators	16	2	12	1	38
C 265		C6-1 Do you trace block diagrams of circuits containing magnetic amplifiers	1	2	0	1	2
C 266		C6-2 Do you trace schematic diagrams of magnetic amplifier circuits	1	2	0	1	2

Task Title	306 53	362 51	362 53	362 54	918 50
C 267 C6-3 Do you troubleshoot to isolate a faulty magnetic amplifier	1	1	0	0	2
C 268 C6-4 Do you troubleshoot magnetic amplifiers to circuit level components	1	1	0	0	2
C 269 C6-5 Do you adjust magnetic amplifiers or components	1	1	0	0	2
C 270 C6-6 Do you trace block diagrams of circuits containing saturable reactors	0	1	0	0	2
C 271 C6-7 Do you trace schematic diagrams of saturable reactor circuits	0	1	0	0	2
C 272 C6-8 Do you troubleshoot to isolate a faulty saturable reactor	0	1	0	0	4
C 273 C6-9 Do you troubleshoot saturable reactors to circuit level components	0	0	0	0	2
C 274 C6-10 Do you adjust saturable reactor circuits or components	0	0	0	0	2
D 277 D1-3 Do you troubleshoot circuits to isolate a faulty power supply	88	37	85	68	92
D 278 D1-4 Do you troubleshoot power supplies to circuit level components	81	22	79	22	92
D 284 D1-10 Do you perform tasks on voltage multipliers (doubblers/triplers)	37	2	21	6	64
D 285 D1-11 Do you perform tasks on DC to DC converters	41	19	29	9	50
D 286 D1-12 Do you perform tasks on inverters (DC to AC converters)	36	24	32	13	58
D 287 D1-13 Do you perform tasks on switching power supplies	12	6	6	6	59
D 291 D2-3 Do you troubleshoot circuits to isolate a faulty power supply filter	57	5	47	7	73
D 301 D2-4 Do you troubleshoot power supply filters to circuit level components	49	3	35	4	73
D 302 D3-3 Do you troubleshoot circuits to isolate a faulty power supply voltage regulator	66	8	50	6	84
D 306 D3-4 Do you troubleshoot power supply voltage regulators to circuit level components	59	5	41	3	82
D 307 D3-8 Do you perform tasks on IC power supply voltage regulators	36	1	6	1	72
D 308 D3-9 Do you perform tasks on pulse width modulator power supply voltage regulators	15	0	0	1	29
D 309 D3-10 Do you perform tasks on transistor series power supply voltage regulators with current limiting	33	1	24	2	55
E 311 D3-11 Do you perform tasks on crow bar power supply voltage regulators	13	0	0	1	17
E 313 E1-2 Do you troubleshoot RCL circuits to circuit level components	32	5	21	2	64
E 318 E1-4 Do you troubleshoot resonant RCL circuits to circuit level components	21	3	18	2	52
E 319 E2-2 Do you troubleshoot circuits to isolate a faulty frequency sensitive filter	10	3	53	4	29
E 321 E2-3 Do you troubleshoot frequency sensitive filters to circuit level components	6	1	32	1	28
E 322 E2-5 Do you calculate capacitance or inductance values for specific frequency sensitive filters	3	0	18	1	16

T Y	Task Nbr	Task Title	306 53	362 51	362 53	362 54	918 50
F	335	F1-9 Do the oscillators you work with use phase lock loops (PLL)	9	2	3	0	15
F	340	F1-14 Do you perform tasks on voltage control oscillators (VCO/VTD)	14	2	12	1	31
F	345	F1-19 Do you perform tasks on burst generators	2	1	0	0	17
F	349	F2-3 Do you troubleshoot to isolate a faulty multivibrator circuit	39	3	24	1	58
F	350	F2-4 Do you troubleshoot multivibrators to circuit level components	35	1	21	1	56
F	352	F2-6 Do the multivibrators you work with use LC tank circuits	16	1	12	1	43
F	354	F2-8 Do the multivibrators you work with use Crystals	27	1	6	1	54
