

SUGGESTED CONTENTS FOR STUDENT
APPRENTICES IN GENERAL ELECTRICAL WORK.

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SUGGESTED CONTENTS FOR STUDENT
OCT 27 1939
APPRENTICES IN GENERAL ELECTRICAL WORK.

By

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PREFACE

As our country changes from a rural population to urban and develops a more complicated social order, each member of this order becomes more specialized in his work and habits. With the further development of the machine age it has become necessary for each laborer to have special training to be able to meet the requirements of even the simplest of jobs. Under these conditions many special schools have sprung up and our colleges are over crowded with students seeking special training in order that they may meet the demands of the workaday world. Even with all the special schools and colleges operating to their limit we find that they are not able to give the necessary training. The greater part of our workers are unable to get the training offered by the colleges and special schools. The public schools in the larger cities have established special trade schools for their students but because of the lack of funds and the small number of students desiring any given type of training and the many different types desired, the medium sized and small schools have been unable to meet this need. The parents and teacher of the children from these small general educational schools have seen the services of their children go begging on the labor markets.

This is not a condition brought on by the depression but was recognized by our Congress as early as 1917. In order to help the boys and girls get the training that

they desired, Congress passed the Smith-Hughes Act. From time to time Congress has enacted legislation extending services provided in the Smith-Hughes Act. In 1936 Congress passed the George-Dean Act which greatly extended the aid given by the Smith-Hughes Acts. One of the new training fields opened up by the act was in diversified occupations. In Policies Bulletin No. 1, page 49, is found the following explanation of this new course.

"In some cities it is not practical to organize part-time cooperative trade courses, where there is no dominant industry or group of closely allied industries to employ the cooperative students. Often, however, there are many opportunities in such cities to place students in positions which offer real chances for training and advancement in diverse occupations. A modified form of part-time cooperative organization, under which students can be placed in available openings of this type, will help materially to meet a definite vocational training need in certain cities. In order to permit the establishment of such courses, which are classified as general continuation, and in this way partially solve the problem of part-time education for the small cities and towns, Federal part-time funds may be used in reimbursement of the salaries of coordinators and teachers of part-time cooperative occupational courses which meet all the provisions of the State plan relating to the part-time general continuation school as well as the provisions covering employment of students in miscellaneous occupations."

Thus Federal Aid was offered to small communities, that did not have the funds for full time day trade classes, for setting up programs of training where by the students were employed part of the day and in attendance at school the remainder of the day and at all times under the guidance of a qualified teacher known as a coordinator.

In setting up these new training courses there was very little material that could be borrowed from general education

classes and little more of the day trade class material that could be used. The coordinators found themselves faced with much work to be done and little time to do it in if this new education program was to live and return the services it promised. It is to aid coordinators that the writer has prepared this work.

The writer wishes to express his sincere thanks to the following business and trades people, for without their help this work would have been impossible, Mr. C. A. Pickel, Director of trade and industrial education in the Ponca City High School; Mr. Miller Frost, electrician in Hudson's Motor Exchange; Mr. J. A. Hudson, E.E. owner of Hudson Motor Exchange; Mr. O. A. Braker, master electrician and owner of Braker Electric Co.; Mr. G. R. Snyder, owner of Snyder Electric Co.; Mr. Don Patterson, in charge of battery repair in O. V. Black Tire Shops; L. L. Fawcett, owner of Auto Electric Co.; Mr. Thomas McDonald, operator of Thom's Radio Shop, and J. H. Pemberton, radio repairman in Auto Electric. All of the above men live in Ponca City, Oklahoma.

The writer wishes to express his thanks to Mr. J. W. Taylor, coordinator; Mr. L. H. Longe, owner of Longe Electric Shop; Hal Arnold, manager of Duncan Battery Co.; and Albert Lewis, Independent Radio Service, all of Duncan Oklahoma.

The writer is indeed indebted to Professor H. A. Huntington, Head of Trade and Industrial Education, A. & M. College, Stillwater, Oklahoma, for the inspirations he has given in the preparation of this work.

CHAPTER I.

INTRODUCTION .

It is the responsibility of coordinators, with the aid of the employer, to make out a schedule of processes which the boy will follow while working for that employer. When a coordinator has a number of these schedules to make in fields that are unfamiliar to him, he can profit by referring to some schedules that have been made out by some one that is familiar with the field of work. The writer having had experience in the electrical field and having taught electricity for a number of years, also having the help of electricians in up to date electrical shops, has prepared schedules for a general electrical shop work. It is not expected that they would fit any one employer's shop or that they should be used as they are, but that they should be a guide and aid to the coordinator in making out his schedule of process so for general electrical shop work.

In making these schedules of processes the writer chose four of the leading electrical shops in town, one for motor repair, one for building wiring, one for battery work and one for radio work from which to secure valid lists of work and learning experiences. In each shop he secured the aid of the best electrician in the shop, in most cases the owner and operator of the shop, to assist in making the first draft of the schedule of processes and the directly related subject matter. After this list was corrected and typed, copies were submitted to other electricians for

their criticisms and approval. These electricians were working in the same special fields for which the schedules were made. In all cases except one the men were in different shops from the electrician who helped make the schedule. Copies were also submitted to Mr. Pickel, supervisor of trade and industrial education, and teacher of vocational electricity in the Ponca City High School. The corrected and revised schedules were then used in this thesis.

When a coordinator gets the schedule of processes made it is then necessary for him to expand the list of informational topics into lesson assignments that are to be used as guides by the students while studying at school. The available material and local job and school facilities determine to a great extent the type of lesson assignment sheets to be used so the writer has prepared only a few suggested assignment sheets.

One of the biggest tasks of a coordinator is to secure suitable and up to date material for the students to study during the related study hour. To aid the coordinators in this job, the writer has prepared an annotated bibliography of all the material he was able to inspect. He does not recommend all of the references he has listed but has tried to evaluate them objectively and thereby aid the coordinator in his choice of references. The writer realizes that this is only a beginning in the job of annotating the books, magazines, and pamphlets in the electrical field

CHAPTER II.

