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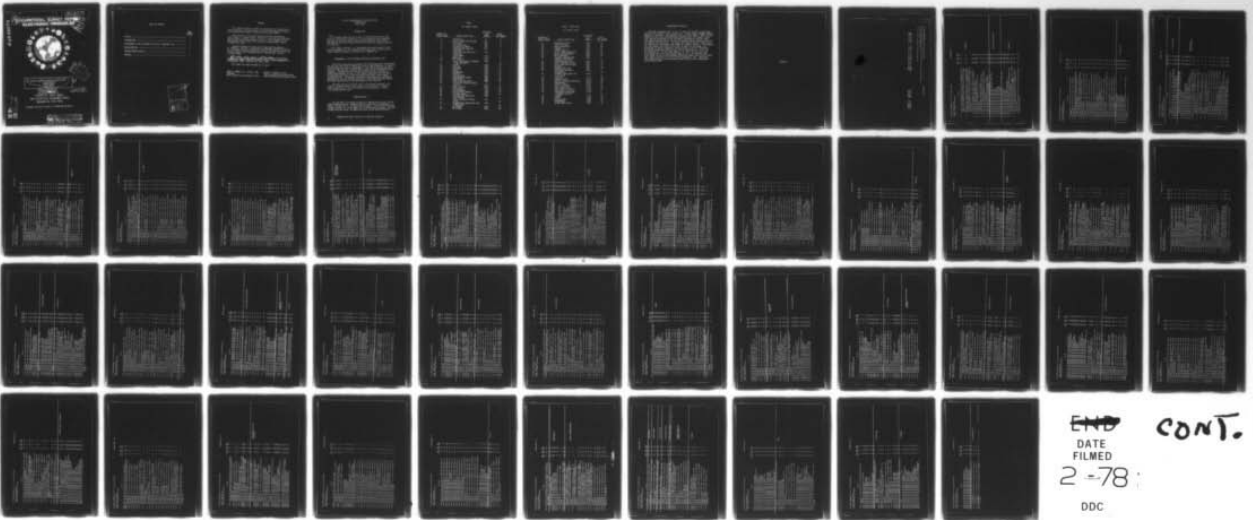
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OCCUPATIONAL SURVEY REPORT ELECTRONIC PRINCIPLES



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SENSOR REPAIR
CAREER LADDER
AFSC 309X0

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OCCUPATIONAL SURVEY BRANCH
USAF OCCUPATIONAL MEASUREMENT CENTER
LACKLAND AFB TEXAS 78236

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PREFACE

This report presents a summary of the results of a detailed Air Force Electronic Principles Survey of the Missile Warning and Space Surveillance Sensor Repair Systems Specialty, AFSC 309X0.

The Electronic Principles Inventory (EPI) was developed by Major Thomas J. O'Connor and Mr. Hendrick W. Ruck and the survey data were analyzed by Captain Thomas E. Ulrich. All are members of the Occupational Survey Branch, USAF Occupational Measurement Center, Lackland AFB, Texas.

Computer programs for analyzing the data were designed by Dr. Raymond E. Christal, Occupational and Manpower Research Division, Air Force Human Resources Laboratory (AFHRL), and were written by the Project Analysis and Programming Branch, Computational Sciences Division, AFHRL.

~~Distribution of this report is made upon request to the USAF Occupational Measurement Center, attention of the Chief, Occupational Survey Branch (OMY), Lackland AFB, Texas 78236.~~

This report has been reviewed and is approved.

JAMES A. TURNER, JR., Colonel, USAF
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MISSILE WARNING AND SPACE SURVEILLANCE
SENSOR REPAIR
AFSC 309X0

INTRODUCTION

→ This report summarizes the results of the administration of the Electronic Principles Inventory to airmen assigned to Missile Warning and Space Surveillance Sensor Repair Systems Specialty (AFSC 309X0). The data for this report were collected during the period April through July 1977. ↵

This report describes: (1) development and administration of the survey instrument; and (2) electronic principles used by DAFSC 5-skill level personnel assigned to selected major commands. ←

DEVELOPMENT OF THE ELECTRONIC PRINCIPLES INVENTORY (EPI)

The EPI was developed by personnel from the Occupational Survey Branch who were well qualified in theoretical physics and electronics, as well as in task analysis and survey development. Over 300 maintenance personnel from SAC, TAC, ADC, MAC, and AFCS participated in the development of the inventory. Representing the five ATC training centers, electronics experts who averaged 12 years of maintenance experience and four years of electronic principles instruction experience spent several weeks refining the EPI. In addition, personnel at the Electrical Engineering Department of the USAF Academy and the Air Force Human Resources Laboratory were consulted during the development of the inventory.

The final version of the EPI used in this survey contained 1,257 items in 62 subject matter areas covering all electronic principles training given at the five ATC technical training centers. Table 1 lists the 62 subject areas.

ADMINISTRATION

The Electronic Principles Inventory was administered by mail to AFSC 30950 airmen worldwide. Responses from 60 individuals represented 63 percent of the total of all AFSC 30950 personnel. There are 96 AFSC 30950 airmen assigned, all in the CONUS, 95 of them assigned to ADCOM. They are divided into two shreds, 60 30950A personnel and 36 30950B personnel.

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TABLE 1
EPI SUBJECT AREAS

<u>SEQUENCE OF SUBJECT AREAS</u>	<u>SUBJECT AREA TITLE</u>	<u>BEGINNING ITEM NUMBER</u>	<u>GPSUM PAGE NUMBER</u>
1	MATHEMATICS	A1	2
2	DIRECT CURRENT AND VOLTAGE	A15	2
3	RESISTANCE	A24	2
4	MULTIMETER USES	B52	3
5	ALTERNATING CURRENT	B61	4
6	INDUCTORS AND INDUCTIVE REACTANCE	B67	4
7	CAPACITORS AND CAPACITIVE REACTANCE	C92	5
8	TRANSFORMERS	C128	6
9	MAGNETISM	C171	7
10	RCL CIRCUITS	D185	8
11	SERIES AND PARALLEL RESONANCE (TIME CONSTANTS)	D229	10
12	FILTERS	D239	10
13	COUPLING	E261	11
14	SOLDERING	E273	11
15	RELAYS	E294	12
16	MICROPHONES	F314	12
17	SPEAKERS	F327	13
18	OSCILLOSCOPES	F342	13
19	SEMICONDUCTOR DIODES	G354	13
20	TRANSISTORS	G404	15
21	TRANSISTOR AMPLIFIERS	G428	16
22	SOLID-STATE SPECIAL PURPOSE DEVICES	H477	19
23	POWER SUPPLIES	H483	19
24	OSCILLATORS	H512	19
25	MULTIVIBRATORS	I539	20
26	LIMITERS AND CLAMPERS	I555	21
27	ELECTRON TUBES	I565	21
28	ELECTRON TUBE AMPLIFIERS AND CIRCUITS	J609	22
29	SPECIAL PURPOSE ELECTRON TUBES	J616	23
30	HETERODYNING, MODULATION, AND DEMODULATION	J632	23
31	AM SYSTEMS	K638	23
32	FM SYSTEMS	K666	24

TABLE 1 (CONTINUED)

EPI SUBJECT AREAS

<u>SEQUENCE OF SUBJECT AREAS</u>	<u>SUBJECT AREA TITLE</u>	<u>BEGINNING ITEM NUMBER-</u>	<u>GPSUM PAGE NUMBER</u>
33	NUMBERING SYSTEMS	K685	25
34	LOGIC FUNCTIONS	L695	25
35	BOOLEAN EQUATIONS	L708	26
36	COUNTERS	L733	27
37	TIMING CIRCUITS	M757	27
38	USE OF SIGNAL GENERATORS	M769	28
39	MOTORS AND GENERATORS	M779	28
40	METER MOVEMENTS	N808	29
41	SATURABLE REACTORS AND MAGNETIC AMPLIFIERS	N818	29
42	WAVESHAPING CIRCUITS	N834	30
43	SINGLE SIDEBAND SYSTEMS	O845	30
44	PULSE MODULATION SYSTEMS	O875	31
45	ANTENNAS	O914	32
46	TRANSMISSION LINES	P953	34
47	WAVEGUIDES AND CAVITY RESONATORS	P984	35
48	MICROWAVE AMPLIFIERS AND OSCILLATORS	P1034	37
49	REGISTERS	Q1110	39
50	STORAGE DEVICES	Q1117	40
51	DIGITAL TO ANALOG CONVERTERS	Q1126	40
52	PHANTASTRONS	Q1140	41
53	SCHMITT TRIGGERS	R1141	41
54	CABLE FABRICATION	R1144	41
55	INPUT/OUTPUT DEVICES	S1146	41
56	PHOTO SENSITIVE DEVICES	S1149	41
57	SYNCHRONOUS VIBRATIONS (CHOPPER CIRCUITS)	S1150	41
58	INFRARED	T1159	41
59	LASERS	T1186	42
60	DISPLAY TUBES	T1220	43
61	PROGRAMMING	U1234	43
62	DB AND POWER RATIOS	U1255	44

PRESENTATION OF RESULTS

Personnel responded "yes" or "no" to the 1,257 electronic principles questions as related to their present job. A Group Summary (GPSUM) computer printout is provided in the Appendix portion of this report. Page 1 of the GPSUM lists the three selected groups identified for this report. Pages 2-44 show the percentage of the incumbents responding to the EPI items. The computer program results display the percent members answering "yes" to the subject area questions. The reader can locate a specific subject area by referring to the Appendix page number as listed in Table 1. For example, the Transformers area results are given on page 6 of the GPSUM. The percentage of survey respondents indicating use of specific electronic principles ranged from high in areas such as Soldering (pp. 11-12) and Oscilloscopes (p. 13) and Power Supplies (p. 19) to low in areas such as Infrared (pp. 41-42) and Display Tubes (p. 43). In addition, some areas appear to discriminate between 30950A and 30950B, such as Oscillators (pp. 19-20), Counters (p. 27) and Single Sideband (p. 30). Additional AFSC 309X0 data can be obtained upon request to the Chief, Occupational Survey Branch (OMY).

APPENDIX

PCT MRS RESPONDING 'YES' BY SELECTED GRPS

GPSMIS PAGE 1

TABULATION OF ELECTRONIC PRINCIPLES UTILIZATION DATA FOR SELECTED GROUPS
IN THE 30950A/B CAREER FIELD.

REPORTS ON THE FOLLOWING GROUPS WERE REQUESTED

GROUP IDENTITY =	SPC276	ALL AIRMEN DAFSC	30950A/B	CONTAINING	60 MEMBERS.
GROUP IDENTITY =	SPC279	ALL AIRMEN DAFSC	30950A	CONTAINING	18 MEMBERS.
GROUP IDENTITY =	SPC280	ALL AIRMEN DAFSC	30950B	CONTAINING	42 MEMBERS.

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

0Y-TSM

SPC SPC SPC
276 279 280

Task ID	Description	SPC	SPC	SPC
A 1	A1-01 DO YOU USE INSTRUMENTS, SUCH AS METERS OR OSCILLOSCOPES, IN WHICH IT IS NECESSARY TO AMPLIFY OR ATTENUATE VOLTAGE, RESISTANCE, ETC., BY POWERS OF 10.	85	89	83
A 2	A1-02 DO YOU USE PUBLICATIONS, SUCH AS A TECHNICAL ORDERS OR MAINTENANCE MANUALS, IN WHICH IT IS NECESSARY FOR YOU TO MULTIPLY OR DIVIDE BY A POWER OF 10 BEFORE YOU CAN APPLY THE INFORMATION FROM THE PUBLICATION IN A USEFUL WAY ON THE JOB.	67	67	67
A 3	A1-03 DO YOU REARRANGE AND SOLVE FORMULAS OR EQUATIONS.	58	61	57
A 4	A1-04 DO YOU CALCULATE THE SQUARE ROOT OF A QUANTITY.	27	22	29
A 5	A1-05 DO YOU SOLVE FOR UNKNOWN QUANTITIES.	38	33	40
A 6	A1-06 DO YOU CONVERT NUMBERS TO LOGARITHMS.	25	28	24
A 7	A1-07 DO YOU USE LOGARITHM TABLES IN ANY TYPE OF CALCULATIONS.	30	44	24
A 8	A1-08 DO YOU SOLVE QUADRATIC EQUATIONS.	7	0	10
A 9	A1-09 DO YOU USE THE NATURAL SYSTEM OF LOGARITHMS.	17	22	14
A 10	A1-10 DO YOU PERFORM CALCULATIONS ON VECTOR QUANTITIES.	13	11	14
A 11	A1-11 DO YOU WORK WITH TRIGONOMETRIC FUNCTIONS SUCH AS SINE, COSINE, OR TANGENT.	32	33	31
A 12	A1-12 DO YOU DETERMINE AREAS OF PLANE FIGURES.	10	11	10
A 13	A1-13 DO YOU SOLVE OR USE SIMULTANEOUS EQUATIONS.	7	0	10
A 14	A1-14 DO YOU SOLVE OR USE PROPORTIONS.	33	33	33
A 15	A2-01 DO YOU USE THE TERM VOLTAGE OR VOLT (V).	95	100	97
A 16	A2-02 DO YOU USE THE TERM ELECTROMOTIVE FORCE (EMF).	43	33	48
A 17	A2-03 DO YOU USE THE TERM OHM.	92	94	90
A 18	A2-04 DO YOU USE THE TERM ION.	38	94	14
A 19	A2-05 DO YOU USE THE TERM DYNE.	8	11	7
A 20	A2-06 DO YOU USE THE TERM AMPERE.	92	94	90
A 21	A2-07 DO YOU USE THE TERM NEUTRON.	13	17	12
A 22	A2-08 DO YOU USE THE TERM COULOMB.	15	28	10
A 23	A2-09 DO YOU USE THE TERM PROTON.	13	17	12
A 24	A3-01 DO YOU WORK WITH RESISTORS IN YOUR PRESENT JOB.	72	72	71
A 25	A3-02 DO YOU INSPECT RESISTORS.	87	83	88
A 26	A3-03 DO YOU CLEAN RESISTORS.	82	78	83
A 27	A3-04 DO YOU ADJUST RESISTORS.	85	83	86
A 28	A3-05 DO YOU CHECK OHMIC VALUE OR RESISTORS.	85	83	86
A 29	A3-06 DO YOU REMOVE OR REPLACE RESISTORS.	85	83	86
A 30	A3-07 DO YOU USE OR REFER TO TEMPERATURE COEFFICIENTS FOR RESISTORS ON ANY TASKS YOU PERFORM.	38	44	36
A 31	A3-08 DO YOU USE OR REFER TO RESISTOR SYMBOLS SUCH AS FIXED RESISTOR SYMBOLS OR TAPPED RESISTOR SYMBOLS.	85	89	83
A 32	A3-09 DO YOU IDENTIFY OR CLASSIFY THE RESISTORS YOU WORK WITH AS CARBON, FIXED WIRE, SLIDE TAP, RHEOSTAT, OR POTENTIOMETER.	80	89	76
A 33	A3-10 DO YOU USE RESISTOR COLOR CODES WHICH INDICATE OHMIC VALUE OF RESISTANCE.	85	83	86

DIRECT CURRENT AND VOLTAGE

RESISTANCE

MATHEMATICS

PCT HRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

Task ID	Description	SPC	SPC	SPC
34	A 34 A3-11 DO YOU USE RESISTOR COLOR CODES WHICH INDICATE TOLERANCE.	85	83	86
35	A 35 A3-12 DO YOU USE RESISTOR COLOR CODES WHICH INDICATE FAILURE RATE.	22	17	24
36	A 36 A3-13 DO YOU MAKE DECISIONS IN WHICH YOU MUST DETERMINE HOW TWO OR MORE BATTERIES MUST BE CONNECTED TOGETHER TO ACHIEVE A SPECIFIC VOLTAGE.	20	11	24
37	A 37 A3-14 DO YOU USE OR REFER TO THE SCHEMATIC SYMBOLS WHICH REPRESENT BATTERIES, FUSES, CONDUCTORS, LAMPS, OR SWITCHES	87	89	86
38	A 38 A3-15 DO YOU CALCULATE TOTAL RESISTANCE FOR SERIES RESISTIVE CIRCUITS.	60	72	55
39	A 39 A3-16 DO YOU CALCULATE TOTAL CURRENT FOR SERIES RESISTIVE CIRCUITS.	50	61	45
40	A 40 A3-17 DO YOU CALCULATE INDIVIDUAL VOLTAGE DROPS FOR SERIES RESISTIVE CIRCUITS.	60	67	57
41	A 41 A3-18 DO YOU CALCULATE POWER DISSIPATION FOR SERIES RESISTIVE CIRCUITS.	40	39	40
42	A 42 A3-19 DO YOU CALCULATE TOTAL RESISTANCE FOR SERIES PARALLEL RESISTIVE CIRCUITS.	58	72	52
43	A 43 A3-20 DO YOU CALCULATE TOTAL CURRENT FOR SERIES PARALLEL RESISTIVE CIRCUITS.	50	67	43
44	A 44 A3-21 DO YOU CALCULATE INDIVIDUAL VOLTAGE DROPS FOR SERIES PARALLEL RESISTIVE CIRCUITS.	57	67	52
45	A 45 A3-22 DO YOU CALCULATE INDIVIDUAL BRANCH CURRENTS FOR SERIES PARALLEL RESISTIVE CIRCUITS.	43	50	40
46	A 46 A3-23 DO YOU CALCULATE POWER DISSIPATION FOR SERIES PARALLEL RESISTIVE CIRCUITS.	28	28	29
47	A 47 A3-24 DO YOU CALCULATE TOTAL RESISTANCE FOR PARALLEL RESISTIVE CIRCUITS.	55	67	50
48	A 48 A3-25 DO YOU CALCULATE TOTAL CURRENT FOR PARALLEL RESISTIVE CIRCUITS.	47	61	40
49	A 49 A3-26 DO YOU CALCULATE INDIVIDUAL VOLTAGE DROPS FOR PARALLEL RESISTIVE CIRCUITS.	55	61	52
50	A 50 A3-27 DO YOU CALCULATE INDIVIDUAL BRANCH CURRENTS FOR PARALLEL RESISTIVE CIRCUITS.	47	50	45
51	A 51 A3-28 DO YOU CALCULATE POWER DISSIPATION FOR PARALLEL RESISTIVE CIRCUITS.	33	28	36
52	B 52 B1-01 DO YOU MEASURE RESISTANCE.	83	83	83
53	B 53 B1-02 DO YOU REPAIR OHMMETERS.	10	6	12
54	B 54 B1-03 DO YOU MEASURE VOLTAGE.	87	89	86
55	B 55 B1-04 DO YOU REPAIR VOLTMETERS.	10	0	14
56	B 56 B1-05 DO YOU REPAIR AMMETERS.	7	0	10
57	B 57 B1-06 DO YOU MEASURE CURRENT.	65	83	86
58	B 58 B1-07 DO YOU USE MULTIMETERS.	85	89	83
59	B 59 B1-08 DO YOU DIRECTLY USE A QUANTITY OF CHARGE CALLED A COULOMB.	13	11	14
60	B 60 B1-09 DO YOU READ SCHEMATICS.	88	100	83

MULTIMETER USES

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

DI-TSK	SPC	SPC	SPC
	276	279	280
B 61 B2-01 DO YOU USE OR REFER TO THE TERM EFFECTIVE VOLTAGE (RMS).	75	83	71
B 62 B2-02 DO YOU USE OR REFER TO THE TERM PEAK TO PEAK VOLTAGE.	87	83	88
B 63 B2-03 DO YOU USE OR REFER TO THE TERM AVERAGE VOLTAGE (DC).	85	89	83
B 64 B2-04 DO YOU USE OR REFER TO THE TERM WAVE LENGTH.	63	61	64
B 65 B2-05 DO YOU USE OR REFER TO THE TERM FREQUENCY.	88	94	86
B 66 B2-06 DO YOU USE OR REFER TO THE TERM INSTANTANEOUS VALUE.	40	39	40
B 67 B3-01 DO YOU WORK WITH INDUCTORS OR CIRCUITS CONTAINING INDUCTORS, CHOKES, OR CHOKE COILS IN YOUR PRESENT JOB.	77	78	76
B 68 B3-02 DO YOU INSPECT INDUCTORS.	78	83	76
B 69 B3-03 DO YOU CLEAN INDUCTORS.	75	78	74
B 70 B3-04 DO YOU ADJUST INDUCTORS.	75	72	76
B 71 B3-05 DO YOU REMOVE OR REPLACE INDUCTORS.	82	83	81
B 72 B3-06 DO YOU USE OR REFER TO HENRIES.	62	72	57
B 73 B3-07 DO YOU USE OR REFER TO INDUCTIVE REACTANCE.	62	67	60
B 74 B3-08 DO YOU USE OR REFER TO COPPER LOSS IN INDUCTORS.	45	61	38
B 75 B3-09 DO YOU USE OR REFER TO HYSTERESIS LOSS IN INDUCTORS.	8	0	12
B 76 B3-10 DO YOU USE OR REFER TO EDDY CURRENT LOSS IN INDUCTORS.	8	6	10
B 77 B3-11 DO YOU USE OR REFER TO THE GENERAL RULE THAT INDUCTANCE IS PROPORTIONAL TO THE SQUARE OF THE NUMBER OF TURNS OF THE COIL.	12	6	14
B 78 B3-12 DO YOU USE OR REFER TO THE GENERAL RULE THAT INDUCTANCE OF A COIL IS DIRECTLY PROPORTIONAL TO THE CROSS SECTIONAL AREA OF THE CORE.	17	11	19
B 79 B2-13 DO YOU USE OR REFER TO THE GENERAL RULE THAT THE INDUCTANCE OF A COIL IS INVERSELY PROPORTIONAL TO ITS LENGTH.	15	6	19
B 80 B2-14 DO YOU USE OR REFER TO THE GENERAL RULE THAT THE INDUCTANCE OF A COIL IS INVERSELY PROPORTIONAL TO ITS LENGTH.	13	6	17
B 81 B2-15 DO YOU USE OR REFER TO THE GENERAL RULE THAT THE PERMEABILITY OF THE CORE MATERIAL.	10	6	12
B 82 B2-16 DO YOU CALCULATE INDUCTANCE FOR PARTICULAR INDUCTORS USING FORMULAS.	13	11	14
B 83 B3-17 DO YOU CALCULATE THE TOTAL INDUCTANCE FOR INDUCTORS IN SERIES.	18	17	19
B 84 B3-18 DO YOU CALCULATE THE TOTAL INDUCTANCE FOR INDUCTORS IN PARALLEL.	17	11	19
B 85 B3-19 DO YOU CALCULATE THE TOTAL INDUCTANCE FOR INDUCTORS IN SERIES-PARALLEL CIRCUITS.	15	6	10
B 86 B3-20 DO YOU USE OR REFER TO THE GENERAL RULE THAT CURRENT LAGS VOLTAGE IN AC INDUCTOR CIRCUITS.	37	39	36
B 87 B3-21 DO YOU CALCULATE INDUCTIVE REACTANCE.	17	22	14
B 88 B3-22 DO YOU USE OR REFER TO THE GENERAL RULE THAT INDUCTIVE REACTANCE IS DIRECTLY PROPORTIONAL TO FREQUENCY.	35	39	33
B 89 B3-23 DO YOU WORK WITH POWER INDUCTORS.	48	72	38
B 90 B3-24 DO YOU WORK WITH AUDIO FREQUENCY INDUCTORS.	30	22	33
B 91 B3-25 DO YOU WORK WITH RADIO FREQUENCY INDUCTORS.	63	78	57