F	358	F2-12 Do you perform tasks on triggered astable multivibrators	26	1	9	1	48
F	361	F3-3 Do you troubleshoot to isolate a faulty WSC	30	1	3	1	59
F	362	F3-4 Do you troubleshoot WSC to circuit level components	27	1	3	1	58
F	377	F4-5 Do you troubleshoot to isolate a faulty limiter circuit	16	1	15	1	52
F	378	F4-6 Do you troubleshoot limiters to circuit level components	14	1	12	1	48
F	379	F4-7 Do you troubleshoot to isolate a faulty clamper circuit	14	1	12	1	45
F	380	F4-8 Do you troubleshoot clammers to circuit level components	12	0	12	1	44
F	384	F4-12 Do you perform tasks on zener diode circuits	21	1	24	1	58
F	386	F4-14 Do you perform tasks on triode limiter circuits	4	0	9	1	23
G	395	G1-7 Do you convert base number fractions to another base numbering system	21	9	0	1	26
G	402	G1-14 Do you add hexadecimal numbers	23	9	0	1	27
G	403	G1-15 Do you subtract hexadecimal numbers	23	9	0	1	27
G	404	G1-16 Do you use binary coded decimal (BCD)	30	12	6	1	33
G	405	G1-17 Do you use gray codes	3	2	0	1	12
G	406	G1-18 Do you use ICAO codes	3	1	0	1	6
G	407	G1-19 Do you use excess-3 (XS3) codes	3	2	0	0	7
G	408	G1-20 Do you use parity bit codes	35	9	3	1	8
G	409	G1-21 Do you use biquinary codes	4	1	0	0	5
G	410	G1-22 Do you use ASCII codes	62	6	6	1	12
G	411	G1-23 Do you use EBCDI codes	6	3	0	0	8
G	414	G1-26 Do you troubleshoot digital systems to major units	58	13	9	2	64
G	415	G1-27 Do you troubleshoot digital systems subassemblies or circuit cards	58	15	15	2	68
G	416	G1-28 Do you troubleshoot digital systems, subsystems or circuit cards to circuit level components or IC	50	5	9	1	67
G	423	G1-35 Do you perform tasks related to exclusive OR/NOR logic functions	54	10	12	1	70
G	428	G1-40 Do you perform tasks related to Schmidt triggers	50	2	12	1	48
G	429	G1-41 Do you perform tasks related to delay (One-shot) logic functions	35	4	3	1	45
G	430	G1-42 Do you perform tasks related to open collector gates (wired "AND" or wired "OR")	28	3	0	1	33
G	431	G1-43 Do you perform tasks related to buffers	41	8	6	1	63

D T Y	Task Title	306 53	362 51	362 53	362 54	918 50
G 437	G1-49 Do you simplify Boolean expressions using Boolean algebra	16	3	0	1	17
G 449	G2-3 Do you write or debug programs	6	11	6	5	7
G 450	G2-4 Do you troubleshoot computers to a major unit	42	26	21	6	19
G 451	G2-5 Do you troubleshoot computers to a subassembly or circuit card	43	26	21	3	16
G 452	G2-6 Do you troubleshoot computer subassembly or circuit card to circuit level components or IC	30	6	6	2	18
G 454	G2-8 Do you perform tasks on analog computers	18	6	0	3	16
G 459	G2-13 Do you use ADA computer language	0	0	0	1	3
G 460	G2-14 Do you use ATLAS computer language	1	0	0	1	4
G 461	G2-15 Do you use ELAN computer language	0	0	0	1	3
G 463	G2-17 Do you use RPG computer language	0	0	0	1	3
G 465	G2-19 Do you use C computer language	1	0	0	1	4
G 468	G2-22 Do you perform tasks on paper (tape, punch card) computer memories	44	8	0	2	15
G 469	G2-23 Do you perform tasks on advanced technology (bubble, CCD, electron beam, laser, thin film) computer memories	15	0	0	1	5
G 473	G2-27 Do you perform tasks on microprocessor computer terminals	38	13	0	4	15
G 477	G2-31 Do you perform tasks on toggle or push button switch inputs	34	10	0	3	12
G 478	G2-32 Do you perform tasks on incandescent displays (Nixie tubes, LEDs, LCDs)	38	10	3	3	17
G 482	G2-36 Do you perform tasks on removable cartridge disc drives	14	3	3	3	8