TRAINEE'S LEARNING OUTLINE OF SCHEDULE
OF JOB PROCESS AND INFORMATION TOPICS.

In a General Electrical Shop.

This learning outline was worked up in four units because in a city of Ponca City's size the shops are found in separate units. Also this arrangement makes it easier for a coordinator to eliminate any units not found in the shop in which he places a boy.

The content under the heading, "Operations", is a list of the operations or jobs that the boy will do while he is working for his employer. No attempt was made to arrange the operations into any order. Because of the boys limited ability some of the jobs will be left until the later part of his training period but most of the jobs will be done when they come up in the regular course of work brought to the shop. The content under the heading, "Information", is a list of subjects or lessons to be studied while the boy is in school. This is a suggested list and will be used by each coordinator to meet the needs of the boy as he progresses with his training. The order in which a boy studies these topics should be determined to a great extent by the jobs that he is working on in the shop.

The electric motor maintenance and repair unit was worked out with the aid of Mr. Miller Frost, electrician in charge of motor repair in Hudson's Motor Exchange, and checked by Mr. J. A. Hudson, owner of Hudson's Motor Ex-

change. Mr. O. A. Braker, of Braker Electric Co. helped write the unit on Building Wiring while Mr. Snyder of Snyder Electric and Mr. L. H. Longe of Longe Electric, checked the finished unit. Mr. Don Patterson in charge of the battery work at O. V. Black's Tire Shop and the writer prepared the unit on Battery Servicing and Repair. Mr. L. L. Fawcett, owner of Auto Electric and Mr. Hal Arnold, manager of Duncan Battery Co., checked the finished unit. The writer, with the cooperation of Mr. Thom McDonald, owner of Thom's Radio Shop, worked out the unit on Radio Repair. Mr. J. H. Pemberton, who is in charge of the radio work and Mr. Albert Lewis, Independent Radio Service, checked the finished work. Each unit of the learning outline was also checked by Mr. C. A. Pickel, director of vocational education in the Ponca City High School.

TRAINEE'S LEARNING OUTLINE OF SCHEDULE
OF JOB PROCESS AND RELATED INFORMATION
TOPICS

In a General Electrical Shop.

Unit I. Electric Motor Maintenance and Repair.

Operations.

Information.

A. STOCK BOY.

- | | |
|------------------------------------|-------------------------------|
| 1. Cleaning the shop. | 1. Good housekeeping methods. |
| 2. Care of tools. | 2. Tools. Their names and |
| 3. Arranging stock. | care. |
| 4. Packing and unpacking
stock. | 3. Stock display. |
| 5. Making deliveries. | 4. Shipping requirements. |
| | 5. Local traffic laws. |

B. BEARINGS.

- | | |
|---|--|
| 1. Sleeve bearings. | 1. Sleeve bearings. |
| a. Check for loose
bearings. | a. Metals used in sleeve
bearings. |
| b. Replaces bearings. | b. Construction of sleeve
bearings. |
| c. Check bearing for
loose housings. | c. Oil rings in sleeve
bearings. |
| d. Check oil rings. | d. Oils used in sleeve
bearings. |
| e. Replace old rings. | |
| f. Check oil gauges. | |
| g. Check oil drains. | |
| h. Oil properly. | |
| i. Replace dust caps and
rings. | |

Operations.

Information.

2. Ball Bearings.

- a. Check for loose bearings.
- b. Replace bearings.
- c. Adjust clearances.
- d. Check for loose housing.
- e. Pack with correct amount of grease.
- f. Check thrust.

3. Wick Oil Bearings.

- a. Check for loose bearings.
- b. Check wicking to be sure it is touching shaft.
- c. Replace charred wicks.
- d. Repair bearings.
- e. Fill with Non-carbolated vaseline.

2. Ball Bearings.

- a. Metals in ball bearings.
- b. Construction of ball bearings.
- c. Grease used in ball bearing.

3. Wick Oil Bearings.

- a. Construction of wick oil bearings.
- b. Wicks for wick oil bearings.
- c. Oiling wick oil bearings.

C. STATORS.

(A.C. Motors & A.C. Generators)

1. Check for grounds.

2. Check for shorts.

3. Check for open circuits.

4. Check leads through housing

1. Insulations used in stat-
tors.2. Circuits in stat-
tors.3. Conductors used in stat-
tors.

Operations.

Information.

-
- | | |
|---|----------------------------|
| and replace rubber bushings. | ors. |
| 5. Replace or insulate leads. | 4. Laminations in stators. |
| 6. Repair or replace insulation. | 5. Starter circuits. |
| 7. Rewind coils. | |
| 8. Cut out bad coils. | |
| 9. Revarnish coils and bake out oil. | |
| 10. Check and tighten laminations in housing. | |
| 11. Check starting coils in capacitator motors. | |

D. BAR ROTORS.

- | | |
|--------------------------------------|-------------------------------------|
| 1. Check and tighten bar. | 1. Circuits in bar rotors. |
| 2. Check and tighten rotor on shaft. | 2. Electrical voltage by induction. |

E. SHAFTS.

- | | |
|---|----------------------------------|
| 1. Check to see that shaft is round. | 1. Metal used for shafts. |
| 2. Check size of shaft at bearing and pulley. | 2. Construction of shafts. |
| 3. Turn shaft to correct size. | 3. Speeds of shafts and pulleys. |
| 4. Build up shaft. | |

Operations.

Information.

-
5. Check centers before turning.

F. WOUND ROTORS WITH SLIP RINGS

(In A.C. Motors and Generators.)

- | | |
|--|--|
| 1. Check rings to see that they are tight. | 1. Construction of slip rings. |
| 2. Check for shorts between rings. | 2. Circuits in wound rotors with slip rings. |
| 3. Tighten loose rings. | 3. Circuits through rings. |
| 4. Clean shorts in rings. | 4. Insulation in wound rotors. |
| 5. Check coils for shorts and open circuits. | 5. Coil varnishes and enamels. |
| 6. Reinsulate coils. | |
| 7. Rewind coils. | |
| 8. Dip and bake. | |

G. WOUND ROTORS WITH COMMUTATORS.

(A.C. & D.C. Motors and Generators).