ALTERNATING CURRENT

INDUCTORS AND
INDUCTIVE REACTANCE

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

Task ID	Description	SPC	SPC	SPC	SPC
		276	279	280	
C 92	CI-01 DO YOU WORK WITH CAPACITORS OR CIRCUITS CONTAINING CAPACITORS IN YOUR PRESENT JOB.	72	67	74	
C 93	CI-02 DO YOU INSPECT CAPACITORS.	83	83	83	CAPACITORS AND CAPACITIVE REACTANCE
C 94	CI-03 DO YOU CLEAN CAPACITORS.	80	78	81	
C 95	CI-04 DO YOU ADJUST CAPACITORS.	77	78	76	
C 96	CI-05 DO YOU TEST CAPACITORS.	73	78	71	
C 97	CI-06 DO YOU DISCHARGE CAPACITORS.	60	78	81	
C 98	CI-07 DO YOU REMOVE OR REPLACE CAPACITORS.	82	83	81	
C 99	CI-08 DO YOU USE OR REFER TO DISTRIBUTED CAPACITANCE.	23	22	24	
C 100	CI-09 DO YOU USE OR REFER TO ORBITAL STRESS OF ELECTRONS IN A DIELECTRIC.	8	6	10	
C 101	CI-10 DO YOU USE OR REFER TO FARADS, MICROFARADS, OR PICOFARADS.	80	89	76	
C 102	CI-11 DO YOU USE OR REFER TO CAPACITANCE.	78	83	76	
C 103	CI-12 DO YOU USE OR REFER TO DIELECTRIC CONSTANT	20	17	21	
C 104	CI-13 DO YOU USE OR REFER TO WORKING VOLTAGE RATING OF CAPACITORS	73	78	71	
C 105	CI-14 DO YOU USE OR REFER TO CAPACITIVE REACTANCE	40	50	36	
C 106	CI-15 DO YOU USE OR REFER TO CAPACITOR COLOR CODES	57	72	50	
C 107	CI-16 DO YOU WORK WITH CAPACITORS IN DC CIRCUITS	83	89	81	
C 108	CI-17 DO YOU WORK WITH CAPACITORS IN AC CIRCUITS	82	83	81	
C 109	CI-18 DO YOU WORK WITH CAPACITORS IN CIRCUITS WITH BOTH DC AND AC CIRCUITS	82	78	83	
C 110	CI-19 DO YOU WORK WITH CAPACITORS IN DON'T REMEMBER WHICH CIRCUITS	18	28	14	
C 111	CI-20 DO YOU CALCULATE CAPACITANCE FOR PARTICULAR CAPACITORS USING FORMULAS	12	11	12	
C 112	CI-21 DO YOU USE OR REFER TO THE GENERAL RULE THAT CAPACITANCE OF A CAPACITOR IS DIRECTLY PROPORTIONAL TO THE DIELECTRIC CONSTANT	15	11	17	
C 113	CI-22 DO YOU USE OR REFER TO THE GENERAL RULE THAT CAPACITANCE OF A CAPACITOR IS INVERSELY PROPORTIONAL TO THE DIELECTRIC THICKNESS	17	11	12	
C 114	CI-23 DO YOU CALCULATE THE TOTAL CAPACITANCE OF CAPACITORS IN SERIES	25	39	19	
C 115	CI-24 DO YOU CALCULATE THE TOTAL CAPACITANCE OF CAPACITORS IN PARALLEL	28	39	24	
C 116	CI-25 DO YOU CALCULATE THE TOTAL CAPACITANCE OF CAPACITORS IN SERIES-PARALLEL CIRCUITS	28	39	24	
C 117	CI-26 DO YOU USE OR REFER TO THE GENERAL RULE THAT CURRENT DOES NOT FLOW THROUGH CAPACITORS, IT ONLY APPEARS TO DO SO	42	44	40	
C 118	CI-27 DO YOU USE OR REFER TO THE GENERAL RULE THAT CURRENT LEADS VOLTAGE IN AC CAPACITOR CIRCUITS	32	39	29	
C 119	CI-28 DO YOU USE OR REFER TO THE GENERAL RULE THAT CAPACITIVE REACTANCE IS INVERSELY PROPORTIONAL TO FREQUENCY	32	33	31	
C 120	CI-29 DO YOU CALCULATE CAPACITIVE REACTANCE	20	22	19	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

QY-TSK

Task ID	Description	SPC	SPC	SPC
C 121	C1-30 DO YOU WORK WITH ROTOR-STATOR (VARIABLE) CAPACITORS	72	72	71
C 122	C1-31 DO YOU WORK WITH COMPRESSION (TRIMMER) CAPACITORS	67	61	69
C 123	C1-32 DO YOU WORK WITH ELECTROLYTIC (FIXED) CAPACITORS	82	83	81
C 124	C1-33 DO YOU WORK WITH PAPER (FIXED) CAPACITORS	77	78	76
C 125	C1-34 DO YOU WORK WITH MICA (FIXED) CAPACITORS	77	83	74
C 126	C1-35 DO YOU WORK WITH CERAMIC (FIXED) CAPACITORS	77	83	74
C 127	C1-36 DO YOU WORK WITH DON'T REMEMBER WHICH TYPE OF CAPACITORS	13	6	17
C 128	C2-01 DO YOU WORK WITH TRANSFORMERS IN YOUR PRESENT JOB	73	83	69
C 129	C2-02 DO YOU INSPECT TRANSFORMERS	83	83	83
C 130	C2-03 DO YOU CLEAN TRANSFORMERS	80	78	81
C 131	C2-04 DO YOU ADJUST TRANSFORMERS	60	61	60
C 132	C2-05 DO YOU TROUBLESHOOT TRANSFORMERS	78	83	76
C 133	C2-06 DO YOU REMOVE OR REPLACE COMPLETE TRANSFORMERS	82	83	81
C 134	C2-07 DO YOU REMOVE OR REPLACE TRANSFORMER PARTS, SUCH AS THE PRIMARY WINDING	12	6	14
C 135	C2-08 DO YOU MAKE A DISTINCTION BETWEEN MUTUAL INDUCTANCE AND MUTUAL INDUCTANCE (M)	7	6	7
C 136	C2-09 DO YOU USE THE SYMBOL FOR MUTUAL INDUCTANCE, M	3	0	5
C 137	C2-10 DO YOU REFER TO OR USE THE COEFFICIENT OF COUPLING WHEN WORKING WITH TRANSFORMERS	8	11	7
C 138	C2-11 DO YOU CALCULATE TURNS RATIOS FOR TRANSFORMERS USING CURRENT OR VOLTAGE RATIOS	12	11	12
C 139	C2-12 DO YOU REFER TO REFLECTED IMPEDANCE WHEN WORKING WITH TRANSFORMERS	18	22	17
C 140	C2-13 DO YOU CALCULATE IMPEDANCE INTERACTIONS FOR TRANSFORMERS	7	6	7
C 141	C2-14 DO YOU WORK WITH AUTOTRANSFORMERS	68	83	62
C 142	C2-15 DO YOU WORK WITH POWER TRANSFORMERS	80	89	76
C 143	C2-16 DO YOU WORK WITH AUDIO TRANSFORMERS	32	28	33
C 144	C2-17 DO YOU WORK WITH RADIO FREQUENCY TRANSFORMERS	70	78	67
C 145	C2-18 DO YOU WORK WITH DON'T REMEMBER WHAT TYPE OF TRANSFORMERS	12	11	12
C 146	C2-19 DO YOU CHECK TRANSFORMERS FOR OPEN WINDINGS BY MEASURING RESISTANCE	63	83	83
C 147	C2-20 DO YOU CHECK TRANSFORMERS FOR SHORTED WINDINGS BY MEASURING RESISTANCE	80	83	79
C 148	C2-21 DO YOU CHECK TRANSFORMERS FOR SHORTED WINDINGS BY MEASURING OUTPUT VOLTAGES	67	72	64
C 149	C2-22 DO YOU MEASURE RESISTANCE OF TRANSFORMER WINDINGS TO DETERMINE WHETHER A TRANSFORMER HAS A STEP-UP OR STEP-DOWN TURNS RATIO	30	28	31
C 150	C2-23 DO YOU MEASURE OUTPUT VOLTAGE OF TRANSFORMERS TO DETERMINE WHETHER A TRANSFORMER HAS A STEP-UP OR STEP-DOWN TURNS RATIO	43	44	43
C 151	C2-24 DO YOU REFER TO BASIC TRANSFORMER SCHEMATIC SYMBOLS FOR TRANSFORMERS	80	89	76

TRANSFORMERS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

DY-TSK

Task Description	SPC	SPC	SPC
C 152 C2-25 DO YOU REFER TO MULTIPLE SECONDARY-WINDINGS SCHEMATIC SYMBOLS FOR TRANSFORMERS	79	89	74
C 153 C2-26 DO YOU REFER TO MULTIPLE TAP SCHEMATIC SYMBOLS FOR TRANSFORMERS	78	89	74
C 154 C2-27 DO YOU REFER TO CENTER TAP SCHEMATIC SYMBOLS FOR TRANSFORMERS	78	89	74
C 155 C2-28 DO YOU REFER TO AIR CORE SCHEMATIC SYMBOLS FOR TRANSFORMERS	52	56	50
C 156 C2-29 DO YOU REFER TO IRON CORE SCHEMATIC SYMBOLS FOR TRANSFORMERS	58	67	55
C 157 C2-30 DO YOU REFER TO COMBINATIONS OF THE ABOVE SCHEMATIC SYMBOLS FOR TRANSFORMERS	68	72	67
C 158 C2-31 DO YOU DETERMINE PHASE RELATIONSHIPS BETWEEN SECONDARY AND PRIMARY VOLTAGES OF TRANSFORMERS USING SCHEMATIC SYMBOLS	52	67	45
C 159 C2-32 DO YOU DETERMINE OR REFER TO THE TYPE OF CORE IN TRANSFORMERS YOU WORK WITH	27	22	29
C 160 C2-33 DO YOU REFER TO OR USE THE GENERAL RULE THAT THE TURNS RATIO OF A TRANSFORMER IS EQUAL TO THE VOLTAGE RATIO	32	22	36
C 161 C2-34 DO YOU USE OR REFER TO STEP-UP OR STEP-DOWN RATIOS FOR TRANSFORMERS	55	67	50
C 162 C2-35 DO YOU CALCULATE VOLTAGE RATIOS FOR TRANSFORMERS USING TURNS RATIOS	12	11	12
C 163 C2-36 DO YOU CALCULATE CURRENT RATIOS FOR TRANSFORMERS USING TURNS RATIOS	7	6	7
C 164 C2-37 DOES YOUR JOB INVOLVE ANY TASKS DEALING WITH THREE PHASE TRANSFORMERS	63	89	52
C 165 C2-38 DO YOU INSPECT THREE PHASE TRANSFORMERS	60	83	50
C 166 C2-39 DO YOU CLEAN OR LUBRICATE THREE PHASE TRANSFORMERS	55	72	48
C 167 C2-40 DO YOU ADJUST THREE PHASE TRANSFORMERS	45	56	40
C 168 C2-41 DO YOU TROUBLESHOOT THREE PHASE TRANSFORMERS	55	72	48
C 169 C2-42 DO YOU REMOVE OR REPLACE COMPLETE THREE PHASE TRANSFORMERS	48	72	38
C 170 C2-43 DO YOU REMOVE OR REPLACE THREE PHASE TRANSFORMER PARTS SUCH AS WINDINGS	12	11	12
C 171 C3-01 DO YOU USE OR REFER TO PERMANENT MAGNETS	50	78	38
C 172 C3-02 DO YOU USE OR REFER TO TEMPORARY MAGNETS	35	50	29
C 173 C3-03 DO YOU USE OR REFER TO PERMEABILITY OF MAGNETIC MATERIALS	7	0	10
C 174 C3-04 DO YOU USE OR REFER TO RELUCTANCE OF MAGNETIC MATERIALS	8	0	12
C 175 C3-05 DO YOU USE OR REFER TO PERMEABILITY OF MAGNETIC MATERIALS	10	6	12
C 176 C3-06 DO YOU USE OR REFER TO RESIDUAL MAGNETISM	13	6	17
C 177 C3-07 DO YOU USE OR REFER TO MAGNETIC LINES OF FORCE OR FLUX	20	28	17
C 178 C3-08 DO YOU USE OR REFER TO WEBER'S THEORY OF MAGNETISM	7	0	10

MAGNETISM

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

		SPC	SPC	SPC
		276	279	280
0Y-TSK				
C 179 C3-09 DO YOU USE OR REFER TO DOMAIN THEORY OF MAGNETISM		7	0	10
C 180 C3-10 DO YOU USE OR REFER TO MAGNETIC INDUCTION		17	28	12
C 181 C3-11 DO YOU USE OR REFER TO FLUX DENSITY		12	11	12
C 182 C3-12 DO YOU USE OR REFER TO THE GENERAL RULE THAT FOR MAGNETIC POLES, LIKE POLES REPEL AND UNLIKE POLES ATTRACT		40	56	33
C 183 C3-13 DO YOU USE THE LEFT HAND THUMB RULE TO FIND THE DIRECTION OF MAGNETIC FIELDS ABOUT STRAIGHT WIRES		15	11	17
C 184 C3-14 DO YOU USE THE LEFT HAND THUMB RULE TO FIND THE NORTH POLE OF A CURRENT CARRYING COIL		13	6	17
D 185 D1-01 DO YOU WORK WITH RC, LR, RCL CIRCUITS IN YOUR PRESENT JOB		65	78	60
D 186 D1-02 DO YOU USE OR REFER TO VECTORS WHEN WORKING WITH RCL CIRCUITS		25	28	24
D 187 D1-03 DO YOU USE OR REFER TO PYTHAGOREAN THEOREM WHEN WORKING WITH RCL CIRCUITS		20	17	21
D 188 D1-04 DO YOU USE OR REFER TO SINE WHEN WORKING WITH RCL CIRCUITS		25	22	26
D 189 D1-05 DO YOU USE OR REFER TO COSINE WHEN WORKING WITH RCL CIRCUITS		27	22	29
D 190 D1-06 DO YOU USE OR REFER TO TANGENT WHEN WORKING WITH RCL CIRCUITS		17	17	17
D 191 D1-07 DO YOU USE OR REFER TO WATTS WHEN WORKING WITH RCL CIRCUITS		57	72	50
D 192 D1-08 DO YOU USE OR REFER TO TRUE POWER (PT) WHEN WORKING WITH RCL CIRCUITS		38	44	36
D 193 D1-09 DO YOU USE OR REFER TO MAXIMUM POWER (PM) WHEN WORKING WITH RCL CIRCUITS		47	61	40
D 194 D1-10 DO YOU USE OR REFER TO AVERAGE POWER (PAVE) WHEN WORKING WITH RCL CIRCUITS		50	72	40
D 195 D1-11 DO YOU USE OR REFER TO APPARENT POWER (PA) WHEN WORKING WITH RCL CIRCUITS		33	50	26
D 196 D1-12 DO YOU USE OR REFER TO POWER FACTOR (PF) WHEN WORKING WITH RCL CIRCUITS		32	44	26
D 197 D1-13 DO YOU USE OR REFER TO RESONANT CIRCUITS WHEN WORKING WITH RCL CIRCUITS		62	83	52
D 198 D1-14 DO YOU USE OR REFER TO BANDWIDTH WHEN WORKING WITH RCL CIRCUITS		70	89	62
D 199 D1-15 DO YOU USE OR REFER TO SELECTIVITY WHEN WORKING WITH RCL CIRCUITS		55	83	43
D 200 D1-16 DO YOU USE OR REFER TO RESONANT FREQUENCY WHEN WORKING WITH RCL CIRCUITS		67	83	60
D 201 D1-17 DO YOU USE OR REFER TO HALF POWER POINTS WHEN WORKING WITH RCL CIRCUITS		60	78	52
D 202 D1-18 DO YOU USE OR REFER TO BANDPASS REGION WHEN WORKING WITH RCL CIRCUITS		63	83	55
D 203 D1-19 DO YOU USE OR REFER TO CIRCUIT C WHEN WORKING WITH RCL CIRCUITS		30	50	21

RCL CIRCUITS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

DY-TSK

Task ID	Description	SPC	SPC	SPC
D 204	DI-20 DO YOU USE OR REFER TO TANK CIRCUITS WHEN WORKING WITH RCL CIRCUITS	57	78	48
D 205	DI-21 DO YOU DETERMINE VALUES OF TRIGONOMETRIC FUNCTIONS USING FORMULAS	8	11	7
D 206	DI-22 DO YOU DRAW VOLTAGE, CURRENT, OR IMPEDANCE VECTOR DIAGRAMS FOR CIRCUITS	8	11	7
D 207	DI-23 DO YOU CALCULATE TOTAL IMPEDANCE FOR CAPACITIVE CIRCUITS	17	22	14
D 208	DI-24 DO YOU CALCULATE PHASE ANGLES BETWEEN IMPEDANCE AND RESISTANCE IN CAPACITIVE CIRCUITS	7	6	7
D 209	DI-25 DO YOU CALCULATE TOTAL IMPEDANCE FOR SERIES RCL CIRCUITS	15	17	14
D 210	DI-26 DO YOU CALCULATE IMPEDANCE ANGLES FOR SERIES RCL CIRCUITS	7	6	7
D 211	DI-27 DO YOU CALCULATE APPARENT POWER (PA) FOR SERIES RCL CIRCUITS	10	17	7
D 212	DI-28 DO YOU CALCULATE TRUE POWER (PT) FOR SERIES RCL CIRCUITS	17	28	12
D 213	DI-29 DO YOU CALCULATE POWER FACTORS (PF) FOR SERIES RCL CIRCUITS	15	22	12
D 214	DI-30 DO YOU CALCULATE TOTAL CURRENT FOR PARALLEL RCL CIRCUITS	15	17	14
D 215	DI-31 DO YOU CALCULATE IMPEDANCE ANGLES FOR PARALLEL RCL CIRCUITS	7	6	7
D 216	DI-32 DO YOU CALCULATE TOTAL IMPEDANCE FOR PARALLEL RCL CIRCUITS USING THE ASSUMED VOLTAGE METHOD	5	11	2
D 217	DI-33 DO YOU CALCULATE TOTAL IMPEDANCE FOR PARALLEL RCL CIRCUITS USING OHM'S LAW	22	28	19
D 218	DI-34 DO YOU CHECK CAPACITORS USING OHMMETERS	63	83	55
D 219	DI-35 DO YOU CHECK CAPACITORS USING SUBSTITUTION	52	56	50
D 220	DI-36 DO YOU CHECK INDUCTORS USING OHMMETERS	60	78	52
D 221	DI-37 DO YOU CHECK INDUCTORS USING SUBSTITUTION	52	67	45
D 222	DI-38 DO YOU USE OR REFER TO THE GENERAL RULE THAT THETA = 0, PF = 1, AND PA = PT FOR RESONANT CIRCUITS	8	6	10
D 223	DI-39 DO YOU CALCULATE RESONANT FREQUENCIES FOR RCL CIRCUITS	17	22	14
D 224	DI-40 DO YOU USE OR REFER TO THE GENERAL RULE THAT IMPEDANCE IS MINIMUM AND CURRENT MAXIMUM AT THE RESONANT FREQUENCY FOR SERIES RCL CIRCUITS	27	33	24
D 225	DI-41 DO YOU USE OR REFER TO THE GENERAL RULE THAT LINE CURRENT IS MINIMUM AND IMPEDANCE MAXIMUM AT RESONANT FREQUENCY FOR PARALLEL RCL CIRCUITS	22	28	19
D 226	DI-42 DO YOU USE OR REFER TO THE GENERAL RULE THAT HALF POWER POINTS ARE AT 70.7 PERCENT OF THE PEAK CURRENT VALUE	50	56	48
D 227	DI-43 DO YOU USE OR REFER TO THE GENERAL RULE THAT BANDWIDTH IS INVERSELY PROPORTIONAL TO Q	23	33	19
D 228	DI-44 DO YOU DETERMINE HOW CHANGES IN FREQUENCY, RESISTANCE, CAPACITANCE, OR INDUCTANCE WILL AFFECT CURRENT OR PHASE ANGLES FOR RCL CIRCUITS	13	11	14

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

Task ID	Description	SPC	SPC	SPC	Series and Parallel Resonance (Time Constants)
		276	279	280	
0 229	D2-01 IN YOUR PRESENT JOB, DO YOU WORK WITH, USE, OR REFER TO SERIES OR PARALLEL RESONANT CIRCUITS OR TIME CONSTANTS	52	70	40	
0 230	D2-02 DO YOU WORK WITH, USE, OR REFER TO TIME CONSTANTS	53	83	40	
0 231	D2-03 DO YOU WORK WITH, USE, OR REFER TO AVAILABLE VOLTAGE	30	44	24	
0 232	D3-04 DO YOU WORK WITH, USE, OR REFER TO TRANSIENT INTERVALS	27	33	24	
0 233	D2-05 DO YOU USE OR REFER TO THE GENERAL RULE THAT A CAPACITOR IS FULLY CHARGED (OR DISCHARGED) AFTER FIVE (5) TIME CONSTANTS (TC)	32	61	19	
0 234	D2-06 DO YOU USE OR REFER TO UNIVERSAL TIME CONSTANT CHARTS	5	6	5	
0 235	D2-07 DO YOU USE EQUATIONS OR FORMULAS TO DETERMINE CIRCUIT CURRENT OR COMPONENT VOLTAGES AFTER A SPECIFIC TIME FOR RC OR LR CIRCUITS	8	0	12	
0 236	D2-08 DO YOU USE EQUATIONS OR FORMULAS TO DETERMINE THE TIME REQUIRED FOR CIRCUIT CURRENT OR COMPONENT VOLTAGES TO REACH SPECIFIC VALUES FOR RC OR LR CIRCUITS	17	17	17	
0 237	D2-09 DO YOU USE EQUATIONS OR FORMULAS TO DETERMINE COMPONENT VALUES REQUIRED FOR CIRCUIT CURRENT AND COMPONENT VOLTAGES TO REACH SPECIFIC VALUES IN SPECIFIC TIMES	15	22	12	
0 238	D2-10 DO YOU USE OR REFER TO THE GENERAL RULE THAT CURRENT IN LR CIRCUITS REACHES ITS MINIMUM VALUE (OR ZERO) AFTER FIVE (5) TIME CONSTANTS	15	22	12	
0 239	D3-01 DO YOU WORK WITH CIRCUITS USED AS FILTERS IN YOUR PRESENT JOB	68	83	62	
0 240	D3-02 DO YOU INSPECT FILTER CIRCUITS	70	83	64	
0 241	D3-03 DO YOU CLEAN FILTER CIRCUITS	63	83	55	
0 242	D3-04 DO YOU ALIGN OR ADJUST FILTER CIRCUITS	63	83	55	
0 243	D3-05 DO YOU TROUBLESHOOT TO THE FILTER CIRCUIT LEVEL	70	83	64	FILTERS
0 244	D3-06 DO YOU TROUBLESHOOT TO COMPONENT PARTS	68	78	64	
0 245	D3-07 DO YOU REMOVE OR REPLACE THE COMPLETE FILTER CIRCUIT	68	83	62	
0 246	D3-08 DO YOU REMOVE OR REPLACE FILTER CIRCUIT COMPONENT PARTS	65	78	60	
0 247	D3-09 DO YOU WORK WITH LOW PASS FILTERS	70	89	62	
0 248	D3-10 DO YOU WORK WITH HIGH PASS FILTERS	68	89	60	
0 249	D3-11 DO YOU WORK WITH BANDPASS FILTERS	72	89	64	
0 250	D3-12 DO YOU WORK WITH BAND-REJECT FILTERS	52	56	50	
0 251	D3-13 DON'T REMEMBER WHICH TYPE OF FILTER YOU WORK WITH	12	17	10	
0 252	D3-14 DO YOU WORK WITH L-SECTION FILTER CONFIGURATION	48	56	45	
0 253	D3-15 DO YOU WORK WITH T-SECTION FILTER CONFIGURATION	48	56	45	
0 254	D3-16 DO YOU WORK WITH PI-SECTION FILTER CONFIGURATION	40	39	40	
0 255	D3-17 DON'T REMEMBER WHICH TYPE FILTER CONFIGURATION	28	44	21	
0 256	D3-18 DO THE FILTERS YOU WORK WITH USE PARALLEL RESONANT CIRCUITS	45	50	43	
0 257	D3-19 DO THE FILTERS YOU WORK WITH USE SERIES-PARALLEL CIRCUITS	47	50	45	
0 258	D3-20 DO THE FILTERS YOU WORK WITH USE SERIES RESONANT CIRCUITS	47	50	45	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