G 486	G2-40 Do you troubleshoot microprocessor controlled systems to a subassembly or circuit card	37	5	12	2	41
G 487	G2-41 Do you troubleshoot microprocessor controlled systems to isolate a faulty microprocessor	26	2	9	2	36
G 489	G3-2 Do you troubleshoot counter circuits to isolate a faulty counter	35	3	6	1	42
G 490	G3-3 Do you troubleshoot counters to circuit level components	30	0	6	1	39
G 495	G3-8 Do you perform tasks on modulus counters in logic circuits	5	0	0	0	8
G 499	G3-12 Do you troubleshoot circuits containing registers to isolate a faulty register	27	2	0	1	22
G 500	G3-13 Do you troubleshoot registers to circuit level components	25	1	0	1	22
G 504	G3-17 Do you troubleshoot to isolate a faulty combinational logic circuit	23	3	0	2	30
G 505	G3-18 Do you troubleshoot combinational logic circuits to circuit level components	19	2	0	2	27
G 510	G3-23 Do you perform tasks on comparators	16	2	0	1	33
G 511	G3-24 Do you perform tasks on parity generators or checkers	18	3	0	1	13
G 512	G3-25 Do you perform tasks on code converters	18	2	0	1	18
G 514	G3-27 Do you perform tasks on subtractors	13	2	0	1	20
G 518	G4-3 Do you troubleshoot A/D converter circuits	19	12	0	1	45
G 519	G4-4 Do you troubleshoot D/A converter circuits	19	12	0	1	42

D	Task Title	306	362	362	362	362	918
T		53	51	53	54	50	
Y	Nbr						
G 520	G4-5 Do the converters you perform tasks on use flash conversion	1	1	0	0	7	
G 522	G4-7 Do the converters you perform tasks on use ramp conversion	7	1	0	1	14	
H 524	H1-1 Do you measure electrical length on transmission lines	5	7	9	6	2	
H 525	H1-2 Do you measure physical length on transmission lines	6	6	6	14	5	
H 526	H1-3 Do you measure standing wave ratio (SWR) on transmission lines	2	1	3	2	0	
H 527	H1-4 Do you construct transmission lines	5	10	6	15	2	
H 528	H1-5 Do you match transmission line impedance with loads	6	9	9	6	2	
H 529	H1-6 Do you calculate the characteristic impedance (Z0) of transmission lines	3	3	3	4	1	
H 530	H1-7 Do you troubleshoot transmission lines	14	38	15	37	3	
H 531	H1-8 Do you perform tasks on open-wire transmission lines	7	21	9	24	1	
H 532	H1-9 Do you perform tasks on twisted pair transmission lines	15	42	15	44	4	
H 533	H1-10 Do you perform tasks on twin lead transmission lines	8	9	6	13	3	
H 534	H1-11 Do you perform tasks on flexible coaxial transmission lines	11	9	3	9	5	
H 535	H1-12 Do you perform tasks on rigid coaxial transmission lines	5	3	3	5	2	
H 536	H1-13 Do you perform tasks on fiber-optic transmission lines	4	5	3	4	2	
H 537	H1-14 Do you trace schematic or block diagrams of circuits containing waveguides	1	1	0	2	2	
H 538	H1-15 Do you troubleshoot circuits to isolate a faulty waveguide assembly	1	1	0	1	1	
H 539	H1-16 Do you pressurize or purge waveguide assemblies	0	1	0	1	2	
H 540	H1-17 Do you measure standing wave ratio for waveguide assemblies	0	1	0	1	1	
H 541	H1-18 Do you remove or install waveguide or associated coupling hardware components	1	1	0	1	1	
H 542	H2-1 Do you trace schematic or block diagrams of circuits containing microwave oscillators or amplifiers	1	2	0	1	2	
H 543	H2-2 Do you troubleshoot circuits to isolate a faulty microwave oscillator or amplifier	1	1	0	1	2	
H 544	H2-3 Do you tune or adjust microwave oscillators or amplifiers	0	1	0	2	1	
H 545	H2-4 Do you perform tasks on two-cavity klystron microwave oscillators and amplifiers	0	1	0	1	1	