- | | |
|---|--|
| 1. Check commutators for loose bars. | 1. Commutator construction. |
| 2. Check commutator for shorts and grounds. | 2. Insulating commutators. |
| 3. Take windings loose from commutator. | 3. Solder and soldering methods. |
| 4. Solder loose leads in commutator. | 4. Circuits in wound rotor with commutators. |
| 5. Check short circuiting | 5. Short circuiting devices. |
| | 6. Brushes. |
| | 7. Brush holders. |

Operations.

Information.

- | | |
|--|-------------------------|
| device. | 8. Machining armatures. |
| a. Pins. | |
| b. Neckless. | |
| c. Governor weights. | |
| 6. Check and replace brushes. | |
| 7. Check and replace brush
springs. | |
| 8. Check brush holders. | |
| 9. Check bands. | |
| 10. Rewind. | |
| 11. Turn down commutator. | |
| 12. Trim mica between bars. | |

H. MOTOR CONDENSERS.

- | | |
|--|----------------------------|
| 1. Check and replace con-
densers. | 1. Condenser construction. |
| 2. Check centrifugal switch
and contacts. | 2. Condenser operation. |
| | 3. Centrifugal switches. |

I. FIELD COILS IN D. C. MOTORS

(and generators)

- | | |
|-----------------------------|----------------------------|
| 1. Check for shorts. | 1. Field coil circuits. |
| 2. Check for open circuits. | 2. Insulating field coils. |
| 3. Reinsulate. | |
| 4. Rewind or replace coils. | |
| 5. Varnish. | |
| 6. Check and repair leak. | |

Operations.

Information.

J. A.C. GENERATOR ROTORS.

- | | |
|--|---------------------------------|
| 1. Check rings for shorts and grounds. | 1. Ring construction. |
| 2. Check coil for short and grounds. | 2. Wire sizes for coils. |
| 3. Check for loose coils. | 3. Circuits in A.C. generators. |
| 4. Rewind. | |
| 5. Repair or replace insulation. | |
| 6. Tighten coils. | |

K. MOTOR STARTERS.

- | | |
|------------------------------------|--------------------------------------|
| 1. Push button starters. | 1. Contacts and points. |
| a. Check and clean contacts. | 2. Electromagnets. |
| b. Check and repair holding coils. | 3. Relay construction and operation. |
| c. Check overload relays. | 4. Voltage allowables on switches. |
| 2. Hand operated starters. | 5. Code requirements. |
| a. Check contacts. | |
| b. Clean and smooth contact. | |
| c. Check springs on contact. | |
| d. Check holding coils. | |
| e. Check for voltage. | |
| f. Check overload relays. | |

Operations.

Information.

L. TRANSFORMERS.

- | | |
|--|-------------------------------------|
| 1. Check insulators. | 1. Voltage by induction. |
| 2. Replace broken insulators. | 2. Cores for transformers. |
| 3. Check lead wires. | 3. Ratios in transformers. |
| 4. Replace bad lead wires. | 4. Wire sizes in transformers. |
| 5. Check winding for open
circuits. | 5. Winding transformer coils. |
| 6. Check for burned out coils. | 6. Insulating transformer
coils. |
| 7. Rewind. | 7. Code requirements. |
| 8. Check oil level. | |
| 9. Check case for holes or
cracks. | |
| 10. Check laminations. | |
| 11. Tighten laminations. | |

UNIT II.
BUILDING WIRING.

Operations.

Information.

A. STOCK BOY.

- | | |
|-----------------------------|-------------------------------|
| 1. Care of tools. | 1. Tools. Their names and |
| 2. Keeping shelves stocked. | uses. |
| 3. Filling orders for jobs. | a. Trade. |
| 4. Repair small appliances. | b. Commercial. |
| a. Irons, toaster, heater. | 2. Proper names, trade marks, |
| b. Cords. | catalog listings and uses |
| c. Motors. | of electrical materials. |
| 5. Making deliveries to | a. Trade. |
| jobs. | b. Commercial. |
| 6. Making proper charges to | 3. Care and repair of irons, |
| jobs. | toasters, heaters, cords, |
| | small motors. |
| | 4. Traffic laws and safety |
| | rules. |
| | 5. Study of prices. |

B. ROUGHING IN CONDUIT.

- | | |
|----------------------------|----------------------------|
| 1. Bending. | 1. Radii and arcs used in |
| 2. Cutting and threading. | bending conduit. |
| 3. Reaming. | 2. Threads used in conduit |
| 4. Placing conduit in con- | work, pipe threads, 6-32 |
| crete slab. | and 8-32, threads Tap and |
| 5. Installing open conduit | die sets. |
| work. | |

Operations.

Information.

- | | |
|--|--|
| 6. Installing concealed conduit in frame house.
7. Pulling wire in conduit.
8. Fastening conduit to outlets.
9. Installing conduit for services.
10. Grounding neutrals. | 3. Concrete construction.
4. Frame construction.
5. Blue print reading for proper installations.
6. Electric code rules, for conduit installation.
7. Circuits in conduit.
8. City ordinances for conduit.
9. Service installation.
10. Local electric and building ordinances. |
|--|--|

C. ROUGHING IN STEEL TUBE.

- | | |
|--|--|
| 1. Cutting.
2. Bending.
3. Connecting.
4. Supporting at outlet boxes.
5. Running in open work.
6. Installing concealed tube work. | 1. Methods used in cutting and bending steel tube.
2. Fittings for steel tube.
3. Code rules for steel tube.
4. City ordinances for steel tube.
5. Number of conductors for each size conduit. |
|--|--|

D. ROME X.

(NONMETALLIC SHEATHED CABLE)

- | | |
|---|--|
| 1. Removing insulation.
2. Strapping up.
3. Running through frame work. | 1. Construction of Rome X.
2. Circuits with Rome X.
3. Spacing supports. |
|---|--|

Operations.	Information.
4. Fishing through walls of old buildings.	4. Allowable carrying capacity.
5. Supporting at outlet boxes.	5. Code rules for Rome X.
6. Installing outlet boxes.	6. City laws for Rome X.