QY-TSK

D 259 03-21 DON'T REMEMBER WHICH TYPE OF BASIC CIRCUIT 30 50 21
D 260 03-22 DO YOU USE EQUATIONS OR FORMULAS TO DETERMINE 10 11 10
CAPACITANCE OR INDUCTANCE VALUES REQUIRED FOR SPECIFIC
FILERS

E 261 E1-01 DO YOU WORK WITH COUPLING DEVICES IN YOUR PRESENT JOB 72 78 69
E 262 E1-02 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO 67 72 64
THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH RC
COUPLING

E 263 E1-03 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO 62 61 62
THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH
IMPEDANCE COUPLING

E 264 E1-04 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO 70 78 67
THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH
TRANSFORMER COUPLING

E 265 E1-05 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS 67 67 67
WHICH PERFORM RC COUPLING

E 266 E1-06 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS 60 56 62
WHICH PERFORM IMPEDANCE COUPLING

E 267 E1-07 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS 70 72 69
WHICH PERFORM TRANSFORMER COUPLING

E 268 E1-08 DO YOU WORK WITH DIRECTLY COUPLED CIRCUITS 68 72 67
E 269 E1-09 DO YOU WORK WITH CAPACITIVE-RESISTIVE COUPLED 65 67 64
CIRCUITS

E 270 E1-10 DO YOU WORK WITH CAPACITIVE-INDUCTIVE COUPLED 67 67 67
CIRCUITS

E 271 E1-11 DO YOU WORK WITH TRANSFORMER COUPLED CIRCUITS 70 78 67
E 272 E1-12 DON'T REMEMBER WHICH TYPE OF COUPLING CIRCUITS 10 11 10
E 273 E2-01 IN YOUR PRESENT JOB, DO YOU PERFORM SOLDERING 80 83 79

TECHNIQUES OR INSPECT OR EVALUATE SOLDERED CONNECTIONS

E 274 E2-02 DO YOU SELECT TYPE OF SOLDER TO USE 72 61 76
E 275 E2-03 DO YOU ADD FLUX TO CONNECTIONS 75 78 74
E 276 E2-04 DO YOU CLEAN CONNECTIONS USING SOLVENTS 80 72 83
E 277 E2-05 DO YOU STRIP INSULATION FROM WIRES 85 83 86
E 278 E2-06 DO YOU CONNECT OR DISCONNECT HEAT SINKS 85 83 86
E 279 E2-07 DO YOU BEND OR SHAPE WIRES OR LEADS 83 83 83
E 280 E2-08 DO YOU CUT WIRES 85 83 86
E 281 E2-09 DO YOU FILE OR SHAPE SOLDERING IRON TIPS 82 78 83
E 282 E2-10 DO YOU TIN SOLDERING IRON TIPS 83 83 83
E 283 E2-11 DO YOU CLEAN SOLDERING IRON TIPS 85 83 86
E 284 E2-12 DO YOU CLEAN ELECTRICAL SURFACES USING ERASERS 82 83 81
E 285 E2-13 DO YOU TIN OR PRE-TIN CONDUCTORS 82 83 81
E 286 E2-14 DO YOU INSPECT SOLDERED CONNECTIONS 85 83 86
E 287 E2-15 DO YOU DESOLDER CONNECTIONS BY WICKING 75 83 71
E 288 E2-16 DO YOU DESOLDER CONNECTIONS USING VACUUM DESOLDERING 82 83 81
TOOLS

E 289 E2-17 DO YOU CUT COMPONENT LEADS TO REMOVE COMPONENTS 72 67 79
E 290 E2-18 DO YOU CRUSH COMPONENTS FOR REMOVAL 32 22 36

SOLDERING

COUPLING

PCT MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

DIY-TSK

E 291 E2-19 00 YOU MAKE HARDWIRE CONNECTIONS
E 292 E2-20 00 YOU MAKE PRINTED CIRCUIT BOARD CONNECTIONS
E 293 E2-21 00 YOU SOLDER PASSIVE COMPONENTS SUCH AS RESISTORS OR CAPACITORS ON PRINTED CIRCUIT BOARDS
E 294 E2-22 00 YOU SOLDER ACTIVE COMPONENTS SUCH AS SOLID-STATE

DIODES OR TRANSISTORS ON PRINTED CIRCUIT BOARDS
E 295 E3-01 00 YOU WORK WITH RELAYS ON YOUR PRESENT JOB

E 296 E3-02 00 YOU ADJUST RELAYS
E 297 E3-03 00 YOU CLEAN RELAYS

E 298 E3-04 00 YOU INSPECT RELAYS
E 299 E3-05 00 YOU REMOVE OR REPLACE COMPLETE RELAYS
E 300 E3-06 00 YOU REMOVE OR REPLACE PARTS OR RELAYS

E 301 E3-07 00 YOU TROUBLESHOOT RELAYS
E 302 E3-08 00 YOU STRAIGHTEN RELAY CONTACTS
E 303 E3-09 00 YOU PERFORM TASKS ON RELAY CONTACTS

E 304 E3-10 00 YOU PERFORM TASKS ON RELAY COILS
E 305 E3-11 00 YOU PERFORM TASKS ON RELAY COILS
E 306 E3-12 00 YOU PERFORM TASKS ON RELAY ARMATURES

E 307 E3-13 00 YOU PERFORM TASKS ON RELAY SPRINGS
E 308 E3-14 00 YOU USE OR REFER TO SINGLE POLE, SINGLE THROW (SPST), NORMALLY OPEN (NO) SCHEMATIC SYMBOLS FOR RELAYS

E 309 E3-15 00 YOU USE OR REFER TO SINGLE POLE, SINGLE THROW (SPST), NORMALLY CLOSED (NC) SCHEMATIC SYMBOLS FOR RELAYS
E 310 E3-16 00 YOU USE OR REFER TO SINGLE POLE, DOUBLE THROW (SPDT) SCHEMATIC SYMBOLS FOR RELAYS

E 311 E3-17 00 YOU USE OR REFER TO DOUBLE POLE, DOUBLE THROW (DPDT) SCHEMATIC SYMBOLS FOR RELAYS
E 312 E3-18 00 YOU USE OR REFER TO OTHER RELAY SYMBOLS SCHEMATIC SYMBOLS FOR RELAYS

E 313 E3-19 00 YOU CHECK ELECTRICAL CONTINUITY OF COILS BY MEASURING RESISTANCE

F 314 F1-01 00 IN YOUR PRESENT JOB, DO YOU PERFORM ANY TASKS DEALING WITH MICROPHONES

F 315 F1-02 00 YOU INSPECT MICROPHONES
F 316 F1-03 00 YOU CLEAN MICROPHONES
F 317 F1-04 00 YOU OPERATE MICROPHONES

F 318 F1-05 00 YOU TROUBLESHOOT AS FAR AS CHECKING WIRE CONNECTIONS BUT DO NOT TROUBLESHOOT DOWN TO COMPONENT PARTS OR MICROPHONES

F 319 F1-06 00 YOU TROUBLESHOOT DOWN TO MICROPHONE PARTS
F 320 F1-07 00 YOU REMOVE OR REPLACE COMPLETE MICROPHONES
F 321 F1-08 00 YOU REMOVE OR REPLACE MICROPHONE PARTS

F 322 F1-09 00 YOU PERFORM TASKS ON CARBON MICROPHONES
F 323 F1-10 00 YOU PERFORM TASKS ON CAPACITOR MICROPHONES
F 324 F1-11 00 YOU PERFORM TASKS ON CRYSTAL MICROPHONES

F 325 F1-12 00 YOU PERFORM TASKS ON DYNAMIC MICROPHONES
F 326 F1-13 00 YOU PERFORM TASKS ON VELOCITY RIBBON MICROPHONES

RELAYS

MICROPHONES

Task ID	Description	SPC	SPC	SPC
291	E2-19 00 YOU MAKE HARDWIRE CONNECTIONS	62	78	63
292	E2-20 00 YOU MAKE PRINTED CIRCUIT BOARD CONNECTIONS	82	78	83
293	E2-21 00 YOU SOLDER PASSIVE COMPONENTS SUCH AS RESISTORS OR CAPACITORS ON PRINTED CIRCUIT BOARDS	82	78	83
294	E2-22 00 YOU SOLDER ACTIVE COMPONENTS SUCH AS SOLID-STATE DIODES OR TRANSISTORS ON PRINTED CIRCUIT BOARDS	82	78	83
295	E3-01 00 YOU WORK WITH RELAYS ON YOUR PRESENT JOB	82	89	79
296	E3-02 00 YOU ADJUST RELAYS	70	78	67
297	E3-03 00 YOU CLEAN RELAYS	78	83	76
298	E3-04 00 YOU INSPECT RELAYS	78	83	76
299	E3-05 00 YOU REMOVE OR REPLACE COMPLETE RELAYS	80	83	79
300	E3-06 00 YOU REMOVE OR REPLACE PARTS OR RELAYS	53	56	52
301	E3-07 00 YOU TROUBLESHOOT RELAYS	70	78	67
302	E3-08 00 YOU STRAIGHTEN RELAY CONTACTS	75	83	71
303	E3-09 00 YOU PERFORM TASKS ON RELAY CONTACTS	75	78	74
304	E3-10 00 YOU PERFORM TASKS ON RELAY COILS	33	39	31
305	E3-11 00 YOU PERFORM TASKS ON RELAY COILS	28	44	20
306	E3-12 00 YOU PERFORM TASKS ON RELAY ARMATURES	45	50	43
307	E3-13 00 YOU PERFORM TASKS ON RELAY SPRINGS	57	67	52
308	E3-14 00 YOU USE OR REFER TO SINGLE POLE, SINGLE THROW (SPST), NORMALLY OPEN (NO) SCHEMATIC SYMBOLS FOR RELAYS	70	78	67
309	E3-15 00 YOU USE OR REFER TO SINGLE POLE, SINGLE THROW (SPST), NORMALLY CLOSED (NC) SCHEMATIC SYMBOLS FOR RELAYS	70	78	67
310	E3-16 00 YOU USE OR REFER TO SINGLE POLE, DOUBLE THROW (SPDT) SCHEMATIC SYMBOLS FOR RELAYS	67	78	62
311	E3-17 00 YOU USE OR REFER TO DOUBLE POLE, DOUBLE THROW (DPDT) SCHEMATIC SYMBOLS FOR RELAYS	67	78	62
312	E3-18 00 YOU USE OR REFER TO OTHER RELAY SYMBOLS SCHEMATIC SYMBOLS FOR RELAYS	78	89	74
313	E3-19 00 YOU CHECK ELECTRICAL CONTINUITY OF COILS BY MEASURING RESISTANCE	75	83	71
314	F1-01 00 IN YOUR PRESENT JOB, DO YOU PERFORM ANY TASKS DEALING WITH MICROPHONES	17	39	7
315	F1-02 00 YOU INSPECT MICROPHONES	10	28	2
316	F1-03 00 YOU CLEAN MICROPHONES	10	22	5
317	F1-04 00 YOU OPERATE MICROPHONES	17	33	10
318	F1-05 00 YOU TROUBLESHOOT AS FAR AS CHECKING WIRE CONNECTIONS BUT DO NOT TROUBLESHOOT DOWN TO COMPONENT PARTS OR MICROPHONES	12	39	0
319	F1-06 00 YOU TROUBLESHOOT DOWN TO MICROPHONE PARTS	7	11	5
320	F1-07 00 YOU REMOVE OR REPLACE COMPLETE MICROPHONES	13	33	5
321	F1-08 00 YOU REMOVE OR REPLACE MICROPHONE PARTS	8	22	2
322	F1-09 00 YOU PERFORM TASKS ON CARBON MICROPHONES	10	28	2
323	F1-10 00 YOU PERFORM TASKS ON CAPACITOR MICROPHONES	0	0	0
324	F1-11 00 YOU PERFORM TASKS ON CRYSTAL MICROPHONES	2	0	2
325	F1-12 00 YOU PERFORM TASKS ON DYNAMIC MICROPHONES	2	0	2
326	F1-13 00 YOU PERFORM TASKS ON VELOCITY RIBBON MICROPHONES	0	0	0

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

DY-TSK

TASK	DESCRIPTION	SPC	SPC	SPC
F 327	F2-01 IN YOUR PRESENT JOB, DO YOU PERFORM ANY TASKS DEALING WITH SPEAKERS	25	22	26
F 328	F2-02 DO YOU INSPECT SPEAKERS	18	17	19
F 329	F2-03 DO YOU CLEAN SPEAKERS	17	17	17
F 330	F2-04 DO YOU OPERATE SPEAKERS	23	22	24
F 331	F2-05 DO YOU TROUBLESHOOT AS FAR AS CHECKING WIRE CONNECTIONS BUT DO NOT TROUBLESHOOT DOWN TO COMPONENT PARTS OF SPEAKERS	22	22	21
F 332	F2-06 DO YOU TROUBLESHOOT DOWN TO SPEAKER PARTS	8	6	10
F 333	F2-07 DO YOU REMOVE OR REPLACE COMPLETE SPEAKERS	23	22	24
F 334	F2-08 DO YOU REMOVE OR REPLACE SPEAKER PARTS	3	6	2
F 335	F2-09 DO YOU PERFORM ANY TASKS ON SPEAKER CONES	2	0	2
F 336	F2-10 DO YOU PERFORM ANY TASKS ON SPEAKER SPIDERS	2	0	2
F 337	F2-11 DO YOU PERFORM ANY TASKS ON SPEAKER FIELD COILS	2	0	2
F 338	F2-12 DO YOU PERFORM ANY TASKS ON SPEAKER VOICE COILS	2	0	2
F 339	F2-13 DO YOU PERFORM ANY TASKS ON SPEAKER PERMANENT MAGNETS	5	11	7
F 340	F2-14 DO YOU PERFORM ANY TASKS ON SPEAKER ELECTROMAGNETS	2	0	2
F 341	F2-15 DO YOU PERFORM ANY TASKS ON SPEAKER SOFT IRON CORES	2	0	2
F 342	F3-01 DO YOU USE OSCILLOSCOPES IN YOUR PRESENT JOB	50	89	90
F 343	F3-02 DO YOU USE OSCILLOSCOPES TO PERFORM OPERATIONAL CHECKS	87	89	86
F 344	F3-03 DO YOU USE OSCILLOSCOPES TO PERFORM ALIGNMENTS OR ADJUSTMENTS	82	83	81
F 345	F3-04 DO YOU USE OSCILLOSCOPES TO TROUBLESHOOT ELECTRONIC CIRCUITS	80	78	81
F 346	F3-05 DO YOU USE OSCILLOSCOPES TO MEASURE FREQUENCY	68	83	90
F 347	F3-06 DO YOU USE OSCILLOSCOPES TO MEASURE TIME	87	89	86
F 348	F3-07 DO YOU USE OSCILLOSCOPES TO OBSERVE LISAJOUS PATTERNS	32	17	38
F 349	F3-08 DO YOU USE OSCILLOSCOPES TO OBSERVE SIGNALS WHILE UTILIZING ATTENUATOR PROBES	85	83	86
F 350	F3-09 DO YOU USE OSCILLOSCOPES TO MAKE FREQUENCY OR TIME MEASUREMENTS USING DELAY TIME MULTIPLIERS	80	89	76
F 351	F3-10 DO YOU USE OSCILLOSCOPES TO MEASURE AC VOLTAGE	85	89	83
F 352	F3-11 DO YOU USE OSCILLOSCOPES TO MEASURE OR OBSERVE SIGNALS AFTER FIRST ADJUSTING THE GAIN AND DC BAL CONTROLS	85	83	86
F 353	F3-12 DO YOU USE OSCILLOSCOPES TO MEASURE DC VOLTAGE	83	83	83
G 354	G1-01 DO YOU WORK WITH SEMICONDUCTOR DIODES IN YOUR PRESENT JOB	83	89	81
G 355	G1-02 DO YOU INSPECT DIODES	82	83	81
G 356	G1-03 DO YOU REMOVE OR REPLACE DIODES	82	83	81
G 357	G1-04 DO YOU CHECK DIODES USING AN INSTRUMENT	82	83	81
G 358	G1-05 DO YOU USE ENERGY LEVEL DIAGRAMS IN YOUR WORK WITH DIODES	7	6	7
G 359	G1-06 DO YOU USE PN JUNCTION DIODE CHARACTERISTIC CURVES, TOGETHER WITH VALUES OF FORWARD AND REVERSE BIAS VOLTAGE, TO COMPUTE FORWARD OR REVERSE LIAS RESISTANCE	12	17	10
G 360	G1-07 DO YOU COMPUTE FORWARD OR REVERSE BIAS RESISTANCE FOR DIODES	22	33	17

SPEAKERS

OSCILLOSCOPES

SEMICONDUCTOR DIODES

PCT MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

0Y-TSK

Task ID	Description	SPC	SPC	SPC
G 361	61-08 DO YOU USE OR REFER TO THE GENERAL RULE THAT TEMPERATURE CAN AFFECT THE OPERATION OF DIODES	65	72	62
G 362	61-09 DO YOU IDENTIFY SEMICONDUCTOR DIODES AS OPPOSED TO OTHER ELECTRONIC COMPONENTS, SUCH AS RESISTORS, BASED ON THEIR PHYSICAL APPEARANCE	75	83	71
G 363	61-10 DO YOU REFER TO OR DO YOU DETERMINE THE GENERAL EFFECTS OF DOPING ON CURRENT FLOW	8	17	5
G 364	61-11 DO YOU USE OR REFER TO MEASUREMENTS OF FORWARD BIAS RESISTANCE	65	67	64
G 365	61-12 DO YOU USE OR REFER TO DIODE COLOR CODING	47	56	43
G 366	61-13 DO YOU USE OR REFER TO CENTRIFUGAL FORCE OF AN ELECTRON IN ORBIT AROUND A NUCLEUS	7	0	10
G 367	61-14 DO YOU USE OR REFER TO CENTRIPETAL FORCE OF AN ELECTRON IN ORBIT AROUND A NUCLEUS	7	0	10
G 368	61-15 DO YOU USE OR REFER TO DIODE NUMBERING SYSTEM, SUCH AS IN 538	70	83	64
G 369	61-16 DO YOU USE OR REFER TO KINETIC ENERGY OF AN ELECTRON MOVING IN ORBIT	7	0	10
G 370	61-17 DO YOU USE OR REFER TO POTENTIAL ENERGY OF AN ELECTRON MOVING IN ORBIT	7	0	10
G 371	61-18 DO YOU USE OR REFER TO MEASUREMENTS OF REVERSE BIAS RESISTANCE	62	67	60
G 372	61-19 DO YOU USE OR REFER TO NUMBER OF ELECTRONS IN A PARTICULAR SHELL OR ORBIT	5	0	7
G 373	61-20 DO YOU USE OR REFER TO PERMISSIBLE ENERGY LEVELS OF AN ORBITING ELECTRON	5	0	7
G 374	61-21 DO YOU USE OR REFER TO FORBIDDEN ENERGY LEVELS OF AN ORBITING ELECTRON	7	0	10
G 375	61-22 DO YOU USE OR REFER TO VALENCE ELECTRONS (THOSE IN THE OUTERMOST SHELL)	7	0	10
G 376	61-23 DO YOU USE OR REFER TO ATOMIC NUMBER (TOTAL NUMBER OF ELECTRONS IN ATOM)	5	0	7
G 377	61-24 DO YOU USE OR REFER TO SYMBOLS ON THE DIODE WHICH INDICATE THE CATHODE END	75	83	71
G 378	61-25 DO YOU NEED TO KNOW WHICH MATERIALS ARE USED IN THE CONSTRUCTION OF DIODES SUCH AS GERMANIUM OR SILICON	28	33	26
G 379	61-26 DO YOU NEED TO KNOW THAT SEMICONDUCTORS HAVE NEGATIVE TEMPERATURE COEFFICIENTS OF RESISTANCE (AS TEMPERATURE INCREASES RESISTANCE DECREASES)	33	39	31
G 380	61-27 DO YOU USE OR REFER TO PN JUNCTION DIODE CHARACTERISTIC CURVES, SUCH AS VOLTAGE - CURRENT CHARACTERISTIC CURVES (PERHAPS YOU DO THIS TO IDENTIFY POINTS OF STRUCTURAL BREAKDOWN OR OPERATING REGIONS)	17	17	17
G 381	61-28 DO YOU DETERMINE WHETHER PN JUNCTION DIODES ARE FORWARD BIASED OR REVERSE BIASED WHEN YOU READ OR INTERPRET CIRCUIT DIAGRAMS	67	78	62
G 382	61-29 DO YOU USE OR REFER TO VALENCE BAND IN SEMICONDUCTOR MATERIALS	3	0	5