H 546	H2-5 Do you perform tasks on three-cavity klystron microwave oscillators and amplifiers	0	0	0	1	0	
H 547	H2-6 Do you perform tasks on reflex klystron microwave oscillators and amplifiers	0	1	0	1	1	
H 548	H2-7 Do you perform tasks on traveling wave tube microwave oscillators and amplifiers	0	1	0	1	1	
H 549	H2-8 Do you perform tasks on magnetron microwave oscillators and amplifiers	0	1	0	1	4	
H 550	H2-9 Do you perform tasks on backward wave oscillator	0	0	0	1	0	
H 551	H2-10 Do you perform tasks on parametric amplifiers	0	0	0	1	0	

D	Tsk	Task Title	306	362	362	362	362	918
Y	Nbr		53	51	53	54	50	
H	552	H2-11 Do you perform tasks on yttrium iron garnet (YIG) tuned microwave oscillators and amplifiers	0	0	0	1	0	0
H	553	H3-1 Do you trace schematic or block diagrams of circuits containing resonant cavities	0	1	0	1	1	1
H	554	H3-2 Do you troubleshoot circuits to isolate a faulty resonant cavity	0	1	0	1	1	1
H	555	H3-3 Do you tune or adjust resonant cavities electrically	0	1	0	1	1	0
H	556	H3-4 Do you tune or adjust resonant cavities physically	0	1	0	1	1	2
H	557	H3-5 Do you measure frequency of resonant cavities	0	1	0	1	1	0
H	558	H3-6 Do you perform tasks on probe resonant cavities	0	1	0	1	1	1
H	559	H3-7 Do you perform tasks on loop resonant cavities	0	0	0	1	1	0
H	560	H3-8 Do you perform tasks on aperture (iris/window) resonant cavities	0	1	0	1	1	0
H	561	H4-1 Do you use "AM" modulation principles	1	1	0	1	1	2
H	562	H4-2 Do you trace block diagrams of AM transmitters	1	1	0	1	1	2
H	563	H4-3 Do you trace block diagrams of AM transmitter subassemblies or circuit cards	1	1	0	1	1	3
H	564	H4-4 Do you trace schematic diagrams of AM transmitter subassemblies or circuit cards	1	1	0	1	1	4
H	565	H4-5 Do you troubleshoot AM transmitters to major units	1	1	0	1	1	2
H	566	H4-6 Do you troubleshoot AM transmitters to subassemblies or circuit cards	1	1	0	1	1	2
H	567	H4-7 Do you troubleshoot AM transmitter subassemblies or circuit cards to circuit level components	1	1	0	1	1	2
H	568	H4-8 Do you align or adjust AM transmitters or circuits	1	1	0	1	1	2
H	569	H4-9 Do you calculate percentage of modulation for AM transmitters	1	1	0	1	1	1
H	570	H4-10 Do you use "AM" demodulation principles	1	1	0	1	1	1
H	571	H4-11 Do you trace block diagrams of AM receivers	1	1	0	1	1	2
H	572	H4-12 Do you trace block diagrams of AM receiver subassemblies or circuit cards	1	1	0	1	1	2
H	573	H4-13 Do you trace schematic diagrams of AM receiver subassemblies or circuit cards	1	1	0	1	1	2
H	574	H4-14 Do you troubleshoot AM receivers to major units	1	1	0	1	1	2
H	575	H4-15 Do you troubleshoot AM receivers to subassemblies or circuit cards	0	1	0	1	1	2
H	576	H4-16 Do you troubleshoot AM receiver subassemblies or circuit cards to circuit level components	0	1	0	1	1	2
H	577	H4-17 Do you align or adjust AM receivers or circuits	0	1	0	1	1	2
H	578	H4-18 Do you trace block diagrams of single side band (SSB) transmitters	0	1	0	0	0	0
H	579	H4-19 Do you trace block diagrams of SSB transmitter subassemblies or circuit cards	0	1	0	0	0	0
H	580	H4-20 Do you trace schematic diagrams of SSB transmitter subassemblies or circuit cards	0	1	0	0	0	0
H	581	H4-21 Do you troubleshoot SSB transmitters to major units	0	1	0	0	0	0
H	582	H4-22 Do you troubleshoot SSB transmitters to subassemblies or circuit cards	0	1	0	0	0	0