E. BX.

(FLEXIBLE STEEL ARMORER CABLE)

1. Cutting.	1. Construction of BX.
2. Fishing.	2. Circuits with BX.
3. Coupling.	3. Spacing supports.
4. Supporting.	4. Allowable carrying capacity.
5. Use of fiber bushings where metal is removed in fittings.	5. Code rules for BX.
	6. City laws for BX.

F. METAL MOLD.

1. Cutting.	1. Construction of metal mold.
2. Supporting.	2. Circuits in metal mold.
3. Coupling.	3. Metal mold coupling, plate, elbow, tees, etc.
4. Connecting to outlet boxes.	4. Code rules for metal mold.
	5. City laws for metal mold.

G. GREENFIELD.

(FLEXIBLE STEEL CONDUIT)

1. Cutting.	1. Construction of greenfield.
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Operations.

Information.

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|-------------------------|------------------------------|
| 2. Supporting. | 2. Circuits in greenfield. |
| 3. Coupling. | 3. Code rules for green- |
| 4. Connecting to outlet | field. |
| boxes. | 4. City laws for greenfield. |
| 5. Fishing. | |
| 6. Connecting to motor. | |

H. KNOB AND TUBE WIRING.

- | | |
|---------------------------|---------------------------|
| 1. Open work. | 1. Open work. |
| a. Supporting wires. | a. Wire sizes. |
| b. Splicing conductors. | b. Splicing and solder- |
| c. Protecting conductors. | ing. |
| d. Fastening to outlet | c. Circuits. |
| boxes. | d. Code laws. |
| e. Fastening insulators. | e. City laws. |
| f. Use of loom. | 2. Concealed work. |
| | a. Building construction. |
| | b. Circuits. |
| | c. Code rules. |
| | d. City laws. |

I. TRIMMING OUT.

(FINISHING WORK)

- | | |
|--------------------------------|-----------------|
| 1. Putting in switches. | 1. Switches. |
| 2. Putting in service outlets. | 2. Outlets. |
| 3. Hanging fixtures. | 3. Fixtures. |
| 4. Connecting panels. | 4. Fuse panels. |
| 5. Installing and connecting | 5. Meters. |

Operations.

Information.

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- | | |
|-----------------------------|-----------------------------|
| meter loops. | 6. Motor ratings. |
| 6. Connecting motors. | 7. Furnace controls. |
| 7. Connecting furnaces. | 8. Transformers. |
| 8. Installing transformers. | 9. Code rules for fixtures. |
| | 10. City laws for fixtures. |

J. ALARMS, SIGNALS

AND ANNUNCIATOR SYSTEMS.

- | | |
|--|--|
| 1. Installing bell and buzzers. | 1. Construction and operation of bell and buzzers. |
| 2. Installing push buttons. | |
| 3. Installing simple door bell systems. | 2. Simple bell circuits. |
| | 3. Parallel bell circuits. |
| 4. Installing bells in parallel. | 4. Parallel button circuits. |
| | 5. Selective circuits. |
| 5. Installing buttons in parallel. | 6. Magnetic door openers. |
| | 7. Bell transformers. |
| 6. Installing front and rear doors or apartment systems. | 8. Annunciators. |
| | 9. Fire alarm circuits. |
| 7. Installing electric door openers. | a. Open circuits. |
| | b. Closed circuits. |
| 8. Install bell transformer for power. | c. Relays. |
| | 10. Burglar alarm circuits. |
| 9. Installing annunciator systems. | a. For home. |
| | b. For banks. |
| 10. Installing fire alarm systems. | |
| a. Open system. | |

Operations.

Information.

b. Closed system.

11. Installing burglar alarm systems.

a. In homes.

b. In banks.

UNIT III.
BATTERY SERVICING AND REPAIR.

Operations.

Information.

A. STOCK BOY.

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Care of shop. <ol style="list-style-type: none"> a. Cleaning shop. b. Cleaning batteries. 2. Care of equipment. <ol style="list-style-type: none"> a. Bulb type chargers. b. Motor-generator sets. c. Constant potential equipment. d. Charging equipment. e. Testing equipment 3. Inspection of shipments. 4. Keeping solution at proper level. 5. Stocking batteries for storage. 6. Rotation of stock. 7. Boosting charge. 8. Storing old batteries. | <ol style="list-style-type: none"> 1. Care of shop. <ol style="list-style-type: none"> a. Floor construction. b. Fire hazards. c. Drain fittings. d. Arrangement of stock. 2. Charging equipment. <ol style="list-style-type: none"> a. Bulb type charger. b. Motor-generator sets. c. Voltage regulators. d. Ammeters. e. Volt meters. 3. Shipping regulations. 4. Battery electrolytes. 5. Proper care of batteries in storage. |
|--|---|

B. INSTALLING A NEW BATTERY.

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Removing old battery. 2. Check cables. 3. Clean and grease cables. | <ol style="list-style-type: none"> 1. Standard battery for each car. 2. Construction and good |
|---|---|

Operations.	Information.
4. Check and set car generators.	points of battery handled.
5. Check the starter.	3. Care of car generator.
6. Check for shorts in electrical system.	4. Checking starters.
7. Check voltage regulator.	5. Checking ignition systems.
8. Instruct owner in care of battery.	
a. Periodic checking.	
b. Correct charging rates.	

C. SERVICING BATTERIES

IN USE.

1. Fill with battery water.	1. Battery water.
a. Summer practice.	2. Gravity in batteries.
b. Winter practice.	3. Voltage in batteries.
2. Replace with rental battery.	4. Rates for charging batteries.
3. Check gravity.	5. Charging batteries.
4. Check voltage.	a. Charging rates.
5. Place battery on charge.	b. Ampere-hour decrease.
6. Check voltage and add acid.	6. Acid used in batteries.
7. Tighten cradle.	a. Mixing acid and water.
8. Check sealing compound for leaks.	