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

DY-TSK

Task ID	Description	SPC	SPC	SPC
6 383	61-30 DO YOU USE OR REFER TO FORBIDDEN BAND IN SEMICONDUCTOR MATERIALS	3	0	5
6 384	61-31 DO YOU USE OR REFER TO CONDUCTION BAND IN SEMICONDUCTOR MATERIALS	2	0	2
6 385	61-32 DO YOU USE OR REFER TO COVALENT BONDING IN SEMICONDUCTOR MATERIALS	2	0	2
6 386	61-33 DO YOU USE OR REFER TO ELECTRON-HOLE PAIR CREATED IN SEMICONDUCTORS	7	6	7
6 387	61-34 DO YOU USE OR REFER TO ELECTRON FLOW OR HOLE FLOW IN SEMICONDUCTORS	17	11	19
6 388	61-35 DO YOU USE OR REFER TO DONOR IMPURITY IN SEMICONDUCTORS	8	6	10
6 389	61-36 DO YOU USE OR REFER TO ACCEPTOR IMPURITY IN SEMICONDUCTORS	7	6	7
6 390	61-37 DO YOU USE OR REFER TO P-TYPE SEMICONDUCTOR MATERIAL	47	50	45
6 391	61-38 DO YOU USE OR REFER TO N-TYPE SEMICONDUCTOR MATERIAL	47	50	45
6 392	61-39 DO YOU USE OR REFER TO MAJORITY CARRIERS IN SEMICONDUCTORS	12	11	12
6 393	61-40 DO YOU USE OR REFER TO MINORITY CARRIERS IN SEMICONDUCTORS	12	11	12
6 394	61-41 DO YOU USE OR REFER TO JUNCTION RECOMBINATION IN SEMICONDUCTORS	8	6	10
6 395	61-42 DO YOU USE OR REFER TO DEPLETION REGION IN SEMICONDUCTORS	12	11	12
6 396	61-43 DO YOU USE OR REFER TO RELATIONSHIP BETWEEN BARRIER WIDTH AND DIFFERENCE OF POTENTIAL	8	0	12
6 397	61-44 DO YOU USE OR REFER TO THE 1G:1 BACK TO FRONT RESISTANCE RATIO FOR DIODES	60	67	57
6 398	61-45 DO YOU USE OR REFER TO BARRIER HEIGHT IN SEMICONDUCTORS	3	0	5
6 399	61-46 DO YOU USE OR REFER TO DIODE SUBSTITUTION INFORMATION	60	61	60
6 400	61-47 DO YOU USE OR REFER TO MAXIMUM AVERAGE FORWARD CURRENT DIODE RATINGS	32	39	29
6 401	61-48 DO YOU USE OR REFER TO PEAK RECURRENT FORWARD CURRENT DIODE RATINGS	27	22	29
6 402	61-49 DO YOU USE OR REFER TO MAXIMUM SURGE CURRENT DIODE RATINGS	30	39	26
6 403	61-50 DO YOU USE OR REFER TO PEAK REVERSE (INVERSE) VOLTAGE DIODE RATINGS	33	39	31
6 404	62-01 DO YOU WORK WITH TRANSISTORS IN YOUR PRESENT JOB.	83	89	81
6 405	62-02 DO YOU INSPECT TRANSISTORS	82	83	81
6 406	62-03 DO YOU REMOVE OR REPLACE TRANSISTORS	82	83	81
6 407	62-04 DO YOU CHECK TRANSISTORS USING AN INSTRUMENT	77	78	76
6 408	62-05 DO YOU USE OR REFER TO EMITTER - BASE (EB) FORWARD AND REVERSE RESISTANCE MEASUREMENTS	78	83	76
6 409	62-06 DO YOU USE OR REFER TO COLLECTOR - BASE (CB) FORWARD AND REVERSE RESISTANCE MEASUREMENTS	78	83	76

TRANSISTORS

PCI MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

BY-TASK

G 410	G2-07	DO YOU USE OR REFER TO EMITTER - COLLECTOR (EC) RESISTANCE MEASUREMENTS	78	83	76
G 411	G2-08	DO YOU USE OR REFER TO HOW BIASING AFFECTS THE PHYSICAL BARRIER WIDTH OF THE EMITTER - BASE JUNCTION	27	28	26
G 412	G2-09	DO YOU USE OR REFER TO HOW BIASING AFFECTS THE PHYSICAL BARRIER WIDTH OF THE COLLECTOR - BASE JUNCTION	23	28	21
G 413	G2-10	DO YOU USE OR REFER TO THE PHYSICAL SIZE OF THE TRANSISTOR STRUCTURE (COLLECTOR, BASE AND EMITTER)	42	44	40
G 414	G2-11	DO YOU USE OR REFER TO LEAKAGE CURRENT (ICBO) IN A TRANSISTOR	20	22	19
G 415	G2-12	DO YOU USE OR REFER TO TRANSISTOR SCHEMATIC SYMBOLS	82	89	79
G 416	G2-13	DO YOU USE OR REFER TO TRANSISTOR NOTATION SUCH AS G1, G2, G3, ETC	83	89	81
G 417	G2-14	DO YOU USE OR REFER TO TRANSISTOR SUBSTITUTION INFORMATION	68	61	71
G 418	G2-15	DO YOU USE OR REFER TO THE GENERAL RULE THAT THE TRANSISTOR BASE CURRENT IB IS NORMALLY SIGNIFICANTLY SMALLER THAN THE EMITTER CURRENT IE (USUALLY IN RATIO OF 8 PERCENT OF IE)	35	33	36
G 419	G2-16	DO YOU USE THE INFORMATION THAT THE EFFECT OF EMITTER BASE VOLTAGE ON BASE CURRENT IS THE CONTROLLING FACTOR FOR TRANSISTORS	58	67	55
G 420	G2-17	DO YOU USE THE GENERAL RULE THAT LEAKAGE CURRENT (ICBO) IN A TRANSISTOR INCREASES AS TEMPERATURE INCREASES	27	28	26
G 421	G2-18	DO YOU USE OR REFER TO TRANSISTOR CHARACTERISTIC CURVES	13	11	14
G 422	G2-19	DO YOU USE OR REFER TO BETA TRANSISTOR GAINS	12	6	14
G 423	G2-20	DO YOU USE OR REFER TO ALPHA TRANSISTOR GAINS	8	6	10
G 424	G2-21	DO YOU USE OR REFER TO GAMMA TRANSISTOR GAINS	5	6	5
G 425	G2-22	DO YOU CALCULATE BETA TRANSISTOR GAINS	5	0	7
G 426	G2-23	DO YOU CALCULATE ALPHA TRANSISTOR GAINS	5	0	7
G 427	G2-24	DO YOU CALCULATE GAMMA TRANSISTOR GAINS	5	0	7
G 428	G3-01	DO YOU WORK WITH TRANSISTOR AMPLIFIERS IN YOUR PRESENT JOB	80	89	76
G 429	G3-02	DO YOU INSPECT TRANSISTOR AMPLIFIERS	60	83	79
G 430	G3-03	DO YOU ALIGN OR ADJUST TRANSISTOR AMPLIFIERS	77	83	74
G 431	G3-04	DO YOU TROUBLESHOOT TO THE AMPLIFIER CIRCUIT LEVEL	78	83	76
G 432	G3-05	DO YOU TROUBLESHOOT TO AMPLIFIER COMPONENTS	77	83	74
G 433	G3-06	DO YOU REMOVE OR REPLACE THE COMPLETE AMPLIFIER	75	83	71
G 434	G3-07	DO YOU REMOVE OR REPLACE AMPLIFIER COMPONENTS	75	83	71
G 435	G3-08	DO YOU USE OR REFER TO (COMMON EMITTER) THE CHANGE IN COLLECTOR CURRENT WHICH RESULTS FROM A CHANGE IN BASE CURRENT	33	33	33
G 436	G7-09	DO YOU USE OR REFER TO (COMMON EMITTER) THE CALCULATIONS NECESSARY TO MEASURE THE SPECIFIC CHANGE IN COLLECTOR CURRENT WHICH RESULTS FROM A SPECIFIC CHANGE IN BASE CURRENT	12	6	14

TRANSISTOR
AMPLIFIERS

PCI MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

DY-TSM

Task ID	Description	SPC	SPC	SPC
G 437	DO YOU USE OR REFER TO (COMMON EMITTER) THE CHANGE IN COLLECTOR VOLTAGE WHICH RESULTS FROM A CHANGE IN BASE CURRENT	37	33	38
G 438	DO YOU USE OR REFER TO (COMMON EMITTER) THE CALCULATIONS NECESSARY TO MEASURE THE SPECIFIC CHANGE IN COLLECTOR VOLTAGE WHICH RESULTS FROM A SPECIFIC CHANGE IN BASE CURRENT	8	6	10
G 439	DO YOU USE OR REFER TO (COMMON EMITTER) THE CHANGE IN BASE CURRENT WHICH RESULTS FROM AN INPUT SIGNAL	32	50	24
G 440	DO YOU USE OR REFER TO (COMMON EMITTER) THE CALCULATIONS NECESSARY TO MEASURE THE SPECIFIC CHANGE IN BASE CURRENT WHICH RESULTS FROM A SPECIFIC INPUT SIGNAL	10	6	12
G 441	DO YOU USE THE LOAD-LINE METHOD OF ANALYSIS IN YOUR CIRCUIT ANALYSIS (THIS METHOD REQUIRES YOU TO PLOT A LOAD-LINE ON A TRANSISTOR CHARACTERISTIC CURVE)	5	6	5
G 442	DO YOU USE OR REFER TO THE OPERATING POINT (QUIESCENT POINT) FOR A TRANSISTOR	17	22	14
G 443	DO YOU CALCULATE THE SPECIFIC QUIESCENT POINT FOR A PARTICULAR TRANSISTOR	3	0	5
G 444	DO YOU MEASURE VOLTAGE GAIN USED IN THE COMMON EMITTER CONFIGURATION	58	78	50
G 445	DO YOU MEASURE CURRENT GAIN USED IN THE COMMON EMITTER CONFIGURATION	47	56	43
G 446	DO YOU MEASURE POWER GAIN USED IN THE COMMON EMITTER CONFIGURATION	52	56	50
G 447	DO YOU CALCULATE THE VOLTAGE GAIN FOR SPECIFIC TRANSISTORS USING A FORMULA THAT IS, DO YOU DIVIDE THE CHANGE IN BASE-EMITTER VOLTAGE INTO THE CHANGE THE BASE COLLECTOR VOLTAGE TO DETERMINE THE VOLTAGE GAIN	5	11	2
G 448	DO YOU CALCULATE THE CURRENT GAIN FOR SPECIFIC TRANSISTORS USING A FORMULA THAT IS, DO YOU DIVIDE THE CHANGE IN BASE CURRENT INTO THE CHANGE IN COLLECTOR CURRENT TO DETERMINE THE CURRENT GAIN	5	11	2
G 449	DO YOU CALCULATE THE POWER GAIN FOR A SPECIFIC TRANSISTOR USING A FORMULA THAT IS, DO YOU MULTIPLY THE CURRENT GAIN TIMES THE VOLTAGE GAIN TO DETERMINE THE POWER GAIN	7	6	7
G 450	DO YOU NEED TO KNOW THAT MORE COLLECTOR CURRENT IS GENERATED WITH LESS COLLECTOR VOLTAGE AS TEMPERATURE INCREASES (THIS AFFECTS THE STATIC OPERATING POINT [Q] OF THE TRANSISTOR)	17	6	21
G 451	DO YOU COMPUTE THE STATIC OPERATING POINT [Q] OF A TRANSISTOR AT DIFFERENT TEMPERATURES	3	0	5
G 452	DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH EMITTER (SWAPPING) RESISTOR STABILIZATION	35	44	31
G 453	DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH SELF-BIAS STABILIZATION	35	50	29

PCT MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

DY-TSK

	SPC	SPC	SPC
	276	279	280
6 454 G3-27 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH THERMISTOR STABILIZATION	28	39	24
6 455 G3-28 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH FORWARD BIAS DIODE STABILIZATION	33	50	26
6 456 G3-29 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH REVERSE BIAS DIODE STABILIZATION	35	56	26
6 457 G3-30 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH DOUBLE DIODE STABILIZATION	27	39	21
6 458 G3-31 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM EMITTER (SWAMPING) RESISTOR STABILIZATION	45	56	40
6 459 G3-32 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM SELF-BIAS STABILIZATION	45	61	38
6 460 G3-33 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM THERMISTOR STABILIZATION	35	44	31
6 461 G3-34 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM FORWARD BIAS DIODE STABILIZATION	45	56	40
6 462 G3-35 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM REVERSE BIAS DIODE STABILIZATION	45	61	38
6 463 G3-36 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM DOUBLE DIODE STABILIZATION	37	44	33
6 464 G3-37 DO YOU IDENTIFY AMPLITUDE DISTORTION FOR TRANSISTOR CIRCUITS	43	56	38
6 465 G3-38 DO YOU TROUBLESHOOT TRANSISTOR CIRCUITS TO FIND THE CAUSES OF AMPLITUDE DISTORTION	52	61	48
6 466 G3-39 DO YOU IDENTIFY FREQUENCY DISTORTION FOR TRANSISTOR CIRCUITS	50	67	43
6 467 G3-40 DO YOU IDENTIFY PHASE DISTORTION FOR TRANSISTOR CIRCUITS	42	39	43
6 468 G3-41 DO YOU TROUBLESHOOT TRANSISTOR CIRCUITS TO FIND THE CAUSES OF PHASE DISTORTION	40	39	40
6 469 G3-42 DO YOU TROUBLESHOOT TRANSISTOR CIRCUITS TO FIND THE CAUSES OF FREQUENCY DISTORTION	45	61	38
6 470 G3-43 DO YOU NEED TO KNOW THE DEGENERATIVE EFFECTS ON THE CIRCUIT CAUSED BY CHANGING EMITTER RESISTANCE FOR TRANSISTOR AMPLIFIERS IN THE COMMON COLLECTOR CONFIGURATION	18	28	14
6 471 G3-44 DO YOU DETERMINE THE CLASS OF OPERATION FOR AMPLIFIERS IN ORDER TO TROUBLESHOOT AMPLIFIER CIRCUITS	25	17	29
6 472 G3-45 DO YOU TROUBLESHOOT OR REPAIR PARAPHASE AMPLIFIERS	38	39	38
6 473 G3-46 DO YOU TROUBLESHOOT OR REPAIR PUSH-PULL AMPLIFIERS	68	67	69
6 474 G3-47 DO YOU TROUBLESHOOT OR REPAIR COMPLEMENTARY SYMMETRY CIRCUITS	43	50	40
6 475 G3-48 DO YOU TROUBLESHOOT OR REPAIR COMPOUND-CONNECTED AMPLIFIERS	62	72	57

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

Task ID	Description	SPC	SPC	SPC
6 476	63-49 DO YOU TROUBLESHOOT OR REPAIR CASCADE-CONNECTED AMPLIFIERS	63	67	62
H 477	H1-01 DO YOU USE OR REFER TO VARACTORS	58	94	43
H 478	H1-02 DO YOU USE OR REFER TO TUNNEL DIODES	47	61	40
H 479	H1-03 DO YOU USE OR REFER TO FIELD EFFECT TRANSISTORS (FET)	50	67	43
H 480	H1-04 DO YOU USE OR REFER TO UNIJUNCTION TRANSISTORS	62	78	55
H 481	H1-05 DO YOU USE OR REFER TO ZENER DIODES	87	100	81
H 482	H1-06 DO YOU USE OR REFER TO INTEGRATED CIRCUITS	85	100	79
H 483	H2-01 IN YOUR PRESENT JOB, DO YOU WORK WITH POWER SUPPLIES	82	89	79
H 484	H2-02 DO YOU INSPECT POWER SUPPLIES	80	83	79
H 485	H2-03 DO YOU CLEAN POWER SUPPLIES	78	83	76
H 486	H2-04 DO YOU ALIGN OR ADJUST POWER SUPPLIES	80	83	79
H 487	H2-05 DO YOU TROUBLESHOOT TO POWER SUPPLY CIRCUIT LEVEL	77	83	74
H 488	H2-06 DO YOU TROUBLESHOOT TO POWER SUPPLY COMPONENTS	75	83	71
H 489	H2-07 DO YOU REMOVE OR REPLACE COMPLETE POWER SUPPLIES	77	83	74
H 490	H2-08 DO YOU REMOVE OR REPLACE POWER SUPPLY COMPONENTS	75	83	71
H 491	H2-09 DO YOU WORK WITH HALF-WAVE RECTIFIERS	72	78	69
H 492	H2-10 DO YOU WORK WITH FULL-WAVE RECTIFIERS OTHER THAN BRIDGE RECTIFIERS	73	89	67
H 493	H2-11 DO YOU WORK WITH BRIDGE RECTIFIERS	78	89	74
H 494	H2-12 DO YOU WORK WITH THREE-PHASE RECTIFIERS	62	89	50
H 495	H2-13 DO YOU USE OR REFER TO INPUT VOLTAGE	80	89	76
H 496	H2-14 DO YOU USE OR REFER TO INPUT FREQUENCY	67	72	64
H 497	H2-15 DO YOU USE OR REFER TO PEAK OUTPUT VOLTAGE	75	83	71
H 498	H2-16 DO YOU USE OR REFER TO AVERAGE OUTPUT VOLTAGE	77	89	71
H 499	H2-17 DO YOU USE OR REFER TO RIPPLE AMPLITUDE	77	83	74
H 500	H2-18 DO YOU USE OR REFER TO RIPPLE FREQUENCY	68	78	64
H 501	H2-19 DO YOU USE OR REFER TO PEAK REVERSE (INVERSE) VOLTAGE	52	83	38
H 502	H2-20 DO YOU USE OR REFER TO SHAPE OF OUTPUT WAVEFORMS	75	83	71
H 503	H2-21 DO YOU USE OR REFER TO EFFECTIVE OUTPUT VOLTAGE	72	83	67
H 504	H2-22 DO YOU WORK WITH CIRCUITS WHICH EMPLOY CAPACITIVE FILTERS	72	78	69
H 505	H2-23 DO YOU WORK WITH CIRCUITS WHICH EMPLOY INDUCTIVE FILTERS	63	67	62
H 506	H2-24 DO YOU WORK WITH CIRCUITS WHICH EMPLOY CAPACITIVE INPUT L-TYPE FILTERS	63	67	62
H 507	H2-25 DO YOU WORK WITH CIRCUITS WHICH EMPLOY INDUCTIVE INPUT L-TYPE FILTERS	63	72	60
H 508	H2-26 DO YOU WORK WITH CIRCUITS WHICH EMPLOY LC PI-TYPE FILTERS	55	56	55
H 509	H2-27 DO YOU WORK WITH CIRCUITS WHICH EMPLOY RC PI-TYPE FILTERS	55	50	57
H 510	H2-28 DO YOU WORK WITH CIRCUITS WHICH EMPLOY DON'T REMEMBER WHICH TYPE OF FILTER	17	22	14
H 511	H2-29 DO YOU HAVE THE OPTION OF REPLACING ONE TYPE OF FILTER WITH A DIFFERENT TYPE FILTER	5	11	2
H 512	H3-01 DO YOU WORK WITH OSCILLATORS IN YOUR PRESENT JOB	72	89	64

OSCILLATORS

PCT MRS RESPONDING *YES* BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

BY-TSK

Task ID	Description	SPC	SPC	SPC
H 513	H3-02 DO YOU INSPECT OSCILLATORS	68	83	62
H 514	H3-03 DO YOU ALIGN OR ADJUST OSCILLATORS	68	89	60
H 515	H3-04 DO YOU REMOVE OR REPLACE COMPLETE OSCILLATORS	65	83	57
H 516	H3-05 DO YOU REMOVE OR REPLACE OSCILLATOR COMPONENTS	67	83	60
H 517	H3-06 DO YOU TROUBLESHOOT TO OSCILLATOR CIRCUIT LEVEL	68	83	62
H 518	H3-07 DO YOU TROUBLESHOOT TO OSCILLATOR COMPONENTS	68	83	62
H 519	H3-08 DO YOU USE OR REFER TO FEEDBACK	65	83	57
H 520	H3-09 DO YOU USE OR REFER TO FREQUENCY DETERMINING DEVICES (FDD)	55	83	43
H 521	H3-10 DO YOU USE OR REFER TO AMPLITUDE STABILITY	65	83	57
H 522	H3-11 DO YOU USE OR REFER TO FREQUENCY STABILITY	68	89	60
H 523	H3-12 DO YOU USE OR REFER TO DAMPING	48	67	40
H 524	H3-13 DO YOU USE OR REFER TO NEGATIVE FEEDBACK	62	89	50
H 525	H3-14 DO YOU USE OR REFER TO PIEZOELECTRIC EFFECT	20	17	21
H 526	H3-15 DO YOU USE OR REFER TO CRITICAL DAMPING	18	28	14
H 527	H3-16 DO YOU USE OR REFER TO UNDER DAMPING	23	39	17
H 528	H3-17 DO YOU USE OR REFER TO OVER DAMPING	25	39	19
H 529	H3-18 DO YOU WORK WITH OSCILLATORS WHICH USE LC TANK CIRCUITS AC FID	55	72	48
H 530	H3-19 DO YOU WORK WITH OSCILLATORS WHICH USE RC NETWORKS AS FID	62	72	57
H 531	H3-20 DO YOU WORK WITH OSCILLATORS WHICH USE CRYSTALS AS FID	70	83	64
H 532	H3-21 DO YOU WORK WITH OSCILLATORS WHICH USE DON'T REMEMBER WHICH TYPE OF FID	13	17	12
H 533	H3-22 DO YOU WORK WITH SERIES HARTLEY SINUSOIDAL OSCILLATORS	33	44	29
H 534	H3-23 DO YOU WORK WITH SHUNT HARTLEY SINUSOIDAL OSCILLATORS	32	44	26
H 535	H3-24 DO YOU WORK WITH COLPITTS SINUSOIDAL OSCILLATORS	33	44	29
H 536	H3-25 DO YOU WORK WITH CLAPP SINUSOIDAL OSCILLATORS	27	39	21
H 537	H3-26 DO YOU WORK WITH BUTLER SINUSOIDAL OSCILLATORS	22	28	19
H 538	H3-27 DO YOU WORK WITH DON'T REMEMBER WHICH TYPE OF OSCILLATORS	38	50	33
I 539	I1-01 DO YOU WORK WITH MULTIVIBRATORS IN YOUR PRESENT JOB	58	89	45
I 540	I1-02 DO YOU INSPECT WAVE GENERATING OR SHAPING CIRCUITS	55	83	43
I 541	I1-03 DO YOU ALIGN OR ADJUST WAVE GENERATING OR SHAPING CIRCUITS	55	83	43
I 542	I1-04 DO YOU CALIBRATE WAVE GENERATING OR SHAPING CIRCUITS	52	78	40
I 543	I1-05 DO YOU TROUBLESHOOT TO WAVE GENERATING OR SHAPING CIRCUITS	55	83	43
I 544	I1-06 DO YOU TROUBLESHOOT TO WAVE GENERATING OR SHAPING CIRCUIT COMPONENTS	53	83	40
I 545	I1-07 DO YOU REMOVE OR REPLACE COMPLETE WAVE GENERATING OR SHAPING CIRCUITS	52	83	38
I 546	I1-08 DO YOU REMOVE OR REPLACE WAVE GENERATING OR SHAPING COMPONENTS	53	83	40
I 547	I1-09 DO YOU WORK WITH MULTIVIBRATORS WHICH CONTAIN LC TANK CIRCUITS	38	67	26