H	583	H4-23 Do you troubleshoot SSB transmitter subassemblies or circuit cards to circuit level components	0	1	0	0	0	0

D	Tsk	Task Title	306	362	362	362	918
Y	Nbr		53	51	53	54	50
H 584		H4-24 Do you align or adjust SSB transmitters or circuits	0	1	0	0	0
H 585		H4-25 Do you calculate percentage of modulation for SSB transmitters	0	1	0	0	0
H 586		H4-26 Do you trace block diagrams of SSB receivers	0	1	0	0	0
H 587		H4-27 Do you trace block diagrams of SSB receiver subassemblies or circuit cards	0	1	0	0	0
H 588		H4-28 Do you trace schematic diagrams of SSB receiver subassemblies or circuit cards	0	1	0	0	1
H 589		H4-29 Do you troubleshoot SSB receivers to major units	0	1	0	0	0
H 590		H4-30 Do you troubleshoot SSB receivers to sub-assemblies or circuit cards	0	1	0	0	1
H 591		H4-31 Do you troubleshoot SSB receiver subassemblies or circuit cards to circuit level components	0	1	0	0	0
H 592		H4-32 Do you align or adjust SSB receivers or circuits	0	1	0	0	0
H 593		H4-33 Do you use "FM" modulation principles	1	1	0	1	1
H 594		H4-34 Do you trace block diagrams of FM transmitters	2	1	0	1	0
H 595		H4-35 Do you trace block diagrams of FM transmitter subassemblies or circuit cards	2	1	0	1	1
H 596		H4-36 Do you trace schematic diagrams of FM transmitter subassemblies or circuit cards	2	1	0	1	0
H 597		H4-37 Do you troubleshoot FM transmitters to major units	2	1	0	1	1
H 598		H4-38 Do you troubleshoot FM transmitters to sub-assemblies or circuit cards	2	1	0	1	2
H 599		H4-39 Do you troubleshoot FM transmitter subassemblies or circuit cards or circuit level components	1	1	0	1	0
H 600		H4-40 Do you align or adjust FM transmitters or circuits	2	1	0	1	2
H 601		H4-41 Do you calculate modulation index for FM transmitters	1	1	0	1	0
H 602		H4-42 Do you measure frequency deviation for FM transmitters	2	2	0	1	1
H 603		H4-43 Do you use "FM" demodulation principles	2	1	0	1	1
H 604		H4-44 Do you trace block diagrams of FM receivers	2	1	0	1	1
H 605		H4-45 Do you trace block diagrams of FM receiver subassemblies or circuit cards	2	1	0	1	1
H 606		H4-46 Do you trace schematic diagrams of FM receiver subassemblies or circuit cards	2	1	0	1	0
H 607		H4-47 Do you troubleshoot FM receivers to major units	2	1	0	1	1
H 608		H4-48 Do you troubleshoot FM receivers to subassemblies or circuit cards	1	1	0	1	0
H 609		H4-49 Do you troubleshoot FM receiver subassemblies or circuit cards to circuit level components	1	1	0	1	1
H 610		H4-50 Do you align or adjust FM receivers or circuits	1	1	0	1	0
H 611		H4-51 Do you plot receiver signal level curves (RSL) for FM receivers	1	1	0	1	0
H 612		H4-52 Do you use "PM" modulation principles	1	2	0	1	0
H 613		H4-53 Do you trace block diagrams of PM transmitters	1	2	0	1	0
H 614		H4-54 Do you trace block diagrams of PM transmitter subassemblies or circuit cards	1	1	0	1	0
H 615		H4-55 Do you trace schematic diagrams of PM transmitter subassemblies or circuit cards	1	1	0	1	1
H 616		H4-56 Do you troubleshoot PM transmitters to major units	1	1	0	1	0

D	T	Task Title	306 53	362 51	362 53	362 54	918 50
	Y	Nbr					
H 617		H4-57 Do you troubleshoot PM transmitters to sub-assemblies or circuit cards	0	2	0	1	0
H 618		H4-58 Do you troubleshoot PM transmitter subassemblies or circuit cards to circuit level components	0	1	0	1	0
H 619		H4-59 Do you align or adjust PM transmitters or circuits	0	1	0	1	0