D. REPAIRING FAULTY BATTERIES.

1. Opening batteries.	1. Battery construction.
-----------------------	--------------------------

Operations.

Information.

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- | | |
|------------------------|--------------------------------|
| 2. Checking plates. | 2. Battery plate construction. |
| 3. Reinsulating cells. | |
| 4. Replacing plates. | 3. Insulators. |
| 5. Cycling batteries. | 4. Chemical action in |
| 6. Check gravity. | batteries. |
| 7. Check volts. | |

UNIT IV.
RADIO REPAIRING.

Operations.

Information.

A. CARE OF SHOP.

- | | |
|-----------------------------|--|
| 1. Cleaning shop. | 1. House keeping methods. |
| 2. Checking stock. | 2. Checking stock lists in catalogues. |
| 3. Arranging displays. | 3. Attractive display characteristics. |
| 4. Dismantling used radios. | |

B. REPLACING PARTS.

- | | |
|---|--|
| Replacing parts after sets have been analyzed and parts tested. | Study the construction, operation and catalogue listing of |
| 1. Tapestry on grill. | 1. Magnets. |
| 2. Magnets. | 2. Speaker cones. |
| 3. Speaker cones. | 3. Tubes. |
| 4. Tubes. | 4. Fixed condensers. |
| 5. Fixed condensers. | 5. Resistors. |
| 6. Resistors. | 6. Switches. |
| 7. Switches. | 7. Transformers. |
| 8. Transformers. | 8. Ind. coils. |
| 9. R.F. & A.F. coils. | 9. Choke coils. |
| 10. Choke coils. | 10. Variable condensers. |
| 11. Variable condensers. | 11. Electrolytic condensers. |
| 12. Volume controls. | |
| 13. Tone controls. | |

Operations.

Information.

C. TESTING AND REPAIRING.

- | | |
|-----------------------------|---------------------------------|
| 1. Tubes. | 1. Tube tester and tube action. |
| 2. Take ohm meter readings. | 2. Ohm meter. |
| 3. Take voltage readings. | 3. Volt meter. |
| 4. Fixed condensers. | 4. Capacity. |
| 5. Variable condensers. | 5. Spacing. |
| 6. Resistors. | 6. Reactance. |
| 7. Induction coils. | 7. Inductance. |
| 8. Transformers. | 8. Transformer ratios. |
| 9. Volume control. | 9. Resistance Ohm's Law. |
| a. Field. | 10. Electro magnets. |
| b. Voice. | 11. Conductivity. |
| 10. Speaker coils. | 12. Theory of microphones. |
| 11. Switches. | 13. Theory of Photo Electric |
| 12. Microphone. | cells. |
| 13. Photo electric cells. | 14. Circuit breakers. |
| 14. Vibrators. | 15. Man made static. |
| 15. Ignition interference. | |

D. ANALYZING AND TUNING CIRCUITS.

- | | |
|------------------------|----------------------------|
| 1 . Taking milliampere | 1. The ampere meter. |
| readings. | 2. Purpose and care of the |
| 2. Reading the oscil- | oscilloscope. |
| loscope. | 3. Detector circuits. |
| 3. Detector circuits. | 4. R.F. circuits. |
| 4. R.F. circuits. | 5. A.F. circuit. |
| 5. A.F. circuits. | 6. Plate circuits. |

Operations.	Information.
6. Plate circuits.	7. Filament circuits.
7. Filament circuit.	8. Grid circuits.
8. Grid circuits.	9. Speaker circuits.
9. Intermediate frequency circuits.	10. Microphone circuits.
10. Automatic volume control circuits.	11. Power circuits.
11. Speaker circuits.	
12. Microphone circuits.	
13. Power circuit.	

E. INSTALLATIONS.

1. Installing aerials.	1. Antennas.
2. Installing grounds.	2. Ground connections.
3. Installing auto-sets.	3. Auto-sets.
4. Installing P. A. systems.	4. P. A. Systems.

CHAPTER III.

LESSON ASSIGNMENTS.

This chapter was prepared as a suggestion for making lesson assignment sheets to be used as guides by the student in his study of related information topics at school. These are simply guide sheets with no attempt made to prepare them for use in testing the information gained by the student. Each of the sheets has listed in the upper left hand corner the unit number, the section letter and the lesson number found in the column headed information in the learning outline. The assignment sheets are filed in the order they are found in the learning outline so that the lesson assignment sheet for any lesson listed in the learning outline can be found easily and quickly. The complete title of the assignment sheet corresponding to the units, sections and lesson number is given on each sheet as a further identification.

The necessary directions and explanations of the procedure to be followed in the study of the lesson is included to save the instructor time and to make sure the student has the proper guidance for proceeding with the study.

The first type (Type A) of lesson assignment sheet is the question type. In this type the coordinator prepares a list of questions that will encourage the student to read the available references and gain the important information in the lesson. It takes a fuller knowledge of the subject on the part of the coordinator to make the question type of assignment sheets. In many cases the employer will help with

the preparation of the questions. It is best to have the employer check the questions used in the assignment sheets for validity.

The second type (Type B) of assignment sheets is the outline type. In this type of lesson assignment the coordinator prepares an outline of the material to be studied. The outline is made up of the main topics with the subtopics and facts left to be filled in by the student as he finds them in his study of the lesson.

The third type (Type C) of assignment sheet gives the references and the procedure to be followed and allows the student to list his own questions and make an outline of the material he studies in the search for the answers to his questions. This is the poorest of the three types of assignment sheets and can be justified in only a very few cases. Some times we have a boy who is greatly enthused with his work and is anxious to study all that he can find to answer his own questions. In such cases our other types of assignment sheets would be more of a hindrance than a help. When a coordinator is just starting a program, or has placed students in several new occupations for which learning outlines and assignments must be made, the coordinator is unable to make complete assignment sheets so he frequently uses the type C assignment sheets. These sheets are only the beginning of type A and B sheets, and can later be changed into type A or B by the changing of a few words in the directions and the addition of questions or outlines.