MULTIVIBRATORS

PCT MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

Task ID	Description	SPC	SPC	SPC
		276	279	280
I 548	11-10 DO YOU WORK WITH MULTIVIBRATORS WHICH CONTAIN RC NETWORKS	48	72	38
I 549	11-11 DO YOU WORK WITH MULTIVIBRATORS WHICH CONTAIN CRYSTALS	38	61	29
I 550	11-12 DO YOU WORK WITH MULTIVIBRATORS WHICH CONTAIN DON'T REMEMBER WHICH TYPE OF FOD	18	22	17
I 551	11-13 DO YOU WORK WITH ASTABLE MULTIVIBRATORS	53	78	43
I 552	11-14 DO YOU WORK WITH MONOSTABLE MULTIVIBRATORS	57	83	45
I 553	11-15 DO YOU WORK WITH BISTABLE MULTIVIBRATORS	57	83	45
I 554	11-16 DO YOU WORK WITH DON'T REMEMBER WHICH TYPE MULTIVIBRATORS	7	11	5
I 555	12-01 DO YOU WORK WITH LIMITERS OR CLAMPERS IN YOUR PRESENT JOB	67	89	57
I 556	12-02 DO YOU WORK WITH SERIES DIODE LIMITERS	57	78	48
I 557	12-03 DO YOU WORK WITH SHUNT DIODE LIMITERS	53	72	45
I 558	12-04 DO YOU WORK WITH LIMITERS WITH BIAS	43	61	36
I 559	12-05 DO YOU WORK WITH ZENER DIODE LIMITERS	57	78	48
I 560	12-06 DO YOU WORK WITH TRANSISTOR LIMITERS	52	72	43
I 561	12-07 DO YOU WORK WITH DON'T KNOW WHICH TYPE OF LIMITERS	17	17	12
I 562	12-08 DO YOU WORK WITH BASIC DIODE CLAMPING CIRCUITS	57	72	50
I 563	12-09 DO YOU WORK WITH DIODE CLAMPING CIRCUITS WITH BIAS	50	67	43
I 564	12-10 DO YOU WORK WITH DON'T KNOW WHICH TYPE OF CLAMPING CIRCUIT	12	17	10
I 565	13-01 IN YOUR PRESENT JOB, DO YOU WORK ON EQUIPMENT WHICH CONTAINS ELECTRON TUBES	78	89	74
I 566	13-02 DO YOU CHECK ELECTRON TUBES TO SEE IF THEY ARE GOOD	67	78	62
I 567	13-03 DO YOU USE TUBE TESTERS TO CHECK ELECTRON TUBES	47	72	36
I 568	13-04 DO YOU USE MULTIMETERS TO CHECK ELECTRON TUBES	62	67	60
I 569	13-05 DO YOU USE SCOPES TO CHECK ELECTRON TUBES	60	83	50
I 570	13-06 DO YOU USE SUBSTITUTION TO CHECK ELECTRON TUBES	77	83	74
I 571	13-07 DO YOU USE OR REFER TO CUTOFF	45	67	36
I 572	13-08 DO YOU USE OR REFER TO PEAK INVERSE VOLTAGE RATING	22	22	21
I 573	13-09 DO YOU USE OR REFER TO PEAK CURRENT RATING	23	22	24
I 574	13-10 DO YOU USE OR REFER TO TRANSIT TIME	20	33	14
I 575	13-11 DO YOU USE OR REFER TO PLATE DISSIPATION RATING	13	11	14
I 576	13-12 DO YOU USE OR REFER TO SATURATION	52	61	49
I 577	13-13 DO YOU USE OR REFER TO DC PLATE RESISTANCE	32	50	24
I 578	13-14 DO YOU COMPUTE ACTUAL VALUES OF THE DC PLATE RESISTANCE FOR ELECTRON TUBES	5	6	5
I 579	13-15 DO YOU USE OR REFER TO PLATE VOLTAGE	77	89	71
I 580	13-16 DO YOU USE OR REFER TO PLATE CURRENT	68	72	67
I 581	13-17 DO YOU USE OR REFER TO GRID VOLTAGE	77	89	71
I 582	13-18 DO YOU USE OR REFER TO GRID CURRENT	68	72	67
I 583	13-19 DO YOU USE OR REFER TO CATHODE VOLTAGE	77	69	71
I 584	13-20 DO YOU USE OR REFER TO CATHODE CURRENT	68	72	67
I 585	13-21 DO YOU USE OR REFER TO THE TRIODE AMPLIFICATION FACTOR (THE AMPLIFICATION FACTOR FOR TRIODES IS DEFINED AS THE RATIO OF CHANGE IN PLATE VOLTAGE TO A CHANGE IN GRID VOLTAGE)	15	17	14

LIMITERS AND CLAMPERS

ELECTRON TUBES

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

DY-TSK

Task ID	Description	SPC	SPC	SPC
I 586	I3-22 DO YOU CALCULATE ACTUAL VALUES OF TRIODE AMPLIFICATION FACTORS	7	11	5
I 587	I3-23 DO YOU USE OR REFER TO MULTIGRID (TETRODE, PENTODE, ETC) AMPLIFICATION FACTORS	17	22	14
I 588	I3-24 DO YOU USE OR REFER TO ELECTRON TUBE TRANSCONDUCTANCE (G, WHICH IS MEASURED IN MHOS)	8	11	7
I 589	I3-25 DO YOU CALCULATE ACTUAL VALUES OF ELECTRON TUBE TRANSCONDUCTANCES	3	6	2
I 590	I3-26 DO YOU USE OR REFER TO THE ELECTRON TUBE PARAMETER CALLED AC PLATE RESISTANCE	7	17	2
I 591	I3-27 DO YOU CALCULATE ACTUAL VALUES OF AC PLATE RESISTANCE	3	6	2
I 592	I3-28 DO YOU USE OR REFER TO ELECTRON TUBE INTERELECTRODE CAPACITANCE	13	22	10
I 593	I3-29 DO YOU USE OR REFER TO CHARACTERISTIC CURVES IN YOUR WORK WITH ELECTRON TUBES	5	6	5
I 594	I3-30 DO YOU USE CHARACTERISTIC CURVES TO SELECT PLATE VOLTAGE FOR A SPECIFIED BIAS	5	0	7
I 595	I3-31 DO YOU USE CHARACTERISTIC CURVES TO SELECT PLATE CURRENT FOR A SPECIFIED BIAS	5	0	7
I 596	I3-32 DO YOU USE CHARACTERISTIC CURVES TO SELECT BIAS REQUIRED FOR CUTOFF	8	0	12
I 597	I3-33 DO YOU USE CHARACTERISTIC CURVES TO SELECT BIAS REQUIRED FOR SATURATION	8	0	12
I 598	I3-34 DO YOU USE OR REFER TO ELECTRON TUBE AMPLIFIER GAIN	63	78	57
I 599	I3-35 DO YOU USE OR REFER TO ELECTRON TUBE AMPLIFIER EFFICIENCY	30	39	26
I 600	I3-36 DO YOU USE TEST TUBE CHECKUPS TO DETERMINE ELECTRON TUBE AMPLIFIER GAIN	37	61	26
I 601	I3-37 DO YOU USE MULTIMETERS TO DETERMINE ELECTRON TUBE AMPLIFIER GAIN	40	72	26
I 602	I3-38 DO YOU USE OSCILLOSCOPES TO DETERMINE ELECTRON TUBE AMPLIFIER GAIN	57	78	48
I 603	I3-39 DO YOU USE CHARACTERISTIC CURVES TO DETERMINE ELECTRON TUBE AMPLIFIER GAIN	2	0	2
I 604	I3-40 DO YOU CALCULATE ANY ELECTRON TUBE CAPACITANCES SUCH AS INPUT CAPACITANCE	2	0	2
I 605	I3-41 DO YOU USE OR REFER TO TUBE SOCKET NOTATION	70	83	64
I 606	I3-42 DO YOU USE OR REFER TO PIN NUMBERING SYSTEMS	72	83	67
I 607	I3-43 DO YOU USE OR REFER TO THE TYPE OF MATERIAL OR THE OPERATING TEMPERATURE OF THE EMITTING SURFACE IN THE ELECTRON TUBES YOU WORK ON	10	6	12
I 608	I3-44 DO YOU USE OR REFER TO TUBE SUBSTITUTION MATERIAL SUCH AS MANUALS OR CHARTS	47	67	38

Task ID	Description	SPC	SPC	SPC
J 609	J1-01 DO YOU WORK WITH ELECTRON TUBE AMPLIFIERS OR CIRCUITS IN YOUR PRESENT JOB	70	89	62
J 610	J1-02 DO YOU DETERMINE THE CLASS OF OPERATION FOR ELECTRON TUBE AMPLIFIERS IN ORDER TO TROUBLESHOOT AMPLIFIER CIRCUITS	18	22	17

ELECTRON TUBE AMPLIFIERS AND CIRCUITS

PCT MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

Task Description	SPC	SPC	SPC
	276	279	280
J 611 J1-03 DO YOU TROUBLESHOOT OR REPAIR PARAPHASE AMPLIFIERS	28	39	24
J 612 J1-04 DO YOU TROUBLESHOOT OR REPAIR PUSH-PULL AMPLIFIERS	52	67	45
J 613 J1-05 DO YOU TROUBLESHOOT OR REPAIR COMPOUND-CONNECTED AMPLIFIERS	38	56	31
J 614 J1-06 DO YOU TROUBLESHOOT OR REPAIR CASCADE-CONNECTED AMPLIFIERS	45	56	40
J 615 J1-07 DO YOU TROUBLESHOOT OR REPAIR DON'T KNOW WHICH TYPE OF AMPLIFIER	25	28	24
J 616 J2-01 DO YOU WORK WITH GAS TUBES (HOT CATHODE OR COLD CATHODE)	60	89	48
J 617 J2-02 DO YOU WORK WITH CATHODE-RAY TUBES	50	89	33
J 618 J2-03 DO YOU USE OR REFER TO THE CHARACTERISTICS OF BEAM POWER TUBES	20	50	7
J 619 J2-04 DO YOU TROUBLESHOOT OR REPAIR CIRCUITS IN WHICH BEAM POWER TUBES ARE USED	33	83	12
J 620 J2-05 DO YOU USE OR REFER TO THE CHARACTERISTICS OF THYRATRONS	23	56	10
J 621 J2-06 DO YOU TROUBLESHOOT OR REPAIR CIRCUITS IN WHICH THYRATRONS ARE USED	38	83	19
J 622 J2-07 DO YOU USE OR REFER TO THE PRINCIPLES OF OPERATION OF ELECTRON GUNS OF CATHODE-RAY TUBES (CRT)	22	44	12
J 623 J2-08 DO YOU USE OR REFER TO THE PRINCIPLES OF OPERATION OF ELECTROMAGNETIC DEFLECTION SYSTEMS OF CATHODE-RAY TUBES (CRT)	25	56	12
J 624 J2-09 DO YOU USE OR REFER TO THE PRINCIPLES OF OPERATION OF ELECTROSTATIC DEFLECTION SYSTEMS OF CATHODE-RAY TUBES (CRT)	23	50	12
J 625 J2-10 DO YOU USE OR REFER TO PHOSPHOR SCREENS	37	67	24
J 626 J2-11 DO YOU USE OR REFER TO AQUADAG COATINGS	20	56	5
J 627 J2-12 DO YOU USE OR REFER TO ELECTRON OPTICS	10	11	10
J 628 J2-13 DO YOU USE OR REFER TO PERSISTENCE	28	50	19
J 629 J2-14 DO YOU USE OR REFER TO DECAY TIMES	17	17	17
J 630 J2-15 DO YOU USE OR REFER TO FLUORESCENCE	22	28	19
J 631 J2-16 DO YOU USE OR REFER TO PHOSPHORESCENCE	32	61	19
J 632 J3-01 DO YOU WORK ON TRANSMIT OR RECEIVE SYSTEMS IN YOUR PRESENT JOB	73	89	67
J 633 J3-02 DO YOU PERFORM TASKS ON FREQUENCY CONVERTERS	57	78	48
J 634 J3-03 DO YOU PERFORM TASKS ON FREQUENCY MIXERS	67	83	60
J 635 J3-04 DO YOU USE OR REFER TO THE HETERODYNING OF SIGNALS	53	67	48
J 636 J3-05 DO YOU PERFORM TASKS ON REACTANCE MODULATORS	27	56	14
J 637 J3-06 DO YOU PERFORM TASKS ON MODULATED OSCILLATORS	42	72	29
K 638 KI-01 DO YOU WORK ON AM TRANSMIT OR RECEIVE SYSTEMS IN YOUR PRESENT JOB	20	44	10
K 639 KI-02 DO YOU INSPECT AM TRANSMIT OR RECEIVE SYSTEMS	20	44	10
K 640 KI-03 DO YOU CLEAN AM TRANSMIT OR RECEIVE SYSTEMS	20	44	10
K 641 KI-04 DO YOU ALIGN OR ADJUST AM TRANSMIT OR RECEIVE SYSTEMS	20	44	10

HETERODYNING, MODULATION, AND DEMODULATION

AM SYSTEMS

PCI MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

Task ID	Description	SPC	SPC	SPC
	DY-TSK			
K 642	KI-05 DO YOU TROUBLESHOOT TO AM TRANSMIT OR RECEIVE SYSTEMS	20	44	10
K 643	KI-06 DO YOU TROUBLESHOOT TO AM TRANSMIT OR RECEIVE COMPONENTS	20	44	10
K 644	KI-07 DO YOU REMOVE OR REPLACE AM TRANSMIT OR RECEIVE SYSTEMS	20	44	10
K 645	KI-08 DO YOU REMOVE OR REPLACE AM TRANSMIT OR RECEIVE COMPONENTS	20	44	10
K 646	KI-09 DO YOU PERFORM TASKS ON RF OSCILLATORS	20	44	10
K 647	KI-10 DO YOU PERFORM TASKS ON RF AMPLIFIERS	20	44	10
K 648	KI-11 DO YOU PERFORM TASKS ON AUDIO AMPLIFIERS	10	22	5
K 649	KI-12 DO YOU PERFORM TASKS ON POWER AMPLIFIERS	20	44	10
K 650	KI-13 DO YOU PERFORM TASKS ON LOCAL OSCILLATORS	20	44	10
K 651	KI-14 DO YOU PERFORM TASKS ON IF AMPLIFIERS	20	44	10
K 652	KI-15 DO YOU PERFORM TASKS ON DETECTORS	20	44	10
K 653	KI-16 DO YOU PERFORM TASKS ON DON'T REMEMBER WHICH AM STAGE	2	6	0
K 654	KI-17 DO YOU USE OR REFER TO AMPLITUDE STABILIZATION IN TRANSMITTERS	13	33	5
K 655	KI-18 DO YOU USE OR REFER TO FREQUENCY STABILIZATION IN TRANSMITTERS	20	44	10
K 656	KI-19 DO YOU USE OR REFER TO SENSITIVITY OF RECEIVERS	23	44	14
K 657	KI-20 DO YOU USE OR REFER TO SELECTIVITY OF RECEIVERS	22	44	12
K 658	KI-21 DO YOU USE OR REFER TO 2ND HARMONIC DISTORTION	7	17	2
K 659	KI-22 DO YOU USE OR REFER TO BANDPASS DISTORTION	20	44	10
K 660	KI-23 DO YOU USE OR REFER TO SQUAPE LAW DISTORTION	0	0	0
K 661	KI-24 DO YOU USE OR REFER TO CO-CHANNEL INTERFERENCE	4	6	2
K 662	KI-25 DO YOU USE OR REFER TO IMAGE FREQUENCIES IN RECEIVERS	20	50	7
K 663	KI-26 DO YOU USE OR REFER TO SIGNAL TO IMAGE RATIOS OR IMAGE REJECTION RATIOS	13	39	2
K 664	KI-27 DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH AM TRANSMITTER SCHEMATIC DIAGRAMS	18	44	7
K 665	KI-28 DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH AM RECEIVER SCHEMATIC DIAGRAMS	20	44	10
K 666	K2-01 DO YOU WORK WITH FM TRANSMIT OR RECEIVE SYSTEMS IN YOUR PRESENT JOB	25	39	19
K 667	K2-02 DO YOU INSPECT FM TRANSMIT OR RECEIVE SYSTEMS	28	39	24
K 668	K2-03 DO YOU CLEAN FM TRANSMIT OR RECEIVE SYSTEMS	28	39	24
K 669	K2-04 DO YOU ALIGN FM TRANSMIT OR RECEIVE SYSTEMS	28	39	24
K 670	K2-05 DO YOU TROUBLESHOOT TO FM TRANSMIT OR RECEIVE SYSTEMS	27	39	21
K 671	K2-06 DO YOU TROUBLESHOOT TO FM TRANSMIT OR RECEIVE COMPONENTS	27	39	21
K 672	K2-07 DO YOU REMOVE OR REPLACE FM TRANSMIT OR RECEIVE SYSTEMS	25	39	19
K 673	K2-08 DO YOU REMOVE OR REPLACE FM TRANSMIT OR RECEIVE COMPONENTS	27	39	21
K 674	K2-09 DO YOU PERFORM TASKS ON AUDIO AMPLIFIERS	8	17	5
K 675	K2-10 DO YOU PERFORM TASKS ON FREQUENCY MULTIPLIERS	25	39	19

FM SYSTEMS

PCT MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

		SPC	SPC	SPC
		276	279	280
	DY-TSK			
K 676	K2-11 DO YOU PERFORM TASKS ON DRIVERS (INTERMEDIATE AMPLIFIERS)	27	39	21
K 677	K2-12 DO YOU PERFORM TASKS ON POWER AMPLIFIERS	27	39	21
K 678	K2-13 DO YOU PERFORM TASKS ON RF AMPLIFIERS	27	39	21
K 679	K2-14 DO YOU PERFORM TASKS ON FREQUENCY CONVERTERS	23	39	17
K 680	K2-15 DO YOU PERFORM TASKS ON IF AMPLIFIERS	27	39	21
K 681	K2-16 DO YOU PERFORM TASKS ON LIMITERS	22	39	14
K 682	K2-17 DO YOU PERFORM TASKS ON FREQUENCY DISCRIMINATORS	18	39	10
K 683	K2-18 DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH SCHEMATIC DIAGRAMS OF FM TRANSMITTERS	23	39	17
K 684	K2-19 DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH SCHEMATIC DIAGRAMS OF FM RECEIVERS	23	39	17
K 685	K3-01 DO YOU CONVERT DECIMAL (BASE 10) NUMBERS TO OCTAL (BASE 8) NUMBERS	58	72	52
K 686	K3-02 DO YOU CONVERT DECIMAL NUMBERS TO BINARY (BASE 2) NUMBERS	57	67	52
K 687	K3-03 DO YOU CONVERT OCTAL NUMBERS TO DECIMAL NUMBERS	57	67	52
K 688	K3-04 DO YOU CONVERT OCTAL NUMBERS TO BINARY NUMBERS	57	72	50
K 689	K3-05 DO YOU CONVERT BINARY NUMBERS TO DECIMAL NUMBERS	57	72	50
K 690	K3-06 DO YOU CONVERT BINARY NUMBERS TO OCTAL NUMBERS	55	72	48
K 691	K3-07 DO YOU ADD BINARY NUMBERS TO GET A SUM	47	50	45
K 692	K3-08 DO YOU SUBTRACT BINARY NUMBERS USING THE END-AROUND-CARRY METHOD	37	33	38
K 693	K3-09 DO YOU SUBTRACT BINARY NUMBERS USING THE DIRECT SUBTRACTION METHOD	37	33	38
K 694	K3-10 DO YOU ADD OCTAL NUMBERS TO GET A SUM	40	39	40
L 695	L1-01 IN YOUR PRESENT JOB, DO YOU PERFORM ANY TASKS RELATING TO LOGIC FUNCTIONS	55	89	40
L 696	L1-02 DO YOU CONSTRUCT TRUTH TABLES FOR AND LOGIC SYMBOLS OR GATES	37	72	21
L 697	L1-03 DO YOU CONSTRUCT TRUTH TABLES FOR OR LOGIC SYMBOLS OR GATES	37	72	21
L 698	L1-04 DO YOU CONSTRUCT TRUTH TABLES FOR AND OR OR LOGIC SYMBOLS WITH STATE INDICATORS	37	72	21
L 699	L1-05 DO YOU CONSTRUCT TRUTH TABLES FOR EXCLUSIVE OR LOGIC SYMBOLS OR GATES	35	67	21
L 700	L1-06 DO YOU USE OR REFER TO TRUTH TABLES FOR AND LOGIC SYMBOLS OR GATES	47	72	36
L 701	L1-07 DO YOU USE OR REFER TO TRUTH TABLES FOR OR LOGIC SYMBOLS OR GATES	47	72	36
L 702	L1-08 DO YOU USE OR REFER TO TRUTH TABLES FOR AND OR OR LOGIC SYMBOLS WITH STATE INDICATORS	47	72	36
L 703	L1-09 DO YOU USE OR REFER TO TRUTH TABLES FOR EXCLUSIVE OR LOGIC SYMBOLS	43	61	36
L 704	L1-10 DO YOU USE OR REFER TO LOGIC SYMBOLS FOR AND GATES	57	94	40
L 705	L1-11 DO YOU USE OR REFER TO LOGIC SYMBOLS FOR OR GATES	57	94	40
L 706	L1-12 DO YOU USE OR REFER TO LOGIC SYMBOLS FOR NAND OR NOR GATES	57	94	40

NUMBERING SYSTEMS

LOGIC FUNCTIONS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

DY-TSK

SPC SPC SPC
276 279 280

Task ID	Description	SPC	SPC	SPC
L 707	L1-13 DO YOU USE OR REFER TO LOGIC SYMBOLS FOR EXCLUSIVE OR GATES	55	89	40
L 708	L2-01 IN YOUR PRESENT JOB, DO YOU PERFORM ANY TASKS RELATING TO BOOLEAN EQUATIONS, LOGIC DIAGRAMS, OR LOGIC CIRCUITS	47	67	38
L 709	L2-02 DO YOU DRAW LOGIC SYMBOLS FOR DIRECT COUPLED TRANSISTOR LOGIC (DCTL) CIRCUITS	20	33	14
L 710	L2-03 DO YOU CONSTRUCT TRUTH TABLES FOR CURRENT MODE LOGIC (CML) CIRCUITS	10	28	2
L 711	L2-04 DO YOU DRAW LOGIC DIAGRAMS FROM GIVEN BOOLEAN EQUATIONS	18	39	10
L 712	L2-05 DO YOU MEASURE INPUTS OR OUTPUTS OF LOGIC GATES	45	61	38
L 713	L2-06 DO YOU DEVELOP OR ANALYZE BOOLEAN EQUATIONS IN THE PROCESS OF TROUBLESHOOTING DIGITAL CIRCUITS	23	33	19
L 714	L2-07 DO YOU ANALYZE LOGIC CIRCUITS BY USING BOOLEAN ALGEBRA	23	44	14
L 715	L2-08 DO YOU USE OR REFER TO LOGIC SYMBOLS FOR DIRECT COUPLED TRANSISTOR LOGIC (DCTL) CIRCUIT GATES	40	50	36
L 716	L2-09 DO YOU USE OR REFER TO TRUTH TABLES FOR CURRENT MODE LOGIC (CML) CIRCUITS	20	28	17
L 717	L2-10 DO YOU USE OR REFER TO LOGIC DIAGRAMS CONSISTING OF MORE THAN ONE GATE	45	67	36
L 718	L2-11 DO YOU COMPUTE SUM AND CARRY EXPRESSIONS FOR SERIAL HALF OR FULL ADDER LOGIC DIAGRAMS	23	28	21
L 719	L2-12 DO YOU TRACE DATA FLOW THROUGH PARALLEL FULL ADDER LOGIC DIAGRAMS	35	50	29
L 720	L2-13 DO YOU WORK WITH ASTABLE (FREE RUNNING) MULTIVIBRATORS	45	61	38
L 721	L2-14 DO YOU WORK WITH BISTABLE (FLIP-FLOP) MULTIVIBRATORS	47	67	38
L 722	L2-15 DO YOU WORK WITH MONOSTABLE (ONE-SHOT) MULTIVIBRATORS	47	67	38
L 723	L2-16 DO YOU USE OR REFER TO FLIP-FLOP MULTIVIBRATOR SYMBOLS	48	67	40
L 724	L2-17 DO YOU USE OR REFER TO SINGLE-SHOT MULTIVIBRATOR SYMBOLS	48	67	40
L 725	L2-18 DO YOU USE OR REFER TO FLIP-FLOP CIRCUIT DIAGRAMS	47	61	40
L 726	L2-19 DO YOU USE OR REFER TO FLIP-FLOP TRUTH TABLES	38	56	31
L 727	L2-20 DO YOU USE OR REFER TO COMPLEMENTED FLIP-FLOP LOGIC SYMBOLS	47	67	38
L 728	L2-21 DO YOU USE OR REFER TO COMPLEMENTING FLIP-FLOP LOGIC SYMBOLS	47	67	38
L 729	L2-22 DO YOU MEASURE OUTPUT WAVESHAPES OF LOGIC CIRCUITS	45	61	38
L 730	L2-23 DO YOU TRACE DATA FLOW THROUGH COMPLEMENTED FLIP-FLOP SCHEMATIC DIAGRAMS	45	67	36
L 731	L2-24 DO YOU TRACE DATA FLOW THROUGH COMPLEMENTING FLIP-FLOP SCHEMATIC DIAGRAMS	45	67	36
L 732	L2-25 DO YOU CONSTRUCT TRUTH TABLES FOR J-K FLIP-FLOP LOGIC SYMBOLS	20	28	17