H 620		H4-60 Do you calculate pulse recurrence time (PRT) or pulse recurrence frequency (PRF) for PM transmitters	0	1	0	1	1
H 621		H4-61 Do you measure PRT, PRF or pulse width for PM transmitters	0	1	0	1	1
H 622		H4-62 Do you use "PM" demodulation principles	1	3	0	1	1
H 623		H4-63 Do you trace block diagrams of PM receivers	1	2	0	1	1
H 624		H4-64 Do you trace block diagrams of PM receiver subassemblies or circuit cards	1	1	0	1	1
H 625		H4-65 Do you trace schematic diagrams of PM receiver subassemblies or circuit cards	1	1	0	1	1
H 626		H4-66 Do you troubleshoot PM receivers to major units	1	1	0	1	1
H 627		H4-67 Do you troubleshoot PM receivers to subassemblies or circuit cards	0	2	0	1	1
H 628		H4-68 Do you troubleshoot PM receiver subassemblies or circuit cards to circuit level components	0	1	0	1	1
H 629		H4-69 Do you align or adjust PM receivers or circuits	0	1	0	1	1
H 630		H5-1 Do you physically align antennas	1	1	0	1	2
H 631		H5-2 Do you electrically align antennas	0	1	0	1	1
H 632		H5-3 Do you troubleshoot loading of antennas	0	0	0	1	1
H 633		H5-4 Do you troubleshoot coupling of antennas	0	0	0	1	2
H 634		H5-5 Do you plot graph radiation patterns	0	0	0	1	1
H 635		H5-6 Do you troubleshoot antenna components	1	1	0	1	1
H 636		H5-7 Do you measure standing wave ratio (SWR) for antennas	1	1	0	1	0
H 637		H5-8 Do you work with Yagi antennas	0	0	0	0	0
H 638		H5-9 Do you work with dipole antennas	1	1	0	1	1
H 639		H5-10 Do you work with slotted antennas	0	0	0	0	0
H 640		H5-11 Do you work with rotary antennas	0	1	0	0	0
H 641		H5-12 Do you work with hertz antennas	0	0	3	0	0
H 642		H5-13 Do you work with marconi antennas	0	0	0	0	0
H 643		H5-14 Do you work with rhombic antennas	0	0	0	0	0
H 644		H5-15 Do you work with scimitar antennas	0	0	0	0	0
H 645		H5-16 Do you work with parabolic antennas	0	1	0	1	1
H 646		H5-17 Do you work with ground plane antennas	0	0	0	0	0
H 647		H5-18 Do you perform tasks on rotary antenna arrays	0	1	0	0	0
H 648		H5-19 Do you perform tasks on stacked (end fire) antenna arrays	0	0	0	0	0
H 649		H5-20 Do you perform tasks on broadside antenna arrays	0	1	0	0	0
H 650		H5-21 Do you perform tasks on cardioid antenna arrays	0	1	0	0	0
H 651		H5-22 Do you perform tasks on collinear antenna arrays	0	0	0	0	0
H 652		H5-23 Do you perform tasks on phase antenna arrays	0	0	0	1	0
H 653		H5-24 Do you perform tasks on planar antenna arrays	0	0	0	1	0
H 654		H5-25 Do you perform tasks on antennas with vertical polarization	0	0	0	1	0
H 655		H5-26 Do you perform tasks on antennas with horizontal polarization	0	0	0	1	0

D	T	Task Title	306	362	362	362	362	918
Y	Nbr		53	51	53	54	50	
H	656	H5-27 Do you perform tasks on antennas with circular polarization	0	1	0	1	0	0
H	657	H5-28 Do you perform tasks on antennas with unidirectional radiation patterns	1	1	0	1	1	1
H	658	H5-29 Do you perform tasks on antennas with bidirectional radiation patterns	1	1	0	0	0	0
H	659	H5-30 Do you perform tasks on antennas with omnidirectional radiation patterns	1	1	0	0	1	1
I	660	I1-1 Do you measure RF power	1	2	0	1	24	
I	661	I1-2 Do you measure RF peak power	1	1	0	1	17	
I	662	I1-3 Do you measure RF average power	1	1	0	1	18	
I	663	I1-4 Do you measure RF effective power	0	1	0	1	17	
I	664	I1-5 Do you measure RF output power using wattmeters	1	1	0	1	25	
I	665	I2-1 Do you calculate RF apparent power	0	0	0	1	5	
I	666	I2-2 Do you calculate RF true power	0	1	0	1	6	