Each lesson should give the boy a chance to list the questions that seem important to him and any comments he wishes to make about the lesson.

The local set up, the type of student and the coordinators preference are the principal guides in choosing the type of assignment sheets to be used. No one type would be best in all cases and the best one to use is the one best to fill the need in that job at that time.

UNIT I. SECTION G. LESSON 4.

(Type A)

Unit I. Motor Maintenance and Repair.

Section G. Wound Rotors With Commutators.

Lesson 4. Circuits In Wound Rotors With Commutators.

References:

1. Braymer, Armature Winding and Motor Repair.
Pages 1 to 55.
2. E. W. Jones, Essentials of Applied Electricity.
Pages 119 to 144.
3. C. E. Crofoot, Construction Data On 250 Watt Compound Wound D.C. Generators.
4. Fairbanks, Morse & Co., Electric Machinery Catechism.
Pages 1 to 17.
5. Bodine Electric Co., Fractional Horsepower Motors.
6. Century, Fractional Horse Power Motors.

Student Assignment:

As you rewind armatures you find that they are wound to provide for certain circuits. This sheet is to guide you in a study of the different circuits found in armatures and the proper methods of winding these circuits. You are to read several of the above references and write the answers to the following questions as you find them in your reading. At the end of your answers, add any question you may have about the lesson. It is not necessary for you to finish this lesson now, but you may receive a new assignment when your work at the shop changes. You will be expected to finish this at a

later date so if you have almost completed it, it will be best to finish this assignment now.

Questions:

1. What work does the commutator do?
2. What is a lap winding?
3. What is a wave winding?
4. Name six different types of coils used in armature winding.
5. What are the advantages of (a) involute coils, (b) concentric coils?
6. Make diagrams for and explain (a) coil pitch, (b) front pitch, and (c) back pitch.
7. Explain the meaning of full pitch and fractional pitch.
8. What is the meaning of the term reentrant?
9. What are symmetrical windings?
10. Give the best D.C. windings for a repair job in a shop.

Your Questions and Comments:

UNIT II. SECTION I. LESSON 8.

(Type A)

Unit II. Building Wiring.

Section I. Trimming Out.

Lesson 8. Transformers.

References:

1. Moyer and Wostrel, Industrial Electricity and
Wiring. Pages 219 and 237.
2. E. W. Jones, Essentials of Applied Electricity.
Pages 145 to 153 and 179 to 194.
3. Abbott, National Electric Code Hand Book.
Pages 188 to 197.

Student Assignment:

It is not enough to know only methods of connecting electrical appliances to the building circuits because different conditions are met in practically every new job. If the electrician does not understand the construction and operation of the appliance he is installing there are many small errors that are easily overlooked and difficult to detect. The skilled electrician will understand the operation of all parts of the circuits in a building. You should be striving for that higher ability as you study the construction and operation of the transformer in this lesson. Read carefully the above references and answer the following questions. A carefully made diagram is of great value to a work man but a poorly made diagram is only misleading. When you have finished this lesson, hand the assignment sheet

with your answers, to the instructor. It is best to finish each lesson while you are working on it but if your work in the shop has changed you may get a new lesson assignment before this one is finished. You will be expected to finish a lesson before any credit is given on that lesson.

Questions:

1. How does a transformer transfer electrical power from one circuit to another?
2. How does a transformer change the voltage of one circuit to a different voltage in the other circuit?
3. What is the power factor of a transformer?
4. Explain why transformer cores are made as they are.
5. Draw a diagram of proper series connection in a transformer.
6. Draw a diagram of a proper parallel connection in a transformer.
7. Describe briefly and illustrate by simple sketches what you understand by
 - a. Delta connection.
 - b. Y connection.
 - c. Open-delta connections.
8. Describe the difference in construction and operation between a transformer and an autotransformer.
9. What is the object of filling a transformer case with oil?
10. Give briefly the general code requirements regarding the installation and grounding of transformers.

11. Under what condition is the installation of a transformer allowed inside of a building?
12. Why are the primary windings of a step-down transformer made of much smaller wire than the secondary windings?

UNIT III. SECTION D. LESSON 2.

(Type A)

Unit III. Battery Servicing and Repair.

Section D. Repairing Faulty Batteries.

Lesson 2. Battery Plate Construction.

References:

1. O. A. Witte, The Automobile Storage Battery.

Pages 9 to 14 and 69 to 71.

2. The Electric Storage Battery Co. Manual For Exide Batteries.

3. The Electric Storage Battery Co. Fundamentals of a Storage Battery.

Student Assignment:

The plates are the heart of a storage battery and to understand the operation of a battery you must know the construction of the plates and what changes take place in a plate as the battery is charged and discharged. In making your study of battery plates read several of the references from the above list. If you have other questions or comments that you wish to make add them to your answer sheet. When you have finished your study of the construction of a battery return this assignment sheet with your answers to the instructor. He will give you other references for this lesson or a new lesson assignment. It is not necessary for you to finish this lesson before starting a new lesson. If your work in the shop has changed you may return this assignment with the answers you have and receive another assignment

then you will be expected to finish this assignment at a later date.

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Questions:

1. What is the basic material from which plates are made?
2. What is the grid in a plate? Of what is it made?
3. Name the different materials that are used in the paste and give the purpose of each.
4. How are plates fastened to straps?
5. How are battery plates formed?
6. What happens to plates that are charged too rapidly?
7. What happens to plates when the electrolyte is allowed to get below them?
8. What changes take place in a plate when the battery is left in a discharged state for some length of time?
9. What causes a plate to buckle?
10. Give the causes of shedding in a battery.

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UNIT IV. SECTION E. LESSON 1.

(Type A)

Unit IV. Radio Repairing.

Section E. Installations.

Lesson 1. Antennas.

References:

1. A. A. Ghiradi, Radio Physics Course.

Pages 877 to 888.

2. Moyer and Wostrel, Radio Construction and Repairing.

Pages 5 to 30.

3. The Radio Amateur's Hand Book.

Pages 293 to 331.