BOOLEAN EQUATIONS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

Task ID	Description	SPC	SPC	SPC
		276	279	280
DY-TSK				
L 733	L3-01 DO YOU WORK WITH DIGITAL COUNTERS IN YOUR PRESENT JOB	53	89	39
L 734	L3-02 DO YOU USE OR REFER TO UP-COUNTERS	52	89	36
L 735	L3-03 DO YOU USE OR REFER TO DOWN-COUNTERS	52	89	36
L 736	L3-04 DO YOU USE OR REFER TO SERIAL COUNTERS	53	89	38
L 737	L3-05 DO YOU USE OR REFER TO PARALLEL COUNTERS	48	89	31
L 738	L3-06 DO YOU USE OR REFER TO RING COUNTERS	23	39	17
L 739	L3-07 DO YOU USE OR REFER TO DECADE COUNTERS	48	83	33
L 740	L3-08 DO YOU USE OR REFER TO COUNT DETECT CIRCUITS	40	61	31
L 741	L3-09 DO YOU USE OR REFER TO DOWN CLOCKS	50	89	33
L 742	L3-10 DO YOU USE OR REFER TO UP CLOCKS	50	89	33
L 743	L3-11 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF UP-COUNTERS HAVING COMPLEMENTED FLIP-FLOPS	43	83	26
L 744	L3-12 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF SERIAL UP- OR DOWN-COUNTERS HAVING COMPLEMENTING FLIP-FLOPS	43	83	26
L 745	L3-13 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF DECADE COUNTERS	47	83	31
L 746	L3-14 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF RING COUNTERS	22	39	14
L 747	L3-15 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF SERIAL UP-COUNTERS FEEDING A PARALLEL STORAGE REGISTER	42	83	24
L 748	L3-16 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF SHIFT REGISTERS	48	89	31
L 749	L3-17 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF OTHER TYPE OF COUNTERS	35	56	26
L 750	L3-18 DO YOU COMPUTE THE BINARY COUNT AFTER SPECIFIC INPUT PULSES FOR UP-COUNTERS HAVING COMPLEMENTED FLIP-FLOPS	33	61	21
L 751	L3-19 DO YOU COMPUTE THE BINARY COUNT AFTER SPECIFIC INPUT PULSES FOR SERIAL UP- OR DOWN-COUNTERS HAVING COMPLEMENTING FLIP-FLOPS	37	61	26
L 752	L3-20 DO YOU COMPUTE THE BINARY COUNT AFTER SPECIFIC INPUT PULSES FOR SERIAL UP-COUNTERS FEEDING A PARALLEL STORAGE REGISTER	38	67	26
L 753	L3-21 DO YOU COMPUTE THE BINARY COUNT AFTER SPECIFIC INPUT PULSES FOR OTHER TYPES OF COUNTERS	32	50	24
L 754	L3-22 DO YOU CONSTRUCT TRUTH TABLES FROM LOGIC DIAGRAMS OF DECADE COUNTERS	15	33	7
L 755	L3-23 DO YOU DETERMINE THE STATE OF EACH FLIP-FLOP IN RING COUNTERS FOR SPECIFIC INPUT PULSES	20	33	14
L 756	L3-24 DO YOU DETERMINE THE APPROPRIATE AND GATE NECESSARY IN COUNT DETECT CIRCUITS TO INDICATE A REQUIRED COUNT	35	67	21
M 757	M1-01 DO YOU WORK WITH SAWTOOTH WAVE GENERATORS	58	83	48
M 758	M1-02 DO YOU WORK WITH TRAPEZOIDAL WAVE GENERATORS	43	67	33
M 759	M1-03 DO YOU WORK WITH PULSED OSCILLATORS WITH REGENERATIVE FEEDBACK	52	78	40
M 760	M1-04 DO YOU WORK WITH PULSED OSCILLATORS WITHOUT REGENERATIVE FEEDBACK	50	67	43

COUNTERS

TIMING CIRCUITS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

		SPC	SPC	SPC
		276	279	280
DY-15K				
M 761	M1-05 DO YOU WORK WITH BLOCKING OSCILLATORS	50	83	36
M 762	M1-06 DO YOU USE OR REFER TO RISE TIME	78	89	74
M 763	M1-07 DO YOU USE OR REFER TO FALL OR FLYBACK TIME	75	89	69
M 764	M1-08 DO YOU USE OR REFER TO SLEEP TIME	78	89	74
M 765	M1-09 DO YOU USE OR REFER TO ELECTRICAL LENGTH OF SAWTOOTH WAVEFORMS	58	78	50
M 766	M1-10 DO YOU USE OR REFER TO PHYSICAL LENGTH OF SAWTOOTH WAVEFORMS	52	78	40
M 767	M1-11 DO YOU USE OR REFER TO LINEAR SLOPE OF SAWTOOTH WAVEFORMS	52	78	40
M 768	M1-12 DO YOU USE OR REFER TO GATE LENGTH OF SAWTOOTH WAVEFORMS	58	89	45
M 769	M2-01 DO YOU USE SIGNAL GENERATORS IN YOUR PRESENT JOB	77	89	71
M 770	M2-02 DO YOU PERFORM OPERATIONAL CHECKS WHILE USING SIGNAL GENERATORS	77	89	71
M 771	M2-03 DO YOU PERFORM PERIODIC MAINTENANCE SUCH AS ADJUSTING, ALIGNING, OR CALIBRATING WHILE USING SIGNAL GENERATORS	72	72	71
M 772	M2-04 DO YOU TROUBLESHOOT AN ASSEMBLY OR SUBASSEMBLY WHILE USING SIGNAL GENERATORS	68	72	67
M 773	M2-05 DO YOU TROUBLESHOOT TO THE SMALLEST REPLACEABLE COMPONENT WHILE USING SIGNAL GENERATORS	60	72	55
M 774	M2-06 DO YOU USE AUDIO SINE-WAVE GENERATORS	43	44	43
M 775	M2-07 DO YOU USE AUDIO NON-SINUSOIDAL WAVE GENERATORS SUCH AS SQUARE WAVE, TRIANGLE, PULSE, OR SPIKE	47	56	43
M 776	M2-08 DO YOU USE RF GENERATORS LESS THAN 1,000 MH	68	72	67
M 777	M2-09 DO YOU USE RF GENERATORS GREATER THAN 1,000 MH	47	83	31
M 778	M2-10 DO YOU USE OTHER SPECIAL PURPOSE OR MULTI-FUNCTION GENERATORS	68	83	62
M 779	M3-01 IN YOUR PRESENT JOB, DO YOU PERFORM ANY TASKS DEALING WITH ALTERNATING CURRENT OR PIPECT CURRENT MOTORS OR GENERATORS	55	89	40
M 780	M3-02 DO YOU INSPECT MOTORS	52	78	40
M 781	M3-03 DO YOU CLEAN OR LUBRICATE MOTORS	53	83	40
M 782	M3-04 DO YOU OPERATE MOTORS	53	83	40
M 783	M3-05 DO YOU REMOVE OR REPLACE COMPLETE MOTORS	52	83	38
M 784	M3-06 DO YOU REMOVE OR REPLACE MOTOR PARTS	22	39	14
M 785	M3-07 DO YOU TROUBLESHOOT AS FAR AS CHECKING WIRE CONNECTIONS OF MOTORS	50	78	38
M 786	M3-08 DO YOU TROUBLESHOOT DOWN TO COMPONENT PARTS OF MOTORS	18	39	10
M 787	M3-09 DO YOU PERFORM ANY TASKS ON FIELD COILS	8	17	5
M 788	M3-10 DO YOU PERFORM ANY TASKS ON ARMATURES	10	17	7
M 789	M3-11 DO YOU PERFORM ANY TASKS ON ROTORS	13	22	10
M 790	M3-12 DO YOU PERFORM ANY TASKS ON BRUSHES	23	56	10
M 791	M3-13 DO YOU PERFORM ANY TASKS ON SLIP RINGS	20	44	10
M 792	M3-14 DO YOU PERFORM ANY TASKS ON COMMUTATORS	15	33	7
M 793	M3-15 DO YOU PERFORM ANY TASKS ON POLE PIECES	8	17	5

USE OF SIGNAL GENERATORS

MOTORS AND GENERATORS

PCT MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

DY-TSK

M 794 M3-16 DO YOU DETERMINE OR MEASURE THE MAGNITUDE OF THE FORCE OR TORQUE CREATED BY A MOTOR	7	22	0
M 795 M3-17 DO YOU DETERMINE OR MEASURE THE DIRECTION OF THE MECHANICAL FORCE OR TORQUE CREATED BY A MOTOR	10	22	5
M 796 M3-18 DO YOU DETERMINE OR MEASURE THE MAGNITUDE OR DIRECTION OF THE INDUCED VOLTAGE IN MOTORS	7	11	5
M 797 M3-19 DO YOU WORK WITH SYNCHRONOUS MOTORS	27	67	10
M 798 M3-20 DO YOU WORK WITH INDUCTION MOTORS	33	72	17
M 799 M3-21 DO YOU WORK WITH SPLIT-PHASE MOTORS	23	39	17
M 800 M3-22 DO YOU WORK WITH SOME COMBINATION OF THE ABOVE MOTORS	37	56	29
M 801 M3-23 DO YOU INSPECT GENERATORS	20	61	2
M 802 M3-24 DO YOU CLEAN OR LUBRICATE GENERATORS	17	50	2
M 803 M3-25 DO YOU OPERATE GENERATORS	17	44	5
M 804 M3-26 DO YOU REMOVE OR REPLACE COMPLETE GENERATORS	20	61	2
M 805 M3-27 DO YOU REMOVE OR REPLACE GENERATOR PARTS	12	33	2
M 806 M3-28 DO YOU TROUBLESHOOT AS FAR AS CHECKING WIRE CONNECTIONS OF GENERATORS	20	61	2
M 807 M3-29 DO YOU TROUBLESHOOT DOWN TO COMPONENT PARTS OF GENERATORS	12	33	2
N 808 N1-01 DO YOU WORK WITH METERS IN YOUR PRESENT JOB	78	89	74
N 809 N1-02 DO YOU CONCEPTUALIZE OR CONSIDER THE FUNCTIONS OF PERMANENT MAGNETS	15	17	14
N 810 N1-03 DO YOU CONCEPTUALIZE OR CONSIDER THE FUNCTIONS OF MOVING COILS	17	17	17
N 811 N1-04 DO YOU CONCEPTUALIZE OR CONSIDER THE FUNCTIONS OF SPIRAL SPRINGS	17	17	17
N 812 N1-05 DO YOU READ METER SCALES	75	89	69
N 813 N1-06 DO YOU EXTEND THE RANGE OF AMMETERS	40	39	40
N 814 N1-07 DO YOU ZERO OHMMETERS	72	83	67
N 815 N1-08 DO YOU ZERO AMMETERS	60	72	55
N 816 N1-09 DO YOU EXTEND THE RANGE OF VOLTMETERS	50	50	50
N 817 N1-10 DO YOU USE OR REFER TO VOLTMETER SENSITIVITY (EXPRESSED IN UNITS OF OHMS PER VOLT)	38	61	29
N 818 N2-01 DO YOU WORK WITH SATURABLE REACTORS OR MAGNETIC AMPLIFIERS IN YOUR PRESENT JOB	35	89	12
N 819 N2-02 DO YOU INSPECT MAGNETIC AMPLIFIERS OR SATURABLE REACTORS	32	83	10
N 820 N2-03 DO YOU CLEAN MAGNETIC AMPLIFIERS OR SATURABLE REACTORS	30	83	7
N 821 N2-04 DO YOU ADJUST MAGNETIC AMPLIFIERS OR SATURABLE REACTORS	27	67	10
N 822 N2-05 DO YOU TROUBLESHOOT MAGNETIC AMPLIFIERS OR SATURABLE REACTORS	30	83	7
N 823 N2-06 DO YOU REMOVE OR REPLACE MAGNETIC AMPLIFIERS OR SATURABLE REACTORS	32	83	10
N 824 N2-07 DO YOU REMOVE OR REPLACE MAGNETIC AMPLIFIER OR SATURABLE REACTOR COMPONENTS	22	67	2

METER MOVEMENTS

SATURABLE REACTORS AND MAGNETIC AMPLIFIERS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

BY-TSM

N 825 N2-08 DO YOU USE OR REFER TO HYSTERESIS CURVES OR LOOPS 2 6 0
 N 826 N2-09 DO YOU INTERPRET SCHEMATIC DRAWINGS TO DEVELOP OUTPUT 15 50 0
 WAVEFORMS ACROSS REACTOR WINDINGS OR LOAD RESISTORS OF
 SINGLE WINDING SATURABLE REACTORS
 N 827 N2-10 DO YOU MEASURE OUTPUT WAVEFORMS ACROSS REACTOR 17 50 2
 WINDINGS OR LOAD RESISTORS OF SINGLE WINDING SATURABLE
 REACTORS
 N 828 N2-11 DO YOU INTERPRET SCHEMATIC DRAWINGS TO DEVELOP OUTPUT 20 50 7
 WAVEFORMS FOR MAGNETIC AMPLIFIERS
 N 829 N2-12 DO YOU USE OR REFER TO COERCIVE FORCE IN SATURABLE 2 0 2
 REACTORS
 N 830 N2-13 DO YOU USE OR REFER TO RESIDUAL MAGNETISM IN 7 17 2
 SATURABLE REACTORS
 N 831 N2-14 DO YOU USE OR REFER TO FLUX DENSITY IN SATURABLE 2 0 2
 REACTORS
 N 832 N2-15 DO YOU USE OR REFER TO POINT OF SATURATION IN 8 17 5
 SATURABLE REACTORS
 N 833 N2-16 DO YOU USE OR REFER TO SATURABLE REACTOR SCHEMATIC 28 78 7
 SYMBOLS
 N 834 N2-C1 DO YOU WORK WITH WAVESHAPING CIRCUITS IN YOUR PRESENT 70 89 62
 JOB
 N 835 N2-02 DO YOU USE OR REFER TO TRANSIENT INTERVALS 48 50 48
 N 836 N3-03 DO YOU USE OR REFER TO PULSE WIDTH (PW) 70 89 62
 N 837 N3-04 DO YOU USE OR REFER TO PULSE RECURRENCE TIME (PRT) 72 89 64
 N 838 N3-05 DO YOU USE OR REFER TO PULSE RECURRENCE FREQUENCY 72 89 64
 (PPF)
 N 839 N3-06 DO YOU USE OR REFER TO DIFFERENTIATING CIRCUITS 65 89 55
 N 840 N3-07 DO YOU USE OR REFER TO INTEGRATING CIRCUITS 65 89 55
 N 841 N3-08 DO YOU USE OR REFER TO THE CLASSIFICATION OF TIME 42 56 36
 CONSTANTS (TC) AS LONG, MEDIUM, OR SHORT
 N 842 N3-09 DO YOU DETERMINE WHETHER AN LR OR RC CIRCUIT IS 25 44 17
 DIFFERENTIATING OR INTEGRATING BASED ON THE TIME CONSTANT
 AND OUTPUT CONFIGURATION
 N 843 N3-10 DO YOU WORK WITH SQUARE WAVE GENERATORS 62 78 55
 N 844 N3-11 DO YOU WORK WITH RECTANGULAR WAVE GENERATORS 52 56 50
 O 845 O1-01 DO YOU WORK ON SINGLE SIDEBAND SYSTEMS IN YOUR 23 78 0
 PRESENT JOB
 O 846 O1-02 DO YOU INSPECT SSB TRANSMIT OR RECEIVE SYSTEMS 23 78 0
 O 847 O1-03 DO YOU CLEAN SSB TRANSMIT OR RECEIVE SYSTEMS 22 72 0
 O 848 O1-04 DO YOU ALIGN SSB TRANSMIT OR RECEIVE SYSTEMS 23 78 0
 O 849 O1-05 DO YOU TROUBLESHOOT TO SSB TRANSMIT OR RECEIVE 22 72 0
 SYSTEMS
 O 850 O1-06 DO YOU TROUBLESHOOT TO SSB TRANSMIT OR RECEIVE 22 72 0
 COMPONENTS
 O 851 O1-07 DO YOU REMOVE OR REPLACE SSB TRANSMIT OR RECEIVE 22 72 0
 SYSTEMS
 O 852 O1-08 DO YOU REMOVE OR REPLACE SSB TRANSMIT OR RECEIVE 22 72 0
 COMPONENTS

WAVESHAPING CIRCUITS

SINGLE SIDEBAND SYSTEMS

PCI MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 260

DY-TSK

0 853	01-09	00	YOU PERFORM TASKS ON SSB AUDIO AMPLIFIERS	3	11	0
0 854	01-10	00	YOU PERFORM TASKS ON SSB BALANCED MODULATORS	8	28	0
0 855	01-11	00	YOU PERFORM TASKS ON SSB CARRIER OSCILLATORS	15	50	0
0 856	01-12	00	YOU PERFORM TASKS ON SSB LC FILTERS	18	61	0
0 857	01-13	00	YOU PERFORM TASKS ON SSB CRYSTAL FILTERS	17	56	0
0 858	01-14	00	YOU PERFORM TASKS ON SSB MECHANICAL FILTERS	15	50	0
0 859	01-15	00	YOU PERFORM TASKS ON SSB OSCILLATORS	22	72	0
0 860	01-16	00	YOU PERFORM TASKS ON SSB MIXERS	20	67	0
0 861	01-17	00	YOU PERFORM TASKS ON SSB DRIVERS	18	61	0
0 862	01-18	00	YOU PERFORM TASKS ON SSB POWER AMPLIFIERS	20	67	0
0 863	01-19	00	YOU PERFORM TASKS ON SSB RF AMPLIFIERS	20	67	0
0 864	01-20	00	YOU PERFORM TASKS ON SSB FREQUENCY CONVERTERS	17	56	0
0 865	01-21	00	YOU PERFORM TASKS ON SSB IF AMPLIFIERS	22	72	0
0 866	01-22	00	YOU PERFORM TASKS ON SSB DEMODULATORS	13	44	0
0 867	01-23	00	YOU PERFORM TASKS ON SSB DON'T REMEMBER WHICH SSB SYSTEM STAGES	5	17	0
0 868	01-24	00	YOU USE OR REFER TO SELECTIVE FADING	2	6	0
0 869	01-25	00	YOU USE OR REFER TO PEAK POWER	18	61	0
0 870	01-26	00	YOU USE OR REFER TO FREQUENCY STABILITY	20	67	0
0 871	01-27	00	YOU USE OR REFER TO RESPONSE CURVES FOR BANDWIDTH FILTERS	15	50	0
0 872	01-28	00	YOU CALCULATE PEAK POWER OR EFFECTIVE POWER OF SSB TRANSMITTERS	17	56	0
0 873	01-29	00	YOU TRACE SIGNALS OR CURRENT PATHS THROUGH SSB TRANSMITTER SCHEMATIC DIAGRAMS	22	72	0
0 874	01-30	00	YOU TRACE SIGNALS OR CURRENT PATHS THROUGH SSB RECEIVER SCHEMATIC DIAGRAMS	12	39	0
0 875	02-01	00	YOU WORK ON PULSE MODULATION SYSTEMS IN YOUR PRESENT JOB	67	89	57
0 876	02-02	00	YOU INSPECT PULSE MODULATION SYSTEMS	68	89	60
0 877	02-03	00	YOU CLEAN PULSE MODULATION SYSTEMS	65	83	57
0 878	02-04	00	YOU ALIGN PULSE MODULATION SYSTEMS	68	89	60
0 879	02-05	00	YOU TROUBLESHOOT TO PULSE MODULATION SYSTEMS COMPONENTS	67	83	60
0 880	02-06	00	YOU TROUBLESHOOT TO PULSE MODULATION SYSTEM COMPONENTS	67	83	60
0 881	02-07	00	YOU REMOVE OR REPLACE PULSE MODULATION SYSTEMS COMPONENTS	58	78	50
0 882	02-08	00	YOU REMOVE OR REPLACE PULSE MODULATION SYSTEM COMPONENTS	67	83	60
0 883	02-09	00	YOU WORK ON PULSE-AMPLITUDE MODULATION (PAM) SYSTEMS	42	44	40
0 884	02-10	00	YOU WORK ON PULSE-DURATION MODULATION (PDM) SYSTEMS	37	50	31
0 885	02-11	00	YOU WORK ON PULSE-POSITION MODULATION (PPM) SYSTEMS	17	22	14
0 886	02-12	00	YOU WORK ON PULSE-CODE MODULATION (PCM) SYSTEMS	10	11	10
0 887	02-13	00	YOU WORK ON LINE PULSING MODULATION SYSTEMS	13	22	10
0 888	02-14	00	YOU WORK ON DON'T REMEMBER WHICH TYPE OF MODULATION SYSTEM	27	28	26

PULSE MODULATION SYSTEMS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

0Y-1SK

0 889	02-15	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM POWER SUPPLIES	67	89	57
0 890	02-16	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM CHARGING CHOKES AND CHARGING DIODES	48	83	33
0 891	02-17	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM PULSE FORMING NETWORKS	55	83	43
0 892	02-18	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM TIMERS	42	72	29
0 893	02-19	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM SWITCHES SUCH AS GAS THYRATRONS	48	83	33
0 894	02-20	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM PULSE TRANSFORMERS	53	83	40
0 895	02-21	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM TRANSMITTER TUBES	58	89	45
0 896	02-22	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM RF AMPLIFIERS	62	83	52
0 897	02-23	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM FREQUENCY CONVERTERS	47	56	43
0 898	02-24	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM IF AMPLIFIERS	57	78	48
0 899	02-25	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM DETECTORS	57	72	50
0 900	02-26	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM VIDEO AMPLIFIERS	48	67	40
0 901	02-27	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM POWER VIDEO AMPLIFIERS	29	39	24
0 902	02-28	DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM DON'T REMEMBER WHICH PULSE MODULATION SYSTEM STAGES (PRF)	8	11	7
0 903	02-29	DO YOU USE OR REFER TO PULSE RECURRENCE FREQUENCY (PRF)	67	89	57
0 904	02-30	DO YOU USE OR REFER TO PULSE RECURRENCE TIME (PRT)	67	89	57
0 905	02-31	DO YOU USE OR REFER TO PULSE WIDTH (PW)	68	89	60
0 906	02-32	DO YOU USE OR REFER TO PULSE SHAPE	68	89	60
0 907	02-33	DO YOU USE OR REFER TO PEAK POWER	60	89	48
0 908	02-34	DO YOU USE OR REFER TO AVERAGE POWER	60	89	48
0 909	02-35	DO YOU CALCULATE PULSE RECURRENCE TIME (PRT) OR PULSE RECURRENCE FREQUENCY (PRF)	60	78	52
0 910	02-36	DO YOU MEASURE PULSE RECURRENCE TIME (PRT) OR PULSE RECURRENCE FREQUENCY (PRF)	67	89	57
0 911	02-37	DO YOU USE FORMULAS TO CALCULATE AVERAGE POWER OR PEAK POWER OF PULSE MODULATION TRANSMIT SYSTEMS	48	89	31
0 912	02-38	DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH PULSE MODULATION TRANSMITTER SCHEMATIC DIAGRAMS	63	89	52
0 913	02-39	DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH PULSE MODULATION RECEIVED SCHEMATIC DIAGRAMS	48	72	38
0 914	03-01	DO YOU WORK WITH ANTENNAS IN YOUR PRESENT JOB	35	89	12
0 915	03-02	DO YOU INSPECT ANTENNAS	32	83	10