I	667	I2-3 Do you calculate RF power loss or gain in db	1	2	0	2	6	
J	668	J1-1 Do you trace block diagrams of circuits containing microphones	3	3	44	16	26	
J	669	J1-2 Do you trace schematic diagrams of microphone circuits	3	3	44	13	27	
J	670	J1-3 Do you troubleshoot to isolate a faulty microphone	3	3	47	16	26	
J	671	J1-4 Do you troubleshoot microphones	2	2	29	7	22	
J	672	J1-5 Do you work on carbon microphones	2	4	38	15	8	
J	673	J1-6 Do you work on capacitor microphones	1	1	9	2	6	
J	674	J1-7 Do you work on crystal microphones	0	1	3	1	13	
J	675	J1-8 Do you work on dynamic microphones	1	1	26	3	6	
J	676	J1-9 Do you work on velocity ribbon microphones	0	0	3	1	1	
J	677	J1-10 Do you trace block diagrams of circuits containing speakers	5	8	50	26	43	
J	678	J1-11 Do you trace schematic diagrams of speaker circuits	5	6	50	21	45	
J	679	J1-12 Do you troubleshoot to isolate a faulty speaker	6	9	53	24	45	
J	680	J1-13 Do you troubleshoot speakers	3	4	41	15	33	
J	682	J2-2 Do you trace schematic diagrams of photosensitive device circuits	35	1	0	1	53	
J	683	J2-3 Do you troubleshoot to isolate a faulty photo-sensitive device	35	1	0	1	52	
J	684	J2-4 Do you adjust or calibrate photosensitive devices	27	1	0	1	44	
J	687	J2-7 Do you work on phototubes	2	1	0	0	23	
J	688	J2-8 Do you work on photo-SCRs	4	0	0	0	11	
J	689	J2-9 Do you work on photocells (Photoconductive or Photovoltaic)	28	0	0	0	42	
J	690	J3-1 Do you trace block diagrams of circuits containing display tubes	3	0	0	0	7	
J	691	J3-2 Do you trace schematic diagrams of display tubes or circuits	3	0	0	0	5	
J	692	J3-3 Do you troubleshoot to isolate a faulty display tube	3	0	0	0	7	
J	693	J3-4 Do you adjust or calibrate display tubes or circuits	2	0	0	0	6	
J	694	J3-5 Do you work on direct view storage tubes (DVST)	0	0	0	0	4	
J	695	J3-6 Do you work on multiple mode storage tubes (HMST)	0	0	0	0	3	
J	696	J3-7 Do you work on scan converter tubes (SCT)	0	0	0	0	2	

D T Y	Task Title	306 53	362 51	362 53	362 54	918 50
J 697	J4-1 Do you trace block diagrams of TV systems or subassemblies	1	0	0	1	24
J 698	J4-2 Do you trace schematic diagrams of TV systems or component circuits	2	0	0	1	23
J 699	J4-3 Do you troubleshoot TV systems to major subassemblies	2	0	0	1	24
J 700	J4-4 Do you troubleshoot TV systems to circuit level components	1	0	0	1	23
J 701	J4-5 Do you adjust or calibrate TV systems or components	2	0	0	1	22
J 702	J4-6 Do you trace block diagrams of laser systems or subassemblies	14	0	0	0	13
J 703	J4-7 Do you trace schematic diagrams of laser systems or component circuits	11	0	0	0	12
J 704	J4-8 Do you troubleshoot laser systems to major subassemblies	14	0	0	0	11
J 705	J4-9 Do you troubleshoot laser systems to circuit level components	9	0	0	0	9
J 706	J4-10 Do you adjust or calibrate laser systems or components	11	0	0	0	9
J 707	J4-11 Do you trace block diagrams of infrared systems or subassemblies	3	0	0	0	9
J 708	J4-12 Do you trace schematic diagrams of infrared systems or component circuits	2	0	0	0	8
J 709	J4-13 Do you troubleshoot infrared systems to major subassemblies	3	0	0	0	8
J 710	J4-14 Do you troubleshoot infrared systems circuit level components	2	0	0	0	8
J 711	J4-15 Do you inspect, clean, or service infrared systems or components	3	0	0	0	8
J 712	J4-16 Do you adjust or calibrate infrared systems or components	3	0	0	0	8