Student Assignment:

The new radios operate on most any type of antenna but to get the high type of reception for which the set was built it is necessary that the antenna not only be installed properly but also that it must be the correct type of antenna. In the study of this lesson the student should learn both the proper method of installing antennas and the correct antennas for each type of radio.

When you have completed your answers to this lesson hand them with this assignment sheet to the instructor. It is best to finish each lesson before you get another assignment but if your work at the shop changes you may receive a new assignment.

Questions:

1. What is the purpose of the antenna in a radio trans-

mitting station. In a receiver installation?

2. Explain and show by a sketch how an elevated antenna and the earth form a condenser. Trace the currents. Mark the following parts on your sketch:
 - a. Aerial.
 - b. Lead-in.
 - c. Ground wire.
 - d. Earth.
3. Explain how signal voltage and current are set up in ordinary antennas.
4. Draw a sketch of 4 types of antennas and explain the construction of each.
5. Describe the construction and explain the operation of a lightning arrester.
6. Why are insulators used on antennas? Explain why ribbing the surface increases the resistance to surface-leakage.
7. Explain why a low-resistance ground connection is important for good reception.
8. What is a counterpoise ground? Why is it used in automobile radio installations?
9. What is a loop antenna? Explain its principle of operation.
10. May rubber covered wire be used as an aerial wire? Why?
11. Describe the construction of a light socket antenna plug. How does it operate?

12. Why is a separate ground required for the lightning arrester?

UNIT II. SECTION B. LESSON 6.

(Type B)

Unit II. Building Wiring.

Section B. Roughing In Conduit.

Lesson 6. Electric Code Rules For Conduit Installation.

References:

1. Abbott, National Electrical Code Handbook.

Pages 76 to 82 and others.

2. Nelson-Dunlap, Interior Electric Wiring.

Pages 35 to 88.

3. National Board of Fire Underwriters, National Electrical Code. Pages 103 to 106.

Student Assignment:

In your work in wiring buildings you have found that they are wired according to the National Electrical Code. This sheet is to help you in your study of the code rules for roughing in conduit. As you read fill in the subtopics and exact information in the following outline. List your questions and comments at the end of your outline. When you have finished or your work in the shop changes you may get another assignment. Hand this assignment sheet with your outline to the instructor. If you have not finished you are expected to finish at a later date.

Outline:

1. Applicable Rules.

a. Rules 401 to 408.

- b. Rules 701 to 707.
- 2. Where approved for use.
- 3. Minimum size.
- 4. Size of conduit for given size and number of conductors.
 - a. Minimum size of conduit to contain a given number of 600 Volt rubber covered conductors.
 - b. Minimum size of conduit to contain more than nine 600 Volt rubber covered conductors.
 - c. Size conduits for combination of conductors.
 - d. Minimum size conduit for three conductor convertible systems.
- 5. Reaming.
- 6. Bushings.
- 7. Threadless coupling.
- 8. Running threads.
- 9. Bends.
 - a. How made.
 - b. Number in one run.
- 10. Exposed to corrosive fumes.

UNIT IV. SECTION C. LESSON I.

(Type C)

Unit IV. Radio Repairing.

Section C. Testing and Repairing.

Lesson I. Tubes.

References:

1. Ghirardi & Freed, Radio Servicing Course.

Pages 158 to 174.

2. Moyer & Worstrel, Radio Construction and Repairing.

Pages 38 to 105.

3. The Radio Amateur's Handbook. (1939).

Pages 49 to 83.

4. J. R. Irwin, Radio. Pages 127 to 151.

5. A. A. Ghirardi, Modern Radio Servicing.

Pages 163 to 232.

Student Assignment:

As you have advanced in the study of radio you have found that the tube is the heart of the radio. To be a skilled radio repairman you should have a thorough knowledge of tubes and their actions. This sheet is to guide you in your study of tubes. In your work of checking tubes you have needed to know more about the construction and operation of tubes. Perhaps you have many questions in mind now and more will occur to you as you advance in your study. As you read the above references in search of the answers to your questions make an outline of the information you find. At the end of the outline state any questions and make any

comment you have.

When you have finished your outline or have changed your type of work at the shop hand your assignment sheet with your outline to your instructor. If you desire to make a further study of tubes the instructor will give you some more references. If you have not finished the lesson you will be expected to finish it at a later date.

The industrious worker will reach the higher goal.

CHAPTER IV.

ANNOTATED BIBLIOGRAPHY.

In preparing this chapter the writer has tried to help the coordinator or teacher who has the responsibility of securing the information and reference material. Each reference that is listed here has been inspected by the writer and evaluated objectively to the best of his ability.

There are five units according to the subject treated in the reference. The general unit includes those books that treat the general field of electrical work, while each of the other four units, motor, wiring, battery, and radio, list references that deal with their special fields. The references are arranged in alphabetical order according to the author's last name or publisher's name when no author is given, the date of each publication is given to indicate its age. Although the writer does not recommend the older references, he listed them to help interested persons check references found in other lists.

The number of chapters and pages are given to help one judge the size of the publication and the price is given as an aid to those with a limited amount to spend.

In attempting to evaluate the text of the references the writer has used the numerals 1, 2 and 3. "1" represents the lower value, "2" the medium and "3" the highest value. "Comprehensive 3" was used to denote a reference that covered the entire field. "Comprehensive 2 Abbreviated 1" rated a reference that was broad in scope but did

not include all phases of the field. "Comprehensive 1 Abbreviated 2" was used for a reference that was limited in subject matter it included. "Abbreviated 3" denotes a reference that is shortened to treat only a few of the topics in the designated field of electrical work.

In evaluating the content of the reference as to degree of advancement the writer used "Essentials of Applied Electricity" by E. W. Jones as a standard reference. If a reference contained no material more advanced than that in "Essentials of Applied Electricity" it was rated as "Elementary 3". If a small part of the reference was more advanced than that in the standard reference it was rated "Elementary 2 Advanced 1". A reference with only a small part of beginners work was rated "Elementary 1 Advanced 2". When a reference was so written that it assumed that the student had mastered the elementary principles of electrical work it was rated "Advanced 3".