ANTENNAS

PCI MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

0Y-TSK

SPC SPC SPC
276 279 280

Task ID	Description	SPC	SPC	SPC
0 916	03-03 DO YOU CLEAN ANTENNAS	30	83	7
0 917	03-04 DO YOU PHYSICALLY ALIGN ANTENNAS	25	72	5
0 918	03-05 DO YOU ELECTRICALLY ALIGN ANTENNAS	22	61	5
0 919	03-06 DO YOU TROUBLESHOOT TO ANTENNAS	30	83	7
0 920	03-07 DO YOU TROUBLESHOOT TO ANTENNA COMPONENTS	27	83	2
0 921	03-08 DO YOU REMOVE OR INSTALL ANTENNAS	10	22	5
0 922	03-09 DO YOU REMOVE OR REPLACE COMPONENTS OF ANTENNAS	25	78	2
0 923	03-10 DO YOU USE OR REFER TO TECHNICAL DATA CONTAINING REPRESENTATIONS OF E OR ELECTRIC FIELD LINES	3	11	0
0 924	03-11 DO YOU USE OR REFER TO TECHNICAL DATA CONTAINING REPRESENTATIONS OF H OR MAGNETIC FIELD LINES	0	0	0
0 925	03-12 DO YOU DETERMINE THE DIRECTION OF THE MAGNETIC LINES IN RELATION TO THE ELECTRIC LINES OF FORCE FOR ANTENNAS	2	0	2
0 926	03-13 DO YOU USE OR REFER TO THE GENERAL RULE THAT ANTENNAS WHICH ARE OF CORRECT LENGTH (HALF-WAVE) ACT AS INDUCTIVE LOADS TO THE GENERATOR	0	0	0
0 927	03-14 DO YOU USE OR REFER TO THE GENERAL RULE THAT ANTENNAS WHICH ARE LONGER THAN A HALF-WAVE ACT AS INDUCTIVE LOADS TO THE GENERATOR	2	0	2
0 928	03-15 DO YOU USE OR REFER TO THE GENERAL RULE THAT ANTENNAS WHICH ARE SHORTER THAN A HALF-WAVE ACT AS CAPACITIVE LOADS TO THE GENERATOR	2	0	2
0 929	03-16 DO YOU WORK WITH HERTZ ANTENNAS	3	6	2
0 930	03-17 DO YOU WORK WITH MARCONI ANTENNAS	2	0	2
0 931	03-18 DO YOU WORK WITH BROADSIDE ARRAYS	3	6	2
0 932	03-19 DO YOU WORK WITH END-FIRE ARRAYS	3	0	5
0 933	03-20 DO YOU WORK WITH CARDIOID ARRAYS	3	6	2
0 934	03-21 DO YOU WORK WITH COLLINER ARRAYS	7	17	2
0 935	03-22 DO YOU USE OR REFER TO THE TERM ELECTROMAGNETIC INDUCTION FIELDS WHEN WORKING WITH ANTENNAS	2	6	0
0 936	03-23 DO YOU MEASURE ELECTROMAGNETIC INDUCTION FIELDS OF ANTENNAS	0	0	0
0 937	03-24 DO YOU USE OR REFER TO THE TERM ELECTROMAGNETIC RADIATION FIELDS WHEN WORKING WITH ANTENNAS	7	22	0
0 938	03-25 DO YOU MEASURE ELECTROMAGNETIC RADIATION FIELDS OF ANTENNAS	0	0	0
0 939	03-26 DO YOU USE OR REFER TO THE TIME PHASE OF ELECTRIC (E) AND MAGNETIC (H) COMPONENTS IN ANTENNA RADIATION	0	0	0
0 940	03-27 DO YOU USE OR REFER TO THE TIME PHASE OF ELECTRIC (E) AND MAGNETIC (H) COMPONENTS IN ANTENNA INDUCTION FIELD	0	0	0
0 941	03-28 ARE ANY OF THE ANTENNAS YOU WORK ON LINEARLY POLARIZED	12	17	10
0 942	03-29 ARE ANY OF THE ANTENNAS YOU WORK ON CIRCULARLY POLARIZED	7	22	0
0 943	03-30 DO YOU MEASURE OR DETERMINE THE POLARITY OF ANTENNAS YOU WORK ON	2	0	2
0 944	03-31 DO YOU CONSTRUCT, OR MAKE THE CALCULATIONS NECESSARY TO CONSTRUCT, ANTENNAS OF CORRECT LENGTH FOR SPECIFIC WAVELENGTHS	0	0	0

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

DY-TSK

0 945 03-32 DO THE ANTENNA ARRAYS YOU WORK WITH CONTAIN PARASITIC
ELEMENTS 7 11 5
0 946 03-33 DO THE ANTENNA ARRAYS YOU WORK WITH CONTAIN PARASITIC
ELEMENTS SERVING AS DIRECTORS 7 11 5
0 947 03-34 DO THE ANTENNA ARRAYS YOU WORK WITH CONTAIN PARASITIC
ELEMENTS SERVING AS REFLECTORS 8 22 2
0 948 03-35 DO THE ANTENNA ARRAYS YOU WORK WITH CONTAIN DON'T
REMEMBER WHAT KIND OF ELEMENTS 10 17 7
0 949 03-36 DO YOU WORK ON UNIDIRECTIONAL ANTENNAS 23 56 10
0 850 03-37 DO YOU WORK ON BIDIRECTIONAL ANTENNAS 5 6 5
0 851 03-38 DO YOU WORK ON DON'T REMEMBER THE DIRECTIONALITY 5 11 2
0 852 03-39 DO YOU WORK WITH ROTAR ANTENNA ARRAYS 13 39 2
P 953 PI-01 IN YOUR PRESENT JOB DO YOU WORK WITH TRANSMISSION
LINES (TRANSMISSION LINES ARE DEFINED TO INCLUDE LEADS
BETWEEN RECEIVERS AND ANTENNAS, TELEPHONE LEADS, AS WELL
AS HIGH VOLTAGE POWER LINES, ETC. DO NOT CONSIDER
WAVEGUIDES AS TRANSMISSION LINES) 40 61 31

TRANSMISSION LINES

P 954 PI-02 DO YOU REFER TO OR USE COPPER LOSS OR I²R LOSS IN
TRANSMISSION LINES 8 11 7
P 955 PI-03 DO YOU REFER TO OR USE SKIN EFFECTS OF HIGH FREQUENCY
CURRENTS IN TRANSMISSION LINES 3 6 2
P 956 PI-04 DO YOU REFER TO OR USE RADIATION LOSS IN TRANSMISSION
LINES 13 28 7
P 957 PI-05 DO YOU USE OR REFER TO DIELECTRIC LOSS IN
TRANSMISSION LINES 8 6 10
P 958 PI-06 DO YOU USE OR REFER TO LEAKAGE LOSSES IN TRANSMISSION
LINES 8 6 10
P 959 PI-07 DO YOU WORK WITH TWISTED PAIR TRANSMISSION LINES 13 28 7
P 960 PI-08 DO YOU WORK WITH TWIN LEAD TRANSMISSION LINES 17 39 7
P 961 PI-09 DO YOU WORK WITH OPEN TWO-WIRE TRANSMISSION LINES 13 28 7
P 962 PI-10 DO YOU WORK WITH FLEXIBLE COAXIAL CABLE TRANSMISSION
LINES 40 61 31
P 963 PI-11 DO YOU WORK WITH RIGID COAXIAL CABLE TRANSMISSION
LINES 37 61 26
P 964 PI-12 DO YOU TROUBLESHOOT TRANSMISSION LINES 38 61 29
P 965 PI-13 DO YOU ANALYZE VOLTAGE OR CURRENT WAVEFORMS IN
TRANSMISSION LINES TO DETERMINE THE TYPE OF TERMINATION
(OPEN, SHORTED, CAPACITIVE, INDUCTIVE) 12 6 14
P 966 PI-14 DO YOU SELECT APPROPRIATE TRANSMISSION LINES
TERMINATIONS TO ACHIEVE DESIRED WAVEFORMS 25 28 24
P 967 PI-15 DO YOU USE OR REFER TO SCHEMATIC SYMBOLS FOR LINE
TERMINATIONS IN TERMS OF CIRCUIT TERMINATIONS 33 50 26
P 968 PI-16 DO YOU MEASURE STANDING WAVE RATIOS (SWR) OF
TRANSMISSION LINES 27 28 26
P 969 PI-17 DO YOU CALCULATE STANDING WAVE RATIOS (SWR) OF
TRANSMISSION LINES 13 17 12
P 970 PI-18 DO YOU PERFORM THE CALCULATIONS NECESSARY TO
DETERMINE THE IMPEDANCE AND LENGTH OF QUARTER - WAVELENGTH
MATCHING TRANSFORMERS TO MATCH TRANSMISSION LINES TO LOADS 3 0 5

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

0Y-TSK

Task ID	Description	SPC	SPC	SPC
P 971	PI-19 DO YOU WORK WITH TRANSMISSION LINES WHICH ARE MATCHED TO LOADS USING MATCHING TRANSFORMERS	15	22	12
P 972	PI-20 DO YOU WORK WITH TRANSMISSION LINES WHICH ARE MATCHED TO LOADS USING DELTA MATCHING	8	11	7
P 973	PI-21 DO YOU SELECT THE TYPE OF TRANSMISSION LINE NEEDED FOR PARTICULAR JOBS WITHOUT REFERRING TO TECHNICAL DATA	8	6	10
P 974	PI-22 DO YOU USE OR REFER TO THE TERM CHARACTERISTIC IMPEDANCE (Z0) OF TRANSMISSION LINES	23	17	26
P 975	PI-23 DO YOU CALCULATE THE CHARACTERISTIC IMPEDANCE (Z0) OF TRANSMISSION LINES	2	0	2
P 976	PI-24 DO YOU USE OR REFER TO THE TERM CUTOFF FREQUENCY OF TRANSMISSION LINES	3	0	5
P 977	PI-25 DO YOU USE OR REFER TO THE TERM VELOCITY FACTOR (K) OF TRANSMISSION LINES	2	0	2
P 978	PI-26 DO YOU COMPUTE THE ELECTRICAL LENGTH OF TRANSMISSION LINES FOR PARTICULAR FREQUENCIES	18	6	24
P 979	PI-27 DO YOU CONSTRUCT TRANSMISSION LINES OF PARTICULAR ELECTRICAL LENGTH FOR GIVEN FREQUENCIES	20	6	26
P 980	PI-28 DO YOU USE OR REFER TO THE GENERAL RULE THAT AS THE FREQUENCY INCREASES AND THE PHYSICAL LENGTH OF TRANSMISSION LINES REMAIN CONSTANT, THE ELECTRICAL LENGTH INCREASES	15	6	19
P 981	PI-29 DO YOU WORK WITH NONRESONANT (FLAT) TRANSMISSION LINES	10	11	10
P 982	PI-30 DO YOU WORK WITH RESONANT TRANSMISSION LINES	15	17	14
P 983	PI-31 DO YOU WORK WITH TRANSMISSION LINES WHICH ARE MATCHED TO LOADS USING STUB MATCHING	5	6	5
P 984	P2-01 DO YOU WORK WITH WAVEGUIDES OR CAVITY RESONATORS IN YOUR PRESENT JOB	40	89	19
P 985	P2-02 DO YOU INSPECT WAVEGUIDES OR CAVITY RESONATORS	40	83	21
P 986	P2-03 DO YOU CLEAN WAVEGUIDES OR CAVITY RESONATORS	37	83	17
P 987	P2-04 DO YOU BEND WAVEGUIDES OR CAVITY RESONATORS	3	6	2
P 988	P2-05 DO YOU TWIST WAVEGUIDES OR CAVITY RESONATORS	3	6	2
P 989	P2-06 DO YOU PURGE WAVEGUIDES OR CAVITY RESONATORS	27	83	2
P 990	P2-07 DO YOU PURGE WAVEGUIDES OR CAVITY RESONATORS	25	78	2
P 991	P2-08 DO YOU TROUBLESHOOT WAVEGUIDES OR CAVITY RESONATORS	37	78	19
P 992	P2-09 DO YOU REMOVE OR INSTALL COMPLETE WAVEGUIDES	18	61	0
P 993	P2-10 DO YOU REMOVE OR INSTALL WAVEGUIDE SECTIONS	25	83	0
P 994	P2-11 DO YOU REMOVE OR INSTALL DUMMY LOADS	30	78	10
P 995	P2-12 DO YOU REMOVE OR INSTALL E BENDS	15	50	0
P 996	P2-13 DO YOU REMOVE OR INSTALL H BENDS	15	50	0
P 997	P2-14 DO YOU REMOVE OR INSTALL OTHER BENDS	13	44	0
P 998	P2-15 DO YOU REMOVE OR INSTALL CHOKE JOINTS	17	56	0
P 999	P2-16 DO YOU REMOVE OR INSTALL ROTATING JOINTS	25	83	0
P1000	P2-17 DO YOU REMOVE OR INSTALL DIRECTIONAL COUPLERS	30	78	10
P1001	P2-18 DO YOU REMOVE OR INSTALL BIDIRECTIONAL COUPLERS	28	78	7
P1002	P2-19 DO YOU USE OR REFER TO >A> WALL OF WAVEGUIDES	8	22	2

WAVEGUIDES AND CAVITY RESONATORS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	SPC	SPC	SPC
	276	279	280
PI003 P2-20 DO YOU USE OR REFER TO >B> WALL OF WAVEGUIDES	8	22	2
PI004 P2-21 DO YOU USE OR REFER TO CUTOFF FREQUENCY OF WAVEGUIDES	2	6	0
PI005 P2-22 DO YOU USE OR REFER TO FREQUENCY-DETERMINING WALL OF WAVEGUIDES	3	11	0
PI006 P2-23 DO YOU USE OR REFER TO POWER-DETERMINING WALL OF WAVEGUIDES	3	11	0
PI007 P2-24 DO YOU USE OR REFER TO ELECTRIC FIELD BOUNDARY CONDITIONS	0	0	0
PI008 P2-25 DO YOU USE OR REFER TO MAGNETIC FIELD BOUNDARY CONDITIONS	0	0	0
PI009 P2-26 DO YOU USE OR REFER TO DUPLEXER FIELD BOUNDARY CONDITIONS	0	0	0
PI010 P2-27 DO YOU USE OR REFER TO THE GENERAL RULE THAT MOST WAVEGUIDES ARE MADE WITH A >B> WALL SIZE OF .7 WAVELENGTHS OF THE OPERATING FREQUENCY	5	17	0
PI011 P2-28 DO YOU USE OR REFER TO THE GENERAL RULE THAT MOST >A> WALLS RANGE FROM .2 TO .5 WAVELENGTHS IN SIZE, WITH .35 USED AS AN AVERAGE	2	6	0
PI012 P2-29 ARE YOU CONCERNED WITH THE MATERIAL (SUCH AS BRASS) WHICH WAVEGUIDES ARE MADE OF	3	11	0
PI013 P2-30 DO YOU COMPUTE THE LENGTH OF A WAVEGUIDE FOR SPECIFIC INSTALLATION	0	0	0
PI014 P2-31 DO YOU USE THE RIGHT HAND RULE TO DETERMINE THE DIRECTION OF PROPAGATION, DIRECTION OF >E> FIELD, OR DIRECTION OF >H> FIELD IN WAVEGUIDES	0	0	0
PI015 P2-32 DO YOU USE OR REFER TO THE TIME PHASE OF PEAK >E> OR >H> LINES IN WAVEGUIDES	0	0	0
PI016 P2-33 DO YOU MEASURE THE TIME PHASE OF >E> OR >H> LINES IN WAVEGUIDES	0	0	0
PI017 P2-34 DO YOU USE OR REFER TO THE SPACE QUADRATURE OF >E> OR >H> LINES IN WAVEGUIDES	0	0	0
PI018 P2-35 ARE HIGH POWER PROBES USED ON WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	20	50	7
PI019 P2-36 ARE LOW POWER PROBES USED ON WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	22	61	5
PI020 P2-37 ARE LOOPS USED ON WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	15	28	10
PI021 P2-38 ARE APERTURES (WINDOWS OR IRISES) USED ON WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	23	78	0
PI022 P2-39 ARE DON'T REMEMBER THE KIND OF ENERGY COUPLING USED ON WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	8	11	7
PI023 P2-40 DO YOU DETERMINE WHERE PROBES SHOULD BE MOUNTED IN WAVEGUIDES OR CAVITY RESONATORS WITHOUT REFERRING TO TECHNICAL DATA	0	0	0
PI024 P2-41 DO YOU DETERMINE THE POSITIONING OF LOOPS IN WAVEGUIDES OR CAVITY RESONATORS WITHOUT REFERRING TO TECHNICAL DATA	0	0	0

DY-TSK

PCT MBS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

DY-15K

DESCRIPTION	SPC	SPC	SPC
P1025 P2-42 DO YOU DETERMINE THE POSITIONING OR SIZE OF APERTURES IN WAVEGUIDES OR CAVITY RESONATORS WITHOUT REFERRING TO TECHNICAL DATA	0	0	0
P1026 P2-43 ARE CHOKE JOINTS USED IN WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	17	56	0
P1027 P2-44 ARE ROTATING JOINTS USED IN WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	25	83	0
P1028 P2-45 ARE DON'T REMEMBER THE KING OF JOINTS USED IN WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	10	22	5
P1029 P2-46 DO YOU TUNE CAVITY RESONATORS USING CAPACITIVE TUNING	22	33	17
P1030 P2-47 DO YOU TUNE CAVITY RESONATORS USING INDUCTIVE TUNING	13	22	10
P1031 P2-48 DO YOU TUNE CAVITY RESONATORS USING VOLUME TUNING	17	33	10
P1032 P2-49 DO YOU TUNE CAVITY RESONATORS USING DON'T REMEMBER THE METHOD OF TUNING	8	22	2
P1033 P2-50 DO YOU MEASURE THE FREQUENCY OF SIGNALS IN CAVITY RESONATORS	30	56	19
P1034 P3-01 IN YOUR PRESENT JOB DO YOU WORK WITH KLYSTRONS, TRAVELING WAVE TUBES (TWT), PARAMETRIC AMPLIFIERS, OR MAGNETRONS	58	89	45
P1035 P3-02 DO YOU USE OR REFER TO INTERELECTRODE CAPACITANCE	12	17	10
P1036 P3-03 DO YOU USE OR REFER TO ELECTRON TRANSIT TIME	12	22	7
P1037 P3-04 DO YOU USE OR REFER TO LEAD INDUCTANCE	8	17	5
P1038 P3-05 DO YOU USE OR REFER TO RF LOSSES IN EXTERNAL CIRCUITRY	27	44	19
P1039 P3-06 DO YOU USE OR REFER TO PRINCIPLE OF ELECTRON VELOCITY MODULATION	7	11	5
P1040 P3-07 DO YOU USE OR REFER TO ELECTRON BUNCHING	17	39	7
P1041 P3-08 DO YOU WORK WITH TWO-CAVITY KLYSTRONS	5	17	0
P1042 P3-09 DO YOU WORK WITH THREE-CAVITY KLYSTRONS	7	22	0
P1043 P3-10 DO YOU WORK WITH REFLEX KLYSTRONS	27	89	0
P1044 P3-11 DO YOU WORK WITH TRAVELING-WAVE TUBES (TWT)	57	89	43
P1045 P3-12 DO YOU WORK WITH NONDEGENERATIVE PARAMETRIC AMPLIFIERS	23	72	2
P1046 P3-13 DO YOU WORK WITH UP-CONVERTER PARAMETRIC AMPLIFIERS	7	17	2
P1047 P3-14 DO YOU WORK WITH MAGNETRONS	5	17	0
P1048 P3-15 DO YOU INSPECT KLYSTRONS OR TWT	57	83	45
P1049 P3-16 DO YOU CLEAN KLYSTRONS OR TWT	50	78	38
P1050 P3-17 DO YOU TUNE KLYSTRONS OR TWT ELECTRICALLY	53	83	40
P1051 P3-18 DO YOU TUNE KLYSTRONS OR TWT MECHANICALLY	37	78	19
P1052 P3-19 DO YOU PERFORM OPERATIONAL CHECKS OF KLYSTRONS OR TWT	57	83	45
P1053 P3-20 DO YOU TROUBLESHOOT KLYSTRONS OR TWT	52	78	40
P1054 P3-21 DO YOU REMOVE OR REPLACE COMPLETE KLYSTRON OR TWT	57	83	45
P1055 P3-22 DO YOU REMOVE OR REPLACE KLYSTRON OR TWT COMPONENTS	18	33	12
P1056 P3-23 DO YOU INSPECT PARAMETRIC AMPLIFIERS	25	78	2
P1057 P3-24 DO YOU CLEAN PARAMETRIC AMPLIFIERS	25	78	2
P1058 P3-25 DO YOU ADJUST PARAMETRIC AMPLIFIERS	27	83	2

