ELECTRONIC PRINCIPLES
ELECTRONIC WARFARE COUNTERMEASURES
CAREER LADDER
AFSC 276X1

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 Electronic Warfare Countermeasures Specialty, AFSC 276X1.

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 Mr. Reginald G. Nolte. 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 Commander
USAF Occupational Measurement Center

WALTER E. DRISKILL, Ph.D.
Chief, Occupational Survey Branch
USAF Occupational Measurement Center
INTRODUCTION

This report summarizes the results of the administration of the Electronic Principles Inventory to airmen assigned to Electronic Warfare Countermeasures Specialty (AFSC 276X1). The data for this report were collected during the period March through June 1977.

This report describes: (1) development and administration of the survey instrument; and (2) electronic principles used by DAFSC 7-skill level personnel both CONUS and overseas and 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 276X1 airmen worldwide. Responses from 156 individuals represented 42 percent of the total of all AFSC 276X1 personnel. Table 2 shows the percentage distribution by major command of the survey incumbents.
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<th>BEGINNING ITEM NUMBER</th>
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<td>WAVEGUIDES AND CAVITY</td>
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<td>PROGRAMMING</td>
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<td>62</td>
<td>DB AND POWER RATIOS</td>
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TABLE 2
COMMAND REPRESENTATION OF SURVEY SAMPLE

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<td>OTHERS</td>
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<tr>
<td>TOTAL</td>
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Total Assigned - 371
Total Sampled - 156
Percent Sampled - 42%

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 6 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 Alternating Current (pp. 4) and Oscilloscopes (pp. 13) to low in areas such as Timing Circuits (pp. 27-28). Additional AFSC 276X1 data can be obtained upon request to the Chief, Occupational Survey Branch (OMY).
Tabulation of Electronic Principles Utilization Data for Selected Groups in the 27671 Career Field

Reports on the following groups were requested:

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<th>Group Identity</th>
<th>Description</th>
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<td>SPL201</td>
<td>All Airmen DAFSC 27671</td>
<td>156 Members</td>
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<tr>
<td>SPL202</td>
<td>All Airmen, CAFSC 27671 stationed in CONUS</td>
<td>125 Members</td>
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<tr>
<td>SPL203</td>
<td>All Airmen DAFSC 27671 stationed overseas</td>
<td>126 Members</td>
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<tr>
<td>SPL204</td>
<td>All Airmen DAFSC 27671 assigned to ADC</td>
<td>4 Members</td>
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<tr>
<td>SPL205</td>
<td>All Air DAFSC 27671 assigned to AFCS</td>
<td>4 Members</td>
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<tr>
<td>GY-TSK</td>
<td>SPL 001</td>
<td>SPL 002</td>
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<td>--------</td>
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<td>---------</td>
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<tr>
<td>1 A1-01</td>
<td>IN YOUR PRESENT JOB DO YOU USE INSTRUMENTS SUCH AS</td>
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<td></td>
<td>METERS OR OSCILLOSCOPES, IN WHICH IT IS NECESSARY TO</td>
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<tr>
<td>2 A1-02</td>
<td>DO YOU USE PUBLICATIONS, SUCH AS A TECHNICAL ORDERS</td>
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<tr>
<td></td>
<td>OR MAINTENANCE MANUALS, IN WHICH IT IS NECESSARY FOR YOU</td>
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<tr>
<td>3 A1-03</td>
<td>DO YOU REARRANGE AND SOLVE FORMULAS OR EQUATIONS</td>
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<td>4 A1-04</td>
<td>DO YOU CALCULATE THE SQUARE ROOT OF A QUANTITY</td>
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<td>5 A1-05</td>
<td>DO YOU SOLVE FOR UNKNOWN QUANTITIES</td>
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<td>6 A1-06</td>
<td>DO YOU CONVERT NUMBERS TO LOGARITHMS</td>
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<td>DO YOU USE LOGARITHM TABLES IN ANY TYPE OF</td>
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<td>DO YOU SOLVE QUADRATIC EQUATIONS</td>
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<td>DO YOU USE THE NATURAL SYSTEM OF LOGARITHMS</td>
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<td>DO YOU PERFORM CALCULATIONS ON VECTOR QUANTITIES</td>
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<td>DO YOU WORK WITH TRIGONOMETRIC FUNCTIONS SUCH AS</td>
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<td>12 A1-12</td>
<td>DO YOU DETERMINE AREAS OF PLANE FIGURES</td>
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<td>DO YOU SOLVE OR USE SIMULTANEOUS EQUATIONS</td>
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<td>DO YOU SOLVE OR USE PROPORTIONS</td>
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<td>DO YOU USE THE TEMPERATURE OR VOLTAGE (V);</td>
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<td>DO YOU USE THE TEMPERATURE OF</td>
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<td>24 A1-40</td>
<td>DO YOU USE THE AMPLITUDE IN YOUR PRESENT JOB</td>
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**MATHEMATICS**

**DIRECT CURRENT AND VOLTAGE**

**RESISTANCE**
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<td>A 34 13-11 DO YOU USE RESISTOR COLOR CODES WHICH INDICATE TOLERANCE?</td>
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<td>A 36 13-12 DO YOU MAKE DECISIONS IN WHICH YOU MUST DETERMINE HOW MANY OR MORE RESISTORS MUST BE CONNECTED TOGETHER TO REPRESENT BATTERIES, FUSES, CONDUCTORS, CAPS, OR SWITCHEs</td>
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<td>B 53 13-33 DO YOU MEASURE VOLTAGE.</td>
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<td>B 57 13-37 DO YOU USE MULTIMETERS.</td>
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<td>B 59 13-39 DO YOU READ SCHEMATICS.</td>
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<td>61 12-01 DO YOU USE OR REFER TO THE TERMIN EFFECTIVE VOLTAGE (rms)?</td>
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<td>64 82-34 DO YOU USE OR REFER TO THE TERMIN WAVE LENGTH?</td>
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<td>65 82-05 DO YOU USE OR REFER TO THE TERMIN FREQUENCY?</td>
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<td>64 82-08 DO YOU USE OR REFER TO THE TERMIN INSTANTANEOUS VALUE?</td>
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<td>67 82-01 DO YOU WORK WITH INDUCTORS OR CIRCUITS CONTAINING</td>
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<td>INDUCES OR CHOKE COILS IN YOUR PRESENT JOB?</td>
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<td>66 83-02 DO YOU INSPECT INDUCTORS?</td>
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<td>69 83-03 DO YOU CLEAN INDUCES?</td>
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<td>67 83-04 DO YOU ADJUST INDUCES?</td>
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<td>67 83-05 DO YOU REMOVE OR REPLACE INDUCTORS?</td>
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<td>67 83-08 DO YOU USE OR REFER TO INDUCTIVE REACTANCE?</td>
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<td>67 83-09 DO YOU USE OR REFER TO COPPER LOSS IN INDUCES?</td>
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<td>67 83-10 DO YOU USE OR REFER TO Hysteresis Loss In Inductors?</td>
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<td>67 83-11 DO YOU USE OR REFER TO ELECTRICAL LOSS IN INDUCES?</td>
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<td>67 83-12 DO YOU USE OR REFER TO THE GENERAL RULE THAT</td>
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<tr>
<td>df itance is directly proportional to the square of the number of</td>
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<tr>
<td>Inductors, the inductance of a coil is directly proportional to the</td>
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<td>cross section of the coil</td>
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<td>68 82-19 DO YOU USE OR REFER TO THE GENERAL RULE THAT THE</td>
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<td>Inductance of a Coi is inversely proportional to its</td>
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<td>62 82-15 DO YOU USE OR REFER TO THE GENERAL RULE THAT THE</td>
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<td>Inductance of a Coi is directly proportional to the</td>
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<td>62 82-16 DO YOU CALCULATE INDUCTANCE FOR PARTICULAR INDUCES</td>
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<td>USING FORMULAS?</td>
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<td>IN SERIES?</td>
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<td>85 83-19 DO YOU CALCULATE THE TOTAL INDUCTANCE FOR INDUCTORS</td>
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<td>IN SERIES-PARALLEL CIRCUITS?</td>
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<td>67 83-21 DO YOU CALCULATE INDUCTIVE REACTANCE?</td>
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<td>86 83-22 DO YOU USE OR REFER TO THE GENERAL RULE THAT</td>
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<td>dhuctive Reactance Is directly proportional to frequency?</td>
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<tr>
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<td>C 93</td>
<td>C 103</td>
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<td>C 96</td>
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<td>C 100</td>
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**PLC MARS RESPONDING YES BY SELECTED GROUPS**

**APPENDIX**

**TASK GROUP SUMMARY**

**PERCENT MEMBERS PERFORMING**

**C-UTSK**

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**CAPACITORS AND CAPACITIVE REACTANCE**

- C 92: List the components for circuits containing specific capacitors.
- C 93: Inspect capacitors in your present job.
- C 94: Clean capacitors.
- C 95: Adjust capacitors.
- C 96: Test capacitors.
- C 97: Discharge capacitors.
- C 98: Remove or replace capacitors.
- C 99: Use or refer to distributed capacitance in a dielectric.
- C 100: Use or refer to orbital stress of electrons in a dielectric.
- C 101: Use or refer to parasitic microfields or microfields.
- C 102: Use or refer to capacitance.
- C 103: Use or refer to dielectric constant.
- C 104: Work on the dielectric constant of capacitors.
- C 105: Use or refer to capacitance in circuits.
- C 106: Use or refer to dielectric constant in circuits.
- C 107: Use or refer to capacitance in DC circuits.
- C 108: Use or refer to capacitance in AC circuits.
- C 109: Use or refer to capacitance in circuits with both DC and AC.
- C 110: Use or refer to capacitance in circuits.
- C 111: Calculate capacitance for particular capacitors using formulas.
- C 112: Use or refer to the general rule that capacitance of a capacitor is directly proportional to the capacitance of another capacitor.
- C 113: Use or refer to the general rule of series and parallel circuits.
- C 114: Use or refer to the general rule that capacitance of a capacitor is inversely proportional to the capacitance of another capacitor.
- C 115: Calculate the total capacitance of capacitors in series.
- C 116: Calculate the total capacitance of capacitors in parallel.
- C 117: Use or refer to the general rule that current does not flow through capacitors, it only appears to do so.
- C 118: Use or refer to the general rule that current leads voltage in AC capacitor circuits.
- C 119: Use or refer to the general rule that capacitance is inversely proportional to the capacitance of another capacitor.
- C 120: Calculate capacitance reactance.
### PCT "MRS RESPONDING YES" BY SELECTED GRS

#### TASK GROUP SUMMARY

**PERCENT MEMBERS PERFORMING**

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**CATEGORIES:**

- Transformers
- Meters
- Capacitors
- Scissors
- Measurement Jig
- Users' Manual
- Soldering/Iron
- Basic Electronics
- Transformers
<p>| C 152 | C 2-26 do you refer to multiple secondary windings schematic symbols for transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 153 | C 2-26 do you refer to multiple tap schematic symbols for transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 154 | C 2-26 do you refer to center tap schematic symbols for transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 155 | C 2-26 do you refer to air core schematic symbols for transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 156 | C 2-26 do you refer to 140 core schematic symbols for transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 157 | C 2-30 do you refer to combinations of the above schematic symbols for transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 158 | C 2-31 do you determine phase relationships between secondary and primary voltages of transformers using | 0 | 0 | 0 | 0 | 0 | 0 |
| C 159 | C 2-32 do you determine or refer to the type of core in transformers you work with | 0 | 0 | 0 | 0 | 0 | 0 |
| C 160 | C 2-33 do you refer to or use the general rule that the turns ratio of a transformer is equal to the voltage ratio | 0 | 0 | 0 | 0 | 0 | 0 |
| C 161 | C 2-34 do you use or refer to step-up or step-down ratios for transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 162 | C 2-35 do you calculate voltage ratios for transformers using turns ratios | 0 | 0 | 0 | 0 | 0 | 0 |
| C 163 | C 2-36 do you calculate current ratios for transformers using turns ratios | 0 | 0 | 0 | 0 | 0 | 0 |
| C 164 | C 2-37 does your job involve any tasks dealing with three phase transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 165 | C 2-38 do you inspect three phase transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 166 | C 2-39 do you clean or lubricate three phase transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 167 | C 2-40 do you adjust three phase transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 168 | C 2-41 do you troubleshoot three phase transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 169 | C 2-42 do you replace or replace complete three phase transformers | 0 | 0 | 0 | 0 | 0 | 0 |
| C 170 | C 2-43 do you replace or replace complete three phase transformer parts such as bushings | 0 | 0 | 0 | 0 | 0 | 0 |
| C 171 | C 3-61 do you use or refer to permanent magnets | 2 | 2 | 2 | 2 | 0 | 0 |
| C 172 | C 3-62 do you use or refer to temporary magnets | 1 | 1 | 0 | 1 | 0 | 0 |
| C 173 | C 3-63 do you use or refer to hysteresis of magnetic materials | 1 | 1 | 0 | 1 | 0 | 0 |
| C 174 | C 3-64 do you use or refer to reluctance of magnetic materials | 0 | 0 | 0 | 0 | 0 | 0 |
| C 175 | C 3-65 do you use or refer to permeability of magnetic materials | 1 | 1 | 0 | 1 | 0 | 0 |
| C 176 | C 3-66 do you use or refer to residual magnetism | 1 | 1 | 0 | 1 | 0 | 0 |
| C 177 | C 3-67 do you use or refer to magnetic lines of force or flux | 5 | 5 | 6 | 6 | 17 | 0 |
| C 178 | C 3-68 do you use or refer to hysteresis theory of magnetism | 1 | 1 | 0 | 1 | 0 | 0 |</p>
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<th>Task</th>
<th>Group Summary</th>
<th>Present Members Performing</th>
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<tr>
<td>UY-TSK</td>
<td>SPL</td>
<td>SPL</td>
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<tr>
<td>C 179 C3-09</td>
<td>DO YOU USE OR REFER TO MAXIMUM THEORY OF MAGNETISM</td>
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<td>C 180 C3-10</td>
<td>DO YOU USE OR REFER TO MAGNETIC INDUCTION</td>
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<td>C 181 C3-11</td>
<td>DO YOU USE OR REFER TO FLUX DENSITY</td>
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<td>C 182 C3-12</td>
<td>DO YOU USE OR REFER TO THE GENERAL RULE THAT FOR MAGNETIC POLES, LIKE POLES REPEL AND UNLIKE POLES ATTRACT</td>
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<td>C 183 C3-13</td>
<td>DO YOU USE THE LEFT-HAND THUMB RULE TO FIND THE DIRECTION OF MAGNETIC FIELDS ABOUT STRAIGHT WIRES</td>
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<td>C 184 C3-14</td>
<td>DO YOU USE THE LEFT-HAND THUMB RULE TO FIND THE NORTHPole OF A CURRENT CARRYING COIL</td>
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<td>D 165 D1-01</td>
<td>DO YOU WORK WITH RCL LRC RCL CIRCUITS IN YOUR PRESENT JOB</td>
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<td>D 166 D1-02</td>
<td>DO YOU USE OR REFER TO VECTORS WHEN WORKING WITH RCL CIRCUITS</td>
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<td>D 167 D1-03</td>
<td>DO YOU USE OR REFER TO PYTHAGOREAN THEOREM WHEN WORKING WITH RCL CIRCUITS</td>
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<td>D 168 D1-04</td>
<td>DO YOU USE OR REFER TO SINE WHEN WORKING WITH RCL CIRCUITS</td>
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<td>D 169 D1-05</td>
<td>DO YOU USE OR REFER TO COSINE WHEN WORKING WITH RCL CIRCUITS</td>
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<td>D 171 D1-07</td>
<td>DO YOU USE OR REFER TO HATS WHEN WORKING WITH RCL CIRCUITS</td>
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<td>D 172 D1-08</td>
<td>DO YOU USE OR REFER TO TRUE POWER (PT) WHEN WORKING WITH RCL CIRCUITS</td>
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<td>D 173 D1-09</td>
<td>DO YOU USE OR REFER TO MAXIMUM POWER (PM) WHEN WORKING WITH RCL CIRCUITS</td>
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<td>DO YOU USE OR REFER TO AVERAGE POWER (PME) WHEN WORKING WITH RCL CIRCUITS</td>
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<td>DO YOU USE OR REFER TO APPARENT POWER (PA) WHEN WORKING WITH RCL CIRCUITS</td>
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<td>You use OR refer to Tank circuits when working with RCL circuits</td>
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<td>Do you determine values of trigonometric functions using rules</td>
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<td>Do you draw voltage-current impedance vector diagrams for circuits</td>
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<td>Do you calculate total impedance for capacitive circuits</td>
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<td>Do you calculate phase angles between impedance and resistance in capacitive circuits</td>
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<td>Do you calculate total impedance for series RCL circuits</td>
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<td>Do you calculate impedance angles for series RCL circuits</td>
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**SOLDERING**

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**RELAYS**

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**Speakers**

- F 327 (F2-01) Do you perform any tasks dealing with speakers?
- F 329 (F2-03) Do you inspect speakers?
- F 335 (F2-04) Do you clean speakers?
- F 337 (F2-06) Do you troubleshoot components?
- F 340 (F2-08) Do you perform any tasks on speaker parts?
- F 341 (F2-10) Do you perform any tasks on speaker connections?
- F 343 (F2-12) Do you perform any tasks on speaker field coils?
- F 345 (F2-14) Do you perform any tasks on speaker permanent magnets?
- F 347 (F2-16) Do you perform any tasks on speaker soft iron cores?

**Oscilloscopes**

- F 348 (F3-01) Do you use oscilloscopes in your present job?
- F 339 (F3-02) Do you use oscilloscopes to perform operational checks?
- F 340 (F3-03) Do you use oscilloscopes to perform alignment or adjustments?
- F 341 (F3-04) Do you use oscilloscopes to troubleshoot electronic circuits?
- F 343 (F3-06) Do you use oscilloscopes to measure frequency?
- F 344 (F3-08) Do you use oscilloscopes to measure time?
- F 345 (F3-10) Do you use oscilloscopes to measure circuit patterns?
- F 346 (F3-12) Do you use oscilloscopes to observe signals while utilizing attenuation phases?
- F 348 (F3-14) Do you use oscilloscopes to measure ac voltage?
- F 349 (F3-16) Do you use oscilloscopes to measure dc voltage?
- F 350 (F3-18) Do you use oscilloscopes to measure dc current?

**Semiconductor Diodes**

- F 351 (F4-01) Do you inspect semiconductor diodes in your present job?
- F 352 (F4-02) Do you repair or replace diodes?
- F 353 (F4-04) Do you check diodes using an instrument?
- F 354 (F4-06) Do you use level diagrams in your work with diodes?
- F 355 (F4-08) Do you compute forward or reverse bias resistance for diodes?
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G 454 53-27 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO
THE ACTUAL CIRCUIT THE COMPONENTS ASSOCIATED WITH

G 455 53-28 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO
THE ACTUAL CIRCUIT THE COMPONENTS ASSOCIATED WITH

G 456 53-29 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO
THE ACTUAL CIRCUIT THE COMPONENTS ASSOCIATED WITH

G 457 53-30 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO
THE ACTUAL CIRCUIT THE COMPONENTS ASSOCIATED WITH

G 458 53-31 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS
WHICH PERFORM EMITTER (O.P.S) RESISTOR STABILIZATION

G 459 53-32 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS
WHICH PERFORM SELF-BIAS STABILIZATION

G 460 53-33 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS
WHICH PERFORM THERMISTOR STABILIZATION

G 461 53-34 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS
WHICH PERFORM FORWARD BIAS DIODE STABILIZATION

G 462 53-35 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS
WHICH PERFORM REVERSE BIAS DIODE STABILIZATION

G 463 53-36 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS
WHICH PERFORM DOUBLE DIODE STABILIZATION

G 464 53-37 DO YOU IDENTIFY AMPLITUDE DISTORTION FOR TRANSISTOR
CIRCUITS

G 465 53-38 DO YOU TROUBLESHOOT TRANSISTOR CIRCUITS TO FIND THE
CAUSES OF AMPLITUDE DISTORTION

G 466 53-39 DO YOU IDENTIFY FREQUENCY DISTORTION FOR TRANSISTOR
CIRCUITS

G 467 53-40 DO YOU IDENTIFY PHASE DISTORTION FOR TRANSISTOR
CIRCUITS

G 468 53-41 DO YOU TROUBLESHOOT TRANSISTOR CIRCUITS TO FIND THE
CAUSES OF PHASE DISTORTION

G 469 53-42 DO YOU TROUBLESHOOT TRANSISTOR CIRCUITS TO FIND THE
CAUSES OF FREQUENCY DISTORTION

G 470 53-43 DO YOU NEED TO KNOW THE DEGENERATIVE EFFECTS ON THE
CIRCUIT CAUSED BY CHANGING EMMITTER RESISTANCE FOR

G 471 53-44 DO YOU DETERMINE THE CLASS OF OPERATION FOR
AMPLIFIERS IN ORDER TO TROUBLESHOOT AMPLIFIER CIRCUITS

G 472 53-45 DO YOU TROUBLESHOOT OR REPAIR PARAFASE AMPLIFIERS

G 473 53-46 DO YOU TROUBLESHOOT OR REPAIR RUSH-PULL AMPLIFIERS

G 474 53-47 DO YOU TROUBLESHOOT OR REPAIR COMPLEMENTARY SYMMETRY
CIRCUITS

G 475 53-48 DO YOU TROUBLESHOOT OR REPAIR COMPOUND-CONNECTED
AMPLIFIERS
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<td>YOU USE OR REFER TO FREQUENCY DETERMINING DEVICES</td>
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<td>YOU USE OR REFER TO AMPLITUDE STABILITY</td>
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<td>YOU USE OR REFER TO CRITICAL Damping</td>
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<td>YOU USE OR REFER TO OSCILLATING CIRCUITS WHICH USE LC TANK</td>
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LIMITERS AND CLAMPERS

ELECTRON TUBES

FACTORS THE AMPLIFICATION FACTOR FOR TRIGGERS IS DEFINED AS
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## Task Group Summary

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### FM Systems

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<td>0</td>
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<td>K 474  K2-09</td>
<td>DO YOU PERFORM TASKS ON AUDIO AMPLIFIERS</td>
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<td>K 475  K2-10</td>
<td>DO YOU PERFORM TASKS ON FREQUENCY MULTIPLIERS</td>
<td>1</td>
<td>1</td>
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</table>

### Notes

- SPL: Scale of Performance, ranging from 0 to 6.
- FM Systems indicate tasks specific to FM systems.
<table>
<thead>
<tr>
<th>TASK GROUP SUMMARY</th>
<th>GATE-7 PERFORMING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DUT-TSK</strong></td>
<td><strong>SPL</strong></td>
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<tr>
<td><strong>K 076</strong></td>
<td><strong>SPL</strong></td>
</tr>
<tr>
<td>K 076 K2-11 OC DO YOU PERFORM TASKS ON UNIRES (INTERMEDIATE AMPLIFIERS)</td>
<td>0 0 0 0 0 0</td>
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<tr>
<td>K 077 K2-12 OC DO YOU PERFORM TASKS ON PDF/AMPLIFIERS</td>
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<td>K 078 K2-13 OC DO YOU PERFORM TASKS ON VIDEO AMPLIFIERS</td>
<td>1 2 0 2 0 0</td>
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<td>K 079 K2-14 OC DO YOU PERFORM TASKS ON DCAMOUNTORS</td>
<td>0 0 0 0 0 0</td>
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<td>K 080 K2-15 OC DO YOU PERFORM TASKS ON MF AMPLIFIERS</td>
<td>1 2 0 2 0 0</td>
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<tr>
<td>K 081 K2-16 OC DO YOU PERFORM TASKS ON LIMITERS</td>
<td>1 2 0 2 0 0</td>
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<tr>
<td>K 082 K2-17 OC DO YOU PERFORM TASKS ON FREQUENCY DISCRIMINATORS</td>
<td>1 2 0 2 0 0</td>
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<td>K 083 K2-18 OC DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH SCHEMATIC DIAGRAMS OF FM TRANSMITTERS</td>
<td>1 2 0 2 0 0</td>
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<td>K 084 K2-19 OC DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH SCHEMATIC DIAGRAMS OF FM RECEIVERS</td>
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<td><strong>K 085</strong></td>
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<tr>
<td>K 085 K2-20 OC CONV DECIMAL BASE 10 NUMBERS TO OCTAL</td>
<td>12 14 0 13 0 0</td>
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<td><strong>K 086</strong></td>
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<tr>
<td>K 086 K3-02 OC CONV DECIMAL BASE 10 NUMBERS TO OCTAL</td>
<td>12 14 0 13 0 0</td>
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<td><strong>K 087</strong></td>
<td><strong>SPL</strong></td>
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<tr>
<td>K 087 K3-03 OC DO YOU CONV OCTAL NUMBERS TO DECIMAL NUMBERS</td>
<td>4 4 3 4 0 0</td>
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<td><strong>K 088</strong></td>
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<td>K 088 K3-04 OC DO YOU CONV OCTAL NUMBERS TO DECIMAL NUMBERS</td>
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<td><strong>K 089</strong></td>
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<td>K 089 K3-05 OC DO YOU CONV OCTAL NUMBERS TO DECIMAL NUMBERS</td>
<td>4 4 3 4 0 0</td>
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<td><strong>K 090</strong></td>
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<td>K 090 K3-06 OC DO YOU CONV OCTAL NUMBERS TO DECIMAL NUMBERS</td>
<td>10 10 0 12 0 0</td>
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<tr>
<td><strong>K 091</strong></td>
<td><strong>SPL</strong></td>
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<tr>
<td>K 091 K3-07 OC ADD BINARY NUMBERS TO GET A SUM</td>
<td>6 6 0 6 0 0</td>
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<tr>
<td><strong>K 092</strong></td>
<td><strong>SPL</strong></td>
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<tr>
<td>K 092 K3-08 OC SUBTRACT BINARY NUMBERS USING THE END-AROUND- CARRY</td>
<td>7 9 0 6 0 0</td>
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<td><strong>K 093</strong></td>
<td><strong>SPL</strong></td>
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<td>K 093 K3-09 OC ADD OCTAL NUMBERS TO GET A SUM</td>
<td>4 6 0 6 0 0</td>
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<td><strong>K 094</strong></td>
<td><strong>SPL</strong></td>
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<tr>
<td>K 094 K3-10 OC ADD OCTAL NUMBERS TO GET A SUM</td>
<td>4 6 0 6 0 0</td>
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<tr>
<td><strong>K 095</strong></td>
<td><strong>SPL</strong></td>
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<tr>
<td>K 095 L1-01 OC DO YOU PERFORM ANY TASKS RELATING TO LOGIC FUNCTIONS</td>
<td>4 3 10 3 0 0</td>
</tr>
<tr>
<td><strong>K 096</strong></td>
<td><strong>SPL</strong></td>
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<tr>
<td>K 096 L1-02 OC CONSTRUCT TRUTH TABLES FOR AND OR LOGIC SYMBOLS ON GATES</td>
<td>1 1 0 1 0 0</td>
</tr>
<tr>
<td><strong>K 097</strong></td>
<td><strong>SPL</strong></td>
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<tr>
<td>K 097 L1-03 OC CONSTRUCT TRUTH TABLES FOR OR LOGIC SYMBOLS ON GATES</td>
<td>1 1 0 1 0 0</td>
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<tr>
<td><strong>K 098</strong></td>
<td><strong>SPL</strong></td>
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<tr>
<td>K 098 L1-04 OC CONSTRUCT TRUTH TABLES FOR AND OR LOGIC SYMBOLS ON GATES</td>
<td>1 1 0 1 0 0</td>
</tr>
<tr>
<td><strong>K 099</strong></td>
<td><strong>SPL</strong></td>
</tr>
<tr>
<td>K 099 L1-05 OC CONSTRUCT TRUTH TABLES FOR EXCLUSIVE OR LOGIC SYMBOLS ON GATES</td>
<td>0 0 0 0 0 0</td>
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<tr>
<td><strong>L 000</strong></td>
<td><strong>SPL</strong></td>
</tr>
<tr>
<td>L 000 L1-06 OC YOU USE OR REFER TO TRUTH TABLES FOR AND LOGIC SYMBOLS ON GATES</td>
<td>2 2 3 2 0 0</td>
</tr>
<tr>
<td><strong>L 001</strong></td>
<td><strong>SPL</strong></td>
</tr>
<tr>
<td>L 001 L1-07 OC YOU USE OR REFER TO TRUTH TABLES FOR OR LOGIC SYMBOLS ON GATES</td>
<td>2 2 3 2 0 0</td>
</tr>
<tr>
<td><strong>L 002</strong></td>
<td><strong>SPL</strong></td>
</tr>
<tr>
<td>L 002 L1-08 OC YOU USE OR REFER TO TRUTH TABLES FOR AND OR LOGIC SYMBOLS ON GATES</td>
<td>1 1 3 1 0 0</td>
</tr>
<tr>
<td><strong>L 003</strong></td>
<td><strong>SPL</strong></td>
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<tr>
<td>L 003 L1-09 OC YOU USE OR REFER TO TRUTH TABLES FOR EXCLUSIVE OR LOGIC SYMBOLS ON GATES</td>
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<tr>
<td><strong>L 004</strong></td>
<td><strong>SPL</strong></td>
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<tr>
<td>L 004 L1-10 OC YOU USE OR REFER TO TRUTH TABLES FOR AND OR LOGIC SYMBOLS ON GATES</td>
<td>3 2 6 2 0 0</td>
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<td><strong>L 005</strong></td>
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<tr>
<td>L 005 L1-11 OC YOU USE OR REFER TO TRUTH TABLES FOR OR LOGIC SYMBOLS ON GATES</td>
<td>3 2 6 2 0 0</td>
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<tr>
<td><strong>L 006</strong></td>
<td><strong>SPL</strong></td>
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<tr>
<td>L 006 L1-12 OC YOU USE OR REFER TO TRUTH TABLES FOR AND LOGIC SYMBOLS ON GATES</td>
<td>1 1 3 1 0 0</td>
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<tr>
<td>T-TSK</td>
<td>SPL</td>
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<td>-------</td>
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<tr>
<td>L 707 1-13 DO YOU USE OR REFER TO LOGIC SYMBOLS FOR EXCLUSIVE OR GATES</td>
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<td>L 708 1-13 DO YOU PERFORM ANY TASKS RELATING TO BOOLEAN EQUATIONS, LOGIC DIAGRAMS, OR LOGIC</td>
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<tr>
<td>L 729 1-13 DO YOU DRAW LOGIC SYMBOLS FOR DIRECT COUPLED TRANSISTOR LOGIC (DCTL) CIRCUITS</td>
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<tr>
<td>L 710 1-13 DO YOU CONSTRUCT TRUTH TABLES FOR CURRENT MODE LOGIC (ICML) CIRCUITS</td>
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<tr>
<td>L 711 1-13 DO YOU DRAW LOGIC DIAGRAMS FROM GIVEN BOOLEAN EQUATIONS</td>
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<tr>
<td>L 712 1-13 DO YOU MEASURE INPUTS OR OUTPUTS OF LOGIC GATES</td>
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<tr>
<td>L 713 1-13 DO YOU DEVELOP OR ANALYZE BOOLEAN EQUATIONS IN THE PROCESS OF TROUBLESHOOTING DIGITAL CIRCUITS</td>
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<tr>
<td>L 714 1-13 DO YOU ANALYZE LOGIC CIRCUITS BY USING BOOLEAN ALGEBRA</td>
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<tr>
<td>L 715 1-13 DO YOU USE OR REFER TO LOGIC SYMBOLS FOR DIRECT COUPLED TRANSISTOR LOGIC (DCTL) CIRCUIT GATES</td>
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<tr>
<td>L 716 1-13 DO YOU USE OR REFER TO TRUTH TABLES FOR CURRENT MODE LOGIC (ICML) CIRCUITS</td>
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<td>L 717 1-13 DO YOU USE OR REFER TO LOGIC DIAGRAMS CONSISTING OF MORE THAN ONE GATE</td>
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<td>L 718 1-13 DO YOU COMPUTE SUM AND CARRY EXPRESSIONS FOR SERIAL 4-BIT FULL ADDER LOGIC DIAGRAMS</td>
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<tr>
<td>L 719 1-13 DO YOU TRACE DATA FLOW THROUGH PARALLEL FULL ADDER LOGIC DIAGRAMS</td>
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<tr>
<td>L 720 1-13 DO YOU WORK WITH ASTABLE (FREE RUNNING) MULTIVIBRATORS</td>
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<tr>
<td>L 721 1-13 DO YOU WORK WITH BISTABLE (FLIP-FLOP) MULTIVIBRATORS</td>
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<tr>
<td>L 722 1-13 DO YOU WORK WITH MONOSTABLE (ONE-SHOT) MULTIVIBRATORS</td>
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<tr>
<td>L 723 1-13 DO YOU USE OR REFER TO FLIP-FLOP MULTIVIBRATOR SYMBOLS</td>
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<tr>
<td>L 724 1-17 DO YOU USE OR REFER TO SINGLE-SHOT MULTIVIBRATOR SYMBOLS</td>
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<tr>
<td>L 725 1-18 DO YOU USE OR REFER TO FLIP-FLOP CIRCUIT DIAGRAMS</td>
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<tr>
<td>L 726 1-19 DO YOU USE OR REFER TO FLIP-FLOP TRUTH TABLES</td>
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<tr>
<td>L 727 1-20 DO YOU USE OR REFER TO COMPLEMENTED FLIP-FLOP LOGIC SYMBOLS</td>
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<td>L 728 1-21 DO YOU USE OR REFER TO COMPLEMENTING FLIP-FLOP LOGIC SYMBOLS</td>
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<tr>
<td>L 729 1-22 DO YOU TRACE OUTPUT WAVESHAPES OF LOGIC CIRCUITS</td>
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<td>L 730 1-23 DO YOU TRACE DATA FLOW THROUGH COMPLEMENTED FLIP-FLOP SCHEMATIC DIAGRAMS</td>
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<td>L 731 1-24 DO YOU TRACE DATA FLOW THROUGH COMPLEMENTING FLIP-FLOP SCHEMATIC DIAGRAMS</td>
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<td>L 732 1-25 DO YOU CONSTRUCT TRUTH TABLES FOR J-K FLIP-FLOP LOGIC SYMBOLS</td>
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### M-TRK

**TEXT GROUPS PERFORMING**

**DESK**

<table>
<thead>
<tr>
<th>L 733</th>
<th>L 3-1</th>
<th>Do you work with digital counters in your present job?</th>
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<tbody>
<tr>
<td>L 734</td>
<td>L 3-2</td>
<td>Do you use or refer to up-counters?</td>
</tr>
<tr>
<td>L 735</td>
<td>L 3-3</td>
<td>Do you use or refer to down-counters?</td>
</tr>
<tr>
<td>L 736</td>
<td>L 3-4</td>
<td>Do you use or refer to serial counters?</td>
</tr>
<tr>
<td>L 737</td>
<td>L 3-5</td>
<td>Do you use or refer to parallel counters?</td>
</tr>
<tr>
<td>L 738</td>
<td>L 3-6</td>
<td>Do you use or refer to decade counters?</td>
</tr>
<tr>
<td>L 739</td>
<td>L 3-7</td>
<td>Do you use or refer to count defect circuits?</td>
</tr>
<tr>
<td>L 740</td>
<td>L 3-8</td>
<td>Do you use or refer to decade clocks?</td>
</tr>
<tr>
<td>L 741</td>
<td>L 3-9</td>
<td>Do you use or refer to up clocks?</td>
</tr>
<tr>
<td>L 742</td>
<td>L 3-10</td>
<td>Do you trace data flow through logic diagrams of up-counters having complemented flip-flops?</td>
</tr>
<tr>
<td>L 743</td>
<td>L 3-11</td>
<td>Do you trace data flow through logic diagrams of serial up-or down-counters having complementing flip-flops?</td>
</tr>
<tr>
<td>L 744</td>
<td>L 3-12</td>
<td>Do you trace data flow through logic diagrams of decade counters?</td>
</tr>
<tr>
<td>L 745</td>
<td>L 3-13</td>
<td>Do you trace data flow through logic diagrams of serial up-counters feeding a parallel storage register?</td>
</tr>
<tr>
<td>L 746</td>
<td>L 3-14</td>
<td>Do you trace data flow through logic diagrams of serial up-or down-counters?</td>
</tr>
<tr>
<td>L 747</td>
<td>L 3-15</td>
<td>Do you trace data flow through logic diagrams of serial up-or down-counters feeding a parallel storage register?</td>
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<tr>
<td>L 748</td>
<td>L 3-16</td>
<td>Do you trace data flow through logic diagrams of serial up-or down-counters feeding a parallel storage register?</td>
</tr>
<tr>
<td>L 749</td>
<td>L 3-17</td>
<td>Do you trace data flow through logic diagrams of other type of counters?</td>
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<tr>
<td>L 750</td>
<td>L 3-18</td>
<td>Do you compute the binary count after specific input pulses for up-counters having complemented flip-flops?</td>
</tr>
<tr>
<td>L 751</td>
<td>L 3-19</td>
<td>Do you compute the binary count after specific input pulses for serial up-or down-counters?</td>
</tr>
<tr>
<td>L 752</td>
<td>L 3-20</td>
<td>Do you compute the binary count after specific input pulses for serial up-counters feeding a parallel storage register?</td>
</tr>
<tr>
<td>L 753</td>
<td>L 3-21</td>
<td>Do you compute the binary count after specific input pulses for other types of counters?</td>
</tr>
<tr>
<td>L 754</td>
<td>L 3-22</td>
<td>Do you construct truth tables from logic diagrams of decade counters?</td>
</tr>
<tr>
<td>L 755</td>
<td>L 3-23</td>
<td>Do you determine the state of each flip-flop in a ring counters for specific input pulses?</td>
</tr>
<tr>
<td>L 756</td>
<td>L 3-24</td>
<td>Do you determine the appropriate and state necessary for a clock detect circuits to indicate a required count?</td>
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### SPL

<table>
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<td>002</td>
<td>003</td>
<td>004</td>
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</table>

**COUNTERS**

**TIMING CIRCUITS**
<table>
<thead>
<tr>
<th>TASK</th>
<th>GROUP SUMMARY</th>
<th>PERCENT MEMBERS PERFORMING</th>
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<tbody>
<tr>
<td>M 761</td>
<td>M1-09 DC YOU WORK WITH BLOCKING OSCILLATORS</td>
<td>4 5 3 6 0 0</td>
</tr>
<tr>
<td>M 762</td>
<td>M1-04 DC YOU USE OR REFER TO RISE TIME</td>
<td>1 3 3 0 0 0</td>
</tr>
<tr>
<td>M 763</td>
<td>M1-07 DC YOU USE OR REFER TO FALL OR FLYBACK TIME</td>
<td>2 2 3 2 0 0</td>
</tr>
<tr>
<td>M 764</td>
<td>M1-08 DC YOU USE OR REFER TO SLEEP TIME</td>
<td>12 13 6 13 0 0</td>
</tr>
<tr>
<td>M 765</td>
<td>M1-09 DC YOU USE OR REFER TO ELECTRICAL LENGTH OF SAWTOOTH</td>
<td>3 2 3 2 0 0</td>
</tr>
<tr>
<td>M 766</td>
<td>M1-10 DC YOU USE OR REFER TO PHYSICAL LENGTH OF SAWTOOTH</td>
<td>1 1 3 1 0 0</td>
</tr>
<tr>
<td>M 767</td>
<td>M1-11 DC YOU USE OR REFER TO LINEAR SLOPE OF SAWTOOTH</td>
<td>3 2 4 3 0 0</td>
</tr>
<tr>
<td>M 768</td>
<td>M1-12 DC YOU USE OR REFER TO STEP LENGTH OF SAWTOOTH</td>
<td>3 3 3 3 0 0</td>
</tr>
<tr>
<td>M 769</td>
<td>M2-01 DC YOU USE SIGNAL GENERATORS IN YOUR PRESENT JOB</td>
<td>15 17 4 14 17 0</td>
</tr>
<tr>
<td>M 770</td>
<td>M2-02 DC YOU PERFORM OPERATIONAL CHECKS WHILE USING SIGNAL GENERATORS</td>
<td>13 14 6 13 17 0</td>
</tr>
<tr>
<td>M 771</td>
<td>M2-03 DC YOU PERFORM PERIODIC MAINTENANCE SUCH AS ADJUSTING, ALIGNING, OR CALIBRATING WHILE USING SIGNAL GENERATORS</td>
<td>9 11 0 10 0 0</td>
</tr>
<tr>
<td>M 772</td>
<td>M2-04 DC YOU TROUBLESHOOT TO AN ASSEMBLY OR SUBASSEMBLY WHILE USING SIGNAL GENERATORS</td>
<td>1 1 0 1 0 0</td>
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<tr>
<td>M 773</td>
<td>M2-05 DC YOU TROUBLESHOOT TO THE SMALLEST REPLACEABLE COMPONENT WHILE USING SIGNAL GENERATORS</td>
<td>1 1 0 1 0 0</td>
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<tr>
<td>M 774</td>
<td>M2-06 DC YOU USE AUDIO SINE-WAVE GENERATORS</td>
<td>3 3 0 3 0 0</td>
</tr>
<tr>
<td>M 775</td>
<td>M2-07 DC YOU USE AUDIO SINE-WAVE GENERATORS SUCH AS SQUARED WAVE, TRIANGLE, PULSE, OR SPIKE</td>
<td>3 4 0 3 0 0</td>
</tr>
<tr>
<td>M 776</td>
<td>M2-08 DC YOU USE RF GENERATORS LESS THAN 1,000 MHZ</td>
<td>54 6 0 5 0 0</td>
</tr>
<tr>
<td>M 777</td>
<td>M2-09 DC YOU USE RF GENERATORS GREATER THAN 1,000 MHZ</td>
<td>6 4 3 4 17 0</td>
</tr>
<tr>
<td>M 778</td>
<td>M2-10 DC YOU USE OTHER SPECIAL PURPOSE OR MULTI-FUNCTION GENERATORS</td>
<td>10 13 0 13 0 0</td>
</tr>
<tr>
<td>M 779</td>
<td>M3-01 IN YOUR PRESENT JOB, DO YOU PERFORM ANY TASKS DEALING WITH ALTERNATING CURRENT OR DIRECT CURRENT MOTORS OR</td>
<td>1 1 0 1 0 0</td>
</tr>
<tr>
<td>M 780</td>
<td>M3-02 DC YOU INSPECT MOTORS</td>
<td>0 0 0 0 0 0</td>
</tr>
<tr>
<td>M 781</td>
<td>M3-03 DC YOU CLEAN OR LUBRicate MOTORS</td>
<td>0 0 0 0 0 0</td>
</tr>
<tr>
<td>M 782</td>
<td>M3-04 DC YOU OPERATE MOTORS</td>
<td>0 0 0 0 0 0</td>
</tr>
<tr>
<td>M 783</td>
<td>M3-05 DC YOU REMOVE OR REPLACE COMPLETE MOTORS</td>
<td>0 0 0 0 0 0</td>
</tr>
<tr>
<td>M 784</td>
<td>M3-06 DC YOU REMOVE OR REPLACE MOTOR PARTS</td>
<td>0 0 0 0 0 0</td>
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<tr>
<td>M 785</td>
<td>M3-07 DC YOU TROUBLESHOOT AS FAR AS CHECKING ARE</td>
<td>0 0 0 0 0 0</td>
</tr>
<tr>
<td>M 786</td>
<td>M3-08 DC YOU TROUBLESHOOT DOWN TO COMPONENT PARTS OF MOTORS</td>
<td>0 0 0 0 0 0</td>
</tr>
<tr>
<td>M 787</td>
<td>M3-09 DC YOU PERFORM ANY TASKS ON FIELD COILS</td>
<td>0 0 0 0 0 0</td>
</tr>
<tr>
<td>M 788</td>
<td>M3-10 DC YOU PERFORM ANY TASKS ON ARMATURES</td>
<td>0 0 0 0 0 0</td>
</tr>
<tr>
<td>M 789</td>
<td>M3-11 DC YOU PERFORM ANY TASKS ON ROTORS</td>
<td>0 0 0 0 0 0</td>
</tr>
<tr>
<td>M 790</td>
<td>M3-12 DC YOU PERFORM ANY TASKS ON BRUSHES</td>
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<td>M 791</td>
<td>M3-13 DC YOU PERFORM ANY TASKS ON SLIP RINGS</td>
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<td>M 792</td>
<td>M3-14 DC YOU PERFORM ANY TASKS ON CONNECTIONS</td>
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<td>M 793</td>
<td>M3-15 DC YOU PERFORM ANY TASKS ON ROLE PIECES</td>
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**USE OF SIGNAL GENERATORS**

**MOTORS AND GENERATORS**
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<tr>
<th>TASK GROUP SUMARY</th>
<th>SELECTED OPERATIONS</th>
<th>SPL 001</th>
<th>SPL 002</th>
<th>SPL 003</th>
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<tr>
<td>M 294 M2-18 DO YOU DETERMINE OR MEASURE THE MAGNITUDE OF THE</td>
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<td>FORCE OR TORQUE Created by a Motor</td>
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<td>M 295 M2-19 DO YOU DETERMINE OR MEASURE THE DIRECTION OF THE</td>
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<td>MECHANICAL FORCE OR TORQUE Created by a Motor</td>
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<td>OF THE INDUCED VOLTAGE IN MOTORS</td>
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<td>M 297 M2-19 DO YOU WORK WITH SYNCHRONOUS MOTORS</td>
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<td>M 307 M2-29 DO YOU TROUBLESHOOT DOWN TO COMPONENT PARTS OF</td>
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<td>N 308 N1-10 DO YOU WORK WITH METERS IN YOUR PRESENT JOB</td>
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<td>EXPRESS IN UNITS OF OHMS PER VOLT</td>
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<td>AMPLIFIERS IN YOUR PRESENT JOB</td>
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<td>N 423 N1-06 DO YOU REMOVE OR REPLACE MAGNETIC AMPLIFIERS OR</td>
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<td>SATURABLE REACTOR COMPONENTS</td>
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<td>Task Group Summary</td>
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<tr>
<td>n 225, 226 &amp; 228</td>
<td>You use or refer to the definition curves or loops</td>
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<tr>
<td>n 225, 226 &amp; 228</td>
<td>You interpret schematic drawings to develop output waveforms across reactor windings on load resistors of single winding saturable reactors</td>
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<tr>
<td>n 229</td>
<td>You use or refer to inductance in saturable reactors</td>
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<td>n 230</td>
<td>You use or refer to residual magnetism in saturable reactors</td>
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<tr>
<td>n 231</td>
<td>You use or refer to flux density in saturable reactors</td>
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<td>n 232</td>
<td>You use or refer to point of saturation in saturable reactors</td>
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<td>n 233</td>
<td>You use or refer to saturable-reactor schematic symbols</td>
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<tr>
<td>n 234</td>
<td>You work with waveshaping circuits in your present job</td>
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<td>n 235</td>
<td>You use or refer to transient intervals</td>
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<td>n 236</td>
<td>You use or refer to pulse width (pF)</td>
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<td>n 237</td>
<td>You use or refer to pulse recurrence time (pRF)</td>
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<td>n 238</td>
<td>You use or refer to pulse recurrence frequency (pRF)</td>
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<td>n 239</td>
<td>You use or refer to differentiating circuits</td>
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<td>n 240</td>
<td>You use or refer to integrating circuits</td>
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<td>n 241</td>
<td>You use or refer to the classification of time constants (long, medium, or short)</td>
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<td>n 242</td>
<td>You determine whether an L or R circuit is differentiating or integrating based on the time constant</td>
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<td>n 243</td>
<td>You work with square wave generators</td>
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<td>n 244</td>
<td>You work with rectangular wave generators</td>
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<td>n 245, 246 &amp; 248</td>
<td>You inspect speed, transmit, or receive systems in your present job</td>
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<td>n 247</td>
<td>You clean speed, transmit, or receive systems</td>
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<td>n 248</td>
<td>You align speed, transmit, or receive systems</td>
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<td>n 249</td>
<td>You troubleshoot to speed, transmit, or receive systems</td>
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<td>n 250</td>
<td>You troubleshoot to speed, transmit, or receive components</td>
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<td>n 250</td>
<td>You troubleshoot to speed, transmit, or receive systems</td>
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<td>n 251</td>
<td>You troubleshoot to speed, transmit, or receive components</td>
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<td>n 252</td>
<td>You troubleshoot to speed, transmit, or receive systems</td>
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<td>n 253</td>
<td>You troubleshoot to speed, transmit, or receive components</td>
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<td>02-19 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM ON POWER SUPPLIES</td>
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<td>02-16 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM CHARGING CIRCUITS AND CHARGING DIODES</td>
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<td>02-17 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM PULSE FORMING NETWORKS</td>
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<td>02-22 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM RF AMPLIFIERS</td>
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<td>PT-23</td>
<td>02-23 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM FREQUENCY CONVERTERS</td>
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<td>02-24 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM IF AMPLIFIERS</td>
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<td>02-25 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM DETECTORS</td>
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<td>02-28 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM DON'T REMEMBER WHICH PULSE MODULATION SYSTEM STAGES</td>
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<td>P:40-14 DO YOU SELECT APPROPRIATE TRANSMISSION LINES TERMINATIONS TO ACHIEVE DESIRED WAVEFORMS IN TERMS OF TERMINATIONS IN TERMS OF CIRCUIT TERMINATIONS</td>
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<td>P 982 PI-30 DC YOU WORK WITH TRANSMISSION LINES WHICH ARE MATCHED TO LOADS USING STUB MATCHING</td>
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<p>| 984 P2-31 DC YOU WORK WITH WAVEGUIDES OR CAVITY RESONATORS IN YOUR PRESENT JOB | 2 | 2 | 0 | 2 | 0 | 0 |
| 985 P2-32 DC YOU INSPECT WAVEGUIDES OR CAVITY RESONATORS | 0 | 0 | 0 | 0 | 0 | 0 |
| 986 P2-33 DC YOU CLEAN WAVEGUIDES OR CAVITY RESONATORS | 0 | 0 | 0 | 0 | 0 | 0 |
| 987 P2-34 DC YOU BEND WAVEGUIDES OR CAVITY RESONATORS | 0 | 0 | 0 | 0 | 0 | 0 |
| 988 P2-35 DC YOU TWIST WAVEGUIDES OR CAVITY RESONATORS | 0 | 0 | 0 | 0 | 0 | 0 |
| 989 P2-36 DC YOU PRESSURIZE WAVEGUIDES OR CAVITY RESONATORS | 0 | 0 | 0 | 0 | 0 | 0 |
| 990 P2-37 DC YOU DUDGE WAVEGUIDES OR CAVITY RESONATORS | 0 | 0 | 0 | 0 | 0 | 0 |
| 991 P2-38 DC YOU DOUBLE-MAK WAVEGUIDES OR CAVITY RESONATORS | 0 | 0 | 0 | 0 | 0 | 0 |
| 992 P2-39 DC YOU REMOVE OR INSTALL COMPLETE WAVEGUIDES | 0 | 0 | 0 | 0 | 0 | 0 |
| 993 P2-40 DC YOU REMOVE OR INSTALL WAVEGUIDE SECTIONS | 0 | 0 | 0 | 0 | 0 | 0 |
| 994 P2-41 DC YOU REMOVE OR INSTALL DUMMY LOADS | 0 | 0 | 0 | 0 | 0 | 0 |
| 995 P2-42 DC YOU REMOVE OR INSTALL BENDS | 0 | 0 | 0 | 0 | 0 | 0 |
| 996 P2-43 DC YOU REMOVE OR INSTALL BENDS | 0 | 0 | 0 | 0 | 0 | 0 |
| 997 P2-44 DC YOU REMOVE OR INSTALL OTHER BENDS | 0 | 0 | 0 | 0 | 0 | 0 |
| 998 P2-45 DC YOU REMOVE OR INSTALL CHOKES JOINTS | 0 | 0 | 0 | 0 | 0 | 0 |
| 999 P2-46 DC YOU REMOVE OR INSTALL ROTATING JOINTS | 0 | 0 | 0 | 0 | 0 | 0 |
| 1000 P2-47 DC YOU REMOVE OR INSTALL DIRECTIONAL COUPLERS | 0 | 0 | 0 | 0 | 0 | 0 |
| 1001 P2-48 DC YOU REMOVE OR INSTALL BIO DIRECTIONAL COUPLERS | 0 | 0 | 0 | 0 | 0 | 0 |
| 1002 P2-49 DC YOU USE OR REFER TO ALL OF WAVEGUIDES | 0 | 0 | 0 | 0 | 0 | 0 |</p>
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<td>P2-28 Do you use or refer to <strong>electric field boundary conditions</strong></td>
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<td>P2-29 Do you use or refer to <strong>magnetic field boundary conditions</strong></td>
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<td>P2-29 Do you use or refer to <strong>diplexer field boundary conditions</strong></td>
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<td>P2-31 Do you use or refer to the general rule that most waveguides are made with a <strong>b =</strong> wall size of =? wavelengths</td>
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<td>P2-33 Are you concerned with the material (such as brass) which waveguides are made of</td>
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<td>P1073</td>
<td>P2-34 Do you compute the length of a waveguide for specific installation</td>
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<td>P2-34 Do you use the right hand rule to determine the direction of propagation, direction of # field, or # lines in waveguides</td>
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<td>P2-36 Are high power probes used on waveguides or cavity resonators you work with?</td>
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<td>P2-37 Are low power probes used on waveguides or cavity resonators you work with?</td>
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<td>P2-39 Do you determine the kind of energy coupling used on waveguides or cavity resonators you work with?</td>
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| P1080 | P2-40 Do you determine where probes should be mounted in waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguides or cavity resonators without referring to waveguide...
PCT NEWS RESPONDING YES BY SELECTED CRPS

TSAK GROUP SUMMARY
RECENT MEMBERS PERFORMING

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**Storage Devices**

**Digital to Analog Converters**
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**DB AND POWER RATIOS**

- U1256 U2-02 Do you use decibels to express amplification and attenuation?
  - SPL 001: 7
  - SPL 002: 7
  - SPL 003: 6
  - SPL 004: 8
  - SPL 005: 0
  - SPL 006: 0

- U1257 U2-03 Do you use logarithms to compute output power in decibels?
  - SPL 001: 8
  - SPL 002: 6
  - SPL 003: 9
  - SPL 004: 9
  - SPL 005: 0
  - SPL 006: 0

- U1258 U2-04 Dummy task to identify incumbents who performed no tasks
  - SPL 001: 6
  - SPL 002: 7
  - SPL 003: 3
  - SPL 004: 8
  - SPL 005: 0
  - SPL 006: 0
SUPPLEMENTARY

INFORMATION
**Electronic Principles Electronic Warfare Countermeasures Career Ladder**

**AFSC 276X1**

**Title:** Electronic Principles Electronic Warfare Countermeasures Career Ladder

**Type of Report & Period Covered:** FINAL

**March 77 - June 77**

**Performing Organization Name and Address:**

Occupational Survey Branch

USAF Occupational Measurement Center

Lackland AFB TX 78236

**Controlling Office Name and Address:**

SAME AS ITEM 9

**Report Date:**

29 July 1977

**Number of Pages:**

14

**Distribution Statement (of this Report):**

Approved for public release; distribution unlimited

**Abstract:**

This report summarizes the results of the administration of the Electronic Principles Inventory to airmen assigned to Electronic Warfare Countermeasures Specialty (AFSC 276X1). The report gives a detailed listing of the technical tasks and knowledge needed to perform the jobs within the specialty or career ladder.

Continued
This specialty has the following functions:

Performs technical electronic warfare counter measures functions; and supervises electronic warfare countermeasures activities. Analyzes electronic warfare activities or abnormal external influences. Supervises electronic warfare countermeasures personnel.