A rating of "General 3" means that the subject was treated in a general way with very few references to specific cases and very little exact information such as tables and directions. "General 2 Specific 1" rated a reference that was mostly general in nature but had a few specific illustrations.

"General 1 Specific 2" was applied to a reference with some general information but was mostly given to specific cases with exact information. A reference rated "Specific 3" was a reference that treated of specific cases with ex-

act information, mostly tables and directions for procedures in certain jobs.

The questions were rated for their thought producing requirements and because they asked for the reproduction of information given in the text. A rating of "Thought 3" meant that practically all questions required some thinking to answer them. "Thought 2 Informative 1" denoted questions which were principally thought questions but had some questions calling for reproduction of information. Questions rated "Thought 1 Informative 2" were principally informative questions. Those rated "Informative 3" were questions that called for the reproduction of facts.

In checking the "Make Up" of the references the writer rated it a "Legibility 3" when the type was large and clean and there were no, or very few, quotations in small type. A rating of "Legibility 2" was given a reference that was in smaller type or contained many quotations in small type. A reference that was mimeographed, written with poor or small type, or for other conditions was difficult to read, was rated "Legibility 1".

To help a prospective buyer judge how well a reference was illustrated the writer gave the number of illustrations and rated their quality. When a large percentage of the illustrations were clean pictures of the articles or operations and the diagrams were attractive and easily read, the reference was rated, "Illustrations 3". A reference containing few clear pictures, with diagrams and charts making up the major part of the illustrations, was rated "Illustrations 2".

A rating of "Illustrations 1" was used for illustrations that were poorly drawn diagrams and charts not attractive.

A reference made up of smooth strong white paper was rated "Quality of Material 3". Poorer material was rated a "2" while dark, rough, or easily torn paper was rated "Quality of Material 1".

The material of the binding was given, such as cloth, paper, leatherite, etc. Then the durability of the bindings was rated "3" for the strongest to "1" for those pamphlets fastened with staples.

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GENERAL ELECTRICAL WORK.

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ANNOTATED BIBLIOGRAPHY Unit General

Author Aluminum Company of America Date 1938

Title Finishes For Aluminum

No. Chapters 7 Pages 68 Price Free

Publisher Aluminum Company of America

Addresses Pittsburg, Penn.

TEXT:

Comprehensive..... Abbreviated 3 Elementary 1 Advanced 2

General..... Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 33 - 3

Quality of Material 3 Binding Spiral - 2

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General

Author Automotive Electric Association Date 1935

Title A. E. A. Tune - Up System

No. Chapters 56 Pages 59 Price \$2.00

Publisher Automotive Electric Association

Addresses 800 Michigan Bldg. Detroit, Michigan

TEXT:

Comprehensive 1 Abbreviated 2 Elementary..... Advanced 3

General..... Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 35 - 3

Quality of Material 3 Binding Paper - 1

Remarks:

ANNOTATED BIBLIOGRAPHY Unit.....General.....

Author.....B. B. Burling..... Date.....1921.....

Title.....Elementary Electric Wiring.....

No. Chapters.....56 jobs..... Pages.....36..... Price.....\$.75.....

Publisher.....The Bruce Publishing Co.....

Addresses.....Milwaukee, Wisconsin.....

TEXT:

Comprehensive..... Abbreviated.....3..... Elementary.....3..... Advanced.....

General..... Specific.....3..... Questions: Thought.....0..... Informative.....0.....

MAKE-UP:

Legibility.....2..... Illustrations.....2.....

Quality of Material.....2..... Binding.....Looseleaf.....

Remarks: Very Elementary wiring circuits.

ANNOTATED BIBLIOGRAPHY Unit.....General.....

Author.....Elmer E. Burns..... Date.....1930.....

Title.....Electricity - A Study of First Principles.....

No. Chapters.....12..... Pages.....233..... Price.....\$1.75.....

Publisher.....D. Van Nostrand Company Inc.....

Addresses.....250 Fourth Ave. New York, N. Y.....

TEXT:

Comprehensive.....2..... Abbreviated.....1..... Elementary.....2..... Advanced.....1.....

General.....3..... Specific..... Questions: Thought..... Informative.....3.....

MAKE-UP:

Legibility.....3..... Illustrations.....170 - 3.....

Quality of Material.....3..... Binding.....Cloth - 3.....

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General
 Author Copper & Brass Research Ass. Date 1939
 Title The Romance of Copper
 No. Chapters 1 Pages 15 Price Free
 Publisher Copper & Brass Research Association
 Addresses 420 Lexington Avenue, New York, N. Y.

TEXT:

Comprehensive..... Abbreviated.....3..... Elementary.....3..... Advanced.....
 General.....3..... Specific..... Questions: Thought.....0..... Informative.....0.....

MAKE-UP:

Legibility.....3..... Illustrations31 - 3.....
 Quality of Material.....3..... Binding Paper - 1.....

Remarks: Also, "Copper In The Home" and "Bulletin of the
 Copper and Brass Research Association". All very attractive
 material.

ANNOTATED BIBLIOGRAPHY Unit General
 Author Esty - Millikan - McDougal Date 1938
 Title Elements of Electricity
 No. Chapters 10 Pages 244 Price \$2.00
 Publisher American Technical Society
 Addresses Chicago, Illinois

TEXT:

Comprehensive.....2..... Abbreviated.....1..... Elementary.....2..... Advanced.....1.....
 General.....3..... Specific..... Questions: Thought.....0..... Informative.....0.....

MAKE-UP:

Legibility.....3..... Illustrations21 - 3.....
 Quality of Material.....3..... Binding Cloth - 3.....

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General
 Author General Electric Date 1939
 Title America's Largest Electrical Workshop
 No. Chapters 1 Pages 18 Price Free
 Publisher General Electric Co.
 Addresses Schenectady, New York.

TEXT:

Comprehensive..... Abbreviated 3 Elementary 3 Advanced.....
 General..... Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility..... 3 Illustrations 44 - 3.
 Quality of