MICROWAVE AMPLIFIERS AND OSCILLATORS

PCT MBRs RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

0Y-1SK

Task Description	SPC	SPC	SPC
PI059 P3-26 DO YOU TUNE PARAMETRIC AMPLIFIERS	27	83	2
PI060 P3-27 DO YOU PERFORM OPERATIONAL CHECKS OF PARAMETRIC AMPLIFIERS	27	83	2
PI061 P3-28 DO YOU TROUBLESHOOT PARAMETRIC AMPLIFIERS	27	83	2
PI062 P3-29 DO YOU REMOVE OR REPLACE COMPLETE PARAMETRIC AMPLIFIER	23	72	2
PI063 P3-30 DO YOU REMOVE OR REPLACE PARAMETRIC AMPLIFIER COMPONENTS	25	78	2
PI064 P3-31 DO YOU INSPECT MAGNETRONS	3	11	0
PI065 P3-32 DO YOU CLEAN MAGNETRONS	3	11	0
PI066 P3-33 DO YOU ADJUST MAGNETRONS	3	11	0
PI067 P3-34 DO YOU TUNE MAGNETRONS	3	11	0
PI068 P3-35 DO YOU PERFORM OPERATIONAL CHECKS OF MAGNETRONS	3	11	0
PI069 P3-36 DO YOU TROUBLESHOOT MAGNETRONS	3	11	0
PI070 P3-37 DO YOU REMOVE OR REPLACE COMPLETE MAGNETRON	3	11	0
PI071 P3-38 DO YOU REMOVE OR REPLACE MAGNETRON COMPONENTS	2	6	0
PI072 P3-39 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS COLLECTOR PLATES	5	17	0
PI073 P3-40 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS CATCHER CAVITIES	3	11	0
PI074 P3-41 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS CATCHER GRIDS	3	11	0
PI075 P3-42 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS FEEDBACK LOOPS	2	6	0
PI076 P3-43 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS DRIFT SPACES	2	6	0
PI077 P3-44 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS BUNCHER GRIDS	2	6	0
PI078 P3-45 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS BUNCHER CAVITIES	2	6	0
PI079 P3-46 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS CONTROL GRIDS	5	11	2
PI080 P3-47 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS CATHODES	7	17	2
PI081 P3-48 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON REPELLER (REFLECTOR) PLATES	27	83	2
PI082 P3-49 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON GRIDS	17	50	2
PI083 P3-50 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON GRID CAVITY GAPS	10	28	2
PI084 P3-51 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON RESONANT CAVITIES	28	89	2
PI085 P3-52 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON MAGNETIC COUPLING LOOPS	13	33	5
PI086 P3-53 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON FILAMENTS	23	67	5
PI087 P3-54 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON CATHODES	23	67	5

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

Task ID	Description	SPC	SPC	SPC
P1088	DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON OUTPUT LEADS	27	78	5
P1089	DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES FILAMENTS	53	83	40
P1090	DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES CATHODES	55	89	40
P1091	DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES MODULATOR GRIDS	42	50	38
P1092	DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES ANODES	50	78	39
P1093	DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES HELIXES	50	83	36
P1094	DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES COLLECTORS	47	78	33
P1095	DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES MAGNETS	37	56	29
P1096	DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES ATTENUATORS	40	78	24
P1097	DO YOU PERFORM TASKS ON PARAMETRIC AMPLIFIER FERRITE CIRCULATORS	23	72	2
P1098	DO YOU PERFORM TASKS ON PARAMETRIC AMPLIFIER SIGNAL CAVITIES	18	56	2
P1099	DO YOU PERFORM TASKS ON PARAMETRIC AMPLIFIER IDLER CAVITIES	12	33	2
P1100	DO YOU PERFORM TASKS ON PARAMETRIC AMPLIFIER VARACTOR CAVITIES	27	83	2
P1101	DO YOU PERFORM TASKS ON PARAMETRIC AMPLIFIER FERRITE DIODES	23	72	2
P1102	DO YOU PERFORM TASKS ON PARAMETRIC AMPLIFIER REVERSE-BIAS BATTERIES	8	22	2
P1103	DO YOU PERFORM TASKS ON ANODES	2	6	0
P1104	DO YOU PERFORM TASKS ON ANODE COOLING PINS	2	6	0
P1105	DO YOU PERFORM TASKS ON COUPLING LOOPS	0	0	0
P1106	DO YOU PERFORM TASKS ON HEATER LEADS	0	0	0
P1107	DO YOU PERFORM TASKS ON RESONANT CAVITIES	2	6	0
P1108	DO YOU PERFORM TASKS ON CATHODES	2	6	0
P1109	DO YOU PERFORM TASKS ON MAGNETS	2	6	0
Q1110	DO YOU USE OR REFER TO STORAGE REGISTERS	60	94	45
Q1111	DO YOU USE OR REFER TO SHIFT REGISTERS	60	94	45
Q1112	DO YOU USE OR REFER TO LOGIC SYMBOLS OF SHIFT REGISTERS	58	89	45
Q1113	DO YOU USE OR REFER TO LOGIC SYMBOLS OF STORAGE REGISTERS	58	89	45
Q1114	DO YOU TRACE THE DATA FLOW THROUGH LOGIC DIAGRAMS OF SHIFT REGISTERS	55	94	39
Q1115	DO YOU TRACE THE DATA FLOW THROUGH LOGIC DIAGRAMS OF OTHER TYPE OF REGISTERS	57	94	40

REGISTERS

PCI MBRS RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

Q#	DESCRIPTION	SPC	SPC	SPC
		276	279	280
Q1116	Q1-07 DO YOU DETERMINE THE STATE OF EACH FLIP-FLOP OF A SWIFT REGISTER AFTER A SPECIFIED NUMBER OF SHIFT PULSES HAVE PASSED	47	89	29
Q1117	Q2-01 DO YOU WORK WITH DIGITAL COUNTERS, REGISTERS, OR STORAGE DEVICES IN YOUR PRESENT JOB	45	78	31
Q1118	Q2-02 DO YOU USE OR REFER TO DELAY LINES	48	78	36
Q1119	Q2-03 DO YOU USE OR REFER TO MAGNETIC CORES	10	6	12
Q1120	Q2-04 DO YOU USE OR REFER TO MAGNETIC DRUMS	7	0	10
Q1121	Q2-05 DO YOU USE OR REFER TO MAGNETIC TAPES	8	0	12
Q1122	Q2-06 DO YOU USE OR REFER TO ACCESS TIME OR SPEED OR MEMORY SYSTEMS	8	0	12
Q1123	Q2-07 DO YOU USE OR REFER TO WORD CAPACITY OF MEMORY SYSTEMS	8	6	10
Q1124	Q2-08 DO YOU USE OR REFER TO VOLATILITY OF MEMORY SYSTEMS	5	0	7
Q1125	Q2-09 DO YOU USE OR REFER TO LOGIC SYMBOL OF DELAY LINES	32	44	26
Q1126	Q2-10 IN YOUR PRESENT JOB, DO YOU WORK WITH ANALOG-TO-DIGITAL (A/D) CONVERTERS, OR BINARY-TO-DECIMAL READOUT CONVERTERS	48	83	33
Q1127	Q3-02 DO YOU COMPUTE OUTPUT VOLTAGES FOR ELECTROMECHANICAL DIGITAL-TO-ANALOG (D/A) CONVERTERS FOR GIVEN INPUT VOLTAGES	23	39	17
Q1128	Q3-03 DO YOU USE OR REFER TO THE GENERAL RULE THAT THE COUNT IN ELECTROMECHANICAL DIGITAL-TO-ANALOG (D/A) CONVERTERS IS DETERMINED BY ADDING THE DENOMINATORS OF THE RESISTORS	8	22	2
Q1129	Q3-04 DO YOU COMPUTE ANALOG VOLTAGES FOR GIVEN BINARY COUNTS IN ELECTRONIC DIGITAL-TO-ANALOG (D/A) CONVERTERS	27	39	21
Q1130	Q3-05 DO YOU PERFORM SAMPLE FUNCTION TASKS ON VARIABLE TIME ANALOG-TO-DIGITAL (A/D) CONVERTER CIRCUITS	27	28	26
Q1131	Q3-06 DO YOU PERFORM HOLD FUNCTION TASKS ON VARIABLE TIME ANALOG-TO-DIGITAL (A/D) CONVERTER CIRCUITS	27	28	26
Q1132	Q3-07 DO YOU PERFORM COMPARE FUNCTION TASKS ON VARIABLE TIME ANALOG-TO-DIGITAL (A/D) CONVERTER CIRCUITS	27	28	26
Q1133	Q3-08 DO YOU PERFORM DIGITIZE FUNCTION TASKS ON VARIABLE TIME ANALOG-TO-DIGITAL (A/D) CONVERTER CIRCUITS	27	28	26
Q1134	Q3-09 DO YOU PERFORM DON'T REMEMBER WHICH FUNCTION TASKS ON VARIABLE TIME ANALOG-TO-DIGITAL (A/D) CONVERTER CIRCUITS	12	17	10
Q1135	Q3-10 DO YOU USE OR REFER TO SAMPLE FUNCTION OF A/D CONVERTERS	27	22	29
Q1136	Q3-11 DO YOU USE OR REFER TO HOLD FUNCTION OF A/D CONVERTERS	27	22	29
Q1137	Q3-12 DO YOU USE OR REFER TO COMPARE FUNCTION OF A/D CONVERTERS	27	22	29
Q1138	Q3-13 DO YOU USE OR REFER TO DIGITAL FUNCTION OF A/D CONVERTERS	30	28	31
Q1139	Q3-14 DO YOU PERFORM ANY TASKS ON MECHANICAL ANALOG-TO-DIGITAL (A/D) CONVERTERS	13	28	7

DIGITAL TO ANALOG CONVERTERS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

DIY-TSK	SPC	SPC	SPC
	276	279	280
R1140 R1-01 DO YOU WORK WITH PHANTASTRON CIRCUITRY IN YOUR PRESENT JOB	15	50	0
PHANTASTROMS			
R1141 R2-01 IN YOUR PRESENT JOB DO YOU WORK WITH SCHMITT TRIGGER CIRCUITS	43	44	43
SCHMITT TRIGGERS			
R1142 R2-02 DO YOU TRACE DATA FLOW THROUGH SCHMITT TRIGGER SCHEMATIC DIAGRAMS	40	39	40
R1143 R2-03 DO YOU USE OR REFER TO SCHMITT TRIGGER LOGIC SYMBOLS	35	44	31
R1144 R3-01 IN YOUR PRESENT JOB DO YOU FABRICATE MULTICONDUCTOR CABLES	65	83	57
CABLE FABRICATION			
R1145 R3-02 DO YOU FABRICATE COAXIAL CABLES	72	78	69
S1146 S1-01 IN YOUR PRESENT JOB DO YOU PERFORM ANY TASKS ON VISUAL READOUT SYSTEMS	48	44	50
S1147 S1-02 DO YOU PERFORM ANY TASKS ON NIXIE LIGHTS OR NIXIE LIGHT DECODER SYSTEMS	42	22	50
S1148 S1-03 DO YOU ANALYZE NIXIE LIGHT DECODER SYSTEMS USING BOOLEAN ALGEBRA	17	11	19
INPUT/OUTPUT DEVICES			
S1149 S2-01 DO YOU WORK WITH PHOTO TUBES IN YOUR PRESENT JOB	10	22	5
S1150 S3-01 IN YOUR PRESENT JOB DO YOU WORK WITH CHOPPER CIRCUITS	17	33	10
S1151 S1-02 DO YOU MEASURE EXCITATION FREQUENCIES	2	0	2
S1152 S3-03 DO YOU MEASURE VOLTAGE-CURRENT PHASE RELATIONSHIPS	3	6	2
S1153 S3-04 DO YOU USE OR REFER TO EXCITATION FREQUENCIES RELATIONSHIPS	0	0	0
S1154 S3-05 DO YOU USE OR REFER TO VOLTAGE-CURRENT PHASE RELATIONSHIPS	2	6	0
S1155 S3-06 DO YOU USE SERVOS IN CONJUNCTION WITH CHOPPER CIRCUIT OPERATION	8	28	0
S1156 S3-07 DO YOU USE DETECTORS IN CONJUNCTION WITH CHOPPER CIRCUIT OPERATION	10	22	5
S1157 S3-08 DO YOU USE ERROR SIGNAL DEVICES IN CONJUNCTION WITH CHOPPER CIRCUIT OPERATION	12	28	5
S1158 S3-09 DO YOU USE COMPARISON CIRCUITS IN CONJUNCTION WITH CHOPPER CIRCUIT OPERATION	12	22	7
S1159 T1-01 DOES YOUR PRESENT JOB INVOLVE ANY TASKS DEALING WITH INFRARED SYSTEMS	0	0	0
T1160 T1-02 DO YOU INSPECT INFRARED SYSTEMS	0	0	0
T1161 T1-03 DO YOU CLEAN INFRARED SYSTEMS	0	0	0
T1162 T1-04 DO YOU ADJUST OR CALIBRATE INFRARED SYSTEMS	0	0	0
T1163 T1-05 DO YOU OPERATE INFRARED SYSTEMS	0	0	0
T1164 T1-06 DO YOU TROUBLESHOOT WIRE CONNECTIONS OF INFRARED SYSTEMS	0	0	0
T1165 T1-07 DO YOU TROUBLESHOOT MAJOR ASSEMBLIES OF INFRARED SYSTEMS	0	0	0
T1166 T1-08 DO YOU TROUBLESHOOT DOWN TO INFRARED SYSTEM COMPONENT PARTS	0	0	0
T1167 T1-09 DO YOU REMOVE OR REPLACE MAJOR ASSEMBLIES OF INFRARED SYSTEMS	2	0	2
T1168 T1-10 DO YOU REMOVE OR REPLACE INFRARED SYSTEM COMPONENT PARTS	2	0	2
INFRARED			
SYNCHRONOUS VIBRATIONS (CHOPPER CIRCUITS)			

PCT MBR'S RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

DY-TSK

T1169	11-11	00	YOU USE OR REFER TO FAP REGION	0	0	0
T1170	11-12	00	YOU USE OR REFER TO INTERMEDIATE REGION	0	0	0
T1171	11-13	00	YOU USE OR REFER TO NEAR REGION	0	0	0
T1172	11-14	00	YOU USE OR REFER TO MICRON	0	0	0
T1173	11-15	00	YOU USE OR REFER TO GRAY BODIES	0	0	0
T1174	11-16	00	YOU USE OR REFER TO BLACK BODIES	0	0	0
T1175	11-17	00	YOU USE OR REFER TO ABSORPTION	0	0	0
T1176	11-18	00	YOU USE OR REFER TO SCATTERING	0	0	0
T1177	11-19	00	YOU USE OR REFER TO ABSOLUTE ZERO	0	0	0
T1178	11-20	00	YOU PLPFCRM TASKS ON BLITZ	0	0	0
T1179	11-21	00	YOU PERFORM TASKS ON TARGET BUTTONS	0	0	0
T1180	11-22	00	YOU PERFORM TASKS ON ERECTOR LENSES	0	0	0
T1181	11-23	00	YOU PERFORM TASKS ON OCULAR LENSES	0	0	0
T1182	11-24	00	YOU PERFORM TASKS ON CORRECTION LENSES	0	0	0
T1183	11-25	00	YOU PERFORM TASKS ON FILTERS	0	0	0
T1184	11-26	00	YOU PERFORM TASKS ON SPHERICAL MIRRORS	0	0	0
T1185	11-27	00	YOU PERFORM TASKS ON PLANE MIRRORS	0	0	0
T1186	12-01	00	DOES YOUR PRESENT JOB INVOLVE ANY TASKS DEALING WITH LASERS	0	0	0
T1187	12-02	00	YOU INSPECT LASER SYSTEMS	0	0	0
T1188	12-03	00	YOU CLEAN LASER SYSTEMS	0	0	0
T1189	12-04	00	YOU OPERATE LASER SYSTEMS	0	0	0
T1190	12-05	00	YOU OPERATE LASER SYSTEMS	0	0	0
T1191	12-06	00	YOU TROUBLESHOOT WIRE CONNECTIONS OF LASER SYSTEMS	0	0	0
T1192	12-07	00	YOU TROUBLESHOOT MAJOR ASSEMBLIES OF LASER SYSTEMS	0	0	0
T1193	12-08	00	YOU TROUBLESHOOT TO COMPONENT PARTS OF LASER SYSTEMS	0	0	0
T1194	12-09	00	YOU REMOVE OR REPLACE MAJOR ASSEMBLIES OF LASER SYSTEMS	0	0	0
T1195	12-10	00	YOU REMOVE OR REPLACE COMPONENT PARTS OF LASER SYSTEMS	0	0	0
T1196	12-11	00	YOU USE OR REFER TO ANGSTROMS (A)	0	0	0
T1197	12-12	00	YOU USE OR REFER TO ELECTRON ENERGY LEVELS	0	0	0
T1198	12-13	00	YOU USE OR REFER TO GROUND STATE	0	0	0
T1199	12-14	00	YOU USE OR REFER TO EXCITED STATE	0	0	0
T1200	12-15	00	YOU USE OR REFER TO PACKET OF RADIATION	0	0	0
T1201	12-16	00	YOU USE OR REFER TO PHOTONS	0	0	0
T1202	12-17	00	YOU USE OR REFER TO SPONTANEOUS EMISSION	0	0	0
T1203	12-18	00	YOU USE OR REFER TO STIMULATED EMISSION	0	0	0
T1204	12-19	00	YOU USE OR REFER TO COHERENCE OR INCOHERENCE	0	0	0
T1205	12-20	00	YOU USE OR REFER TO INVERSION LEVEL	0	0	0
T1206	12-21	00	YOU USE OR REFER TO MONOCHROMATIC	0	0	0
T1207	12-22	00	YOU WORK WITH ACTIVE MATERIALS	0	0	0
T1208	12-23	00	YOU WORK WITH PUMPING SOURCES	0	0	0
T1209	12-24	00	YOU WORK WITH FULL SILVERED (100% REFLECTIVE) MIRRORS	0	0	0

PCT MBRs RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 290

DY-TSM

T1210 12-25 DO YOU WORK WITH HALF SILVERED (92% REFLECTIVE)

MIRRORS

T1211 12-26 DO YOU WORK WITH HELICAL FLASHTUBES

T1212 12-27 DO YOU WORK WITH RUBY

T1213 12-28 DO YOU WORK WITH HELIUM-NEON

T1214 12-29 DO YOU WORK WITH HELIUM-XENON

T1215 12-30 DO YOU WORK WITH XENON

T1216 12-31 DO YOU WORK WITH CESIUM-HELIUM

T1217 12-32 DO YOU WOPK WITH ARGON

T1218 12-33 DO YOU WORK WITH NEODYMIUM IN GLASS

T1219 12-34 DO YOU WOPK WITH GALLIUM ARSENIIDE

T1220 13-01 IN YOUR PRESENT JOB DO YOU WORK WITH DISPLAY TUBES,

SUCH AS DIRECT VIEW STORAGE (DVST) OR MULTIPLE MODE

STORAGE TUBES (HMST)

T1221 13-02 DO YOU INSPECT DVST OR HMST

T1222 13-03 DO YOU CLEAN DVST OR HMST

T1223 13-04 DO YOU ADJUST OR CALIBRATE DVST OR HMST

T1224 13-05 DO YOU OPERATE SYSTEMS THAT CONTAIN DVST OR HMST

T1225 13-06 DO YOU TROUBLESHOOT DVST OR HMST

CIRCUITS

T1226 13-07 DO YOU REMOVE OR REPLACE DVST OR HMST TUBES FROM

MAJOR ASSEMBLIES OR UNITS

T1227 13-08 DO YOU PERFORM TASKS THAT MAKE IT NECESSARY TO NAME

THE VARIOUS ELEMENTS OF DVST

T1228 13-09 DO YOU PERFORM TASKS THAT MAKE IT NECESSARY TO NAME

THE VARIOUS ELEMENTS OF HMST

T1229 13-10 DO YOU PERFORM TASKS ON FLOOD GUNS

T1230 13-11 DO YOU PERFORM TASKS ON WRITE GUNS

T1231 13-12 DO YOU PERFORM TASKS ON ATTACK GUNS

T1232 13-13 DO YOU PERFORM TASKS ON ERASE GUNS

T1233 13-14 DO YOU PERFORM TASKS ON STORAGE GRIDS

U1234 01-01 IN YOUR PRESENT JOB, DO YOU PERFORM ANY PROGRAMMING

TASKS

U1235 01-02 DO YOU USE OR REFER TO DECIMAL SYSTEMS

U1236 01-03 DO YOU USE OR REFER TO PROGRAMS

U1237 01-04 DO YOU USE OR REFER TO HEXIDECIMAL SYSTEMS

U1238 01-05 DO YOU USE OR REFER TO 8-4-2-1 SYSTEMS

U1239 01-06 DO YOU USE OR REFER TO FOUR SYSTEMS

U1240 01-07 DO YOU USE OR REFER TO BINARY SYSTEMS

U1241 01-08 DO YOU USE OR REFER TO TIME-SHARING

U1242 01-09 DO YOU USE OR REFER TO DATA WORDS

U1243 01-10 DO YOU USE OR REFER TO ADDRESS WORDS

U1244 01-11 DO YOU USE OR REFER TO ADDRESS/SUBADDRESS

U1245 01-12 DO YOU USE OR REFER TO STEERING/INFORMATION

U1246 01-13 DO YOU USE OR REFER TO INFORMATION WORDS

U1247 01-14 DO YOU PERFORM TASKS ON SINGLE LEVEL PROGRAMMING

U1248 01-15 DO YOU PERFORM TASKS ON MULTI-LEVEL PROGRAMMING

DISPLAY TUBES

PROGRAMMING

PCI MBR5 RESPONDING 'YES' BY SELECTED GRPS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

SPC SPC SPC
276 279 280

0Y-TSK

U1249 U1-16 DO YOU PERFORM TASKS ON INPUT DEVICES	3	0	5	
U1250 U1-17 DO YOU PERFORM TASKS ON STORAGE DEVICES	2	0	2	
U1251 U1-18 DO YOU PERFORM TASKS ON ARITHMETIC SECTIONS	2	0	2	
U1252 U1-19 DO YOU PERFORM TASKS ON CONTROL SECTIONS	2	0	2	
U1253 U1-20 DO YOU PERFORM TASKS ON OUTPUT DEVICES	3	0	5	
U1254 U1-21 DO YOU PERFORM TASKS ON POWER SUPPLIES	2	0	2	
U1255 U2-01 DO YOU USE DECIBELS TO EXPRESS AMPLIFICATION AND ATTENUATION	87	94	83	DB AND POWER RATIOS
U1256 U2-02 DO YOU USE LOGARITHMS TO COMPUTE OUTPUT POWER IN DECIBELS	42	50	38	
U1257 U2-03 DO YOU USE LOGARITHMS TO COMPUTE ATTENUATION IN DECIBELS	42	50	38	

U1258 U2-04 DUMMY TASK TO IDENTIFY INCUMBENTS WHO PERFORMED NO TASKS

0 0 0

AD-A048 679

AIR FORCE OCCUPATIONAL MEASUREMENT CENTER LACKLAND A--ETC F/G 5/9
MISSILE WARNING AND SPACE SURVEILLANCE SENSOR REPAIR CAREER LAD--ETC(U)
OCT 77 T J O'CONNOR, T E ULRICH

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Corrected

A048 679

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<table border="0"> <tr> <td>Electronic principles</td> <td>Electronics</td> </tr> <tr> <td>Basic electronics</td> <td>Air Force training</td> </tr> <tr> <td>Avionics</td> <td>Teaching methods</td> </tr> <tr> <td>Electronic equipment</td> <td>Training</td> </tr> <tr> <td>Electronic technicians</td> <td></td> </tr> </table>			Electronic principles	Electronics	Basic electronics	Air Force training	Avionics	Teaching methods	Electronic equipment	Training	Electronic technicians	
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Avionics	Teaching methods											
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Electronic technicians												
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)												
<p>This report summarizes the results of the administration of the Electronic Principles Inventory to airmen assigned to Missile Warning and Space Surveillance Sensor Repair Systems Specialty (AFSC 309X0). The report gives a detailed listing of the technical tasks and knowledge needed to perform the jobs within the specialty or career ladder.</p> <p style="text-align: center;"><i>(CONTINUED)</i></p>												

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↙ This specialty has the following functions:

Superintends installation, replacement, maintenance, repair, overhaul, and modification of missile warning and space surveillance sensor equipment, special diagnostic checkout equipment; and associated aerospace ground equipment.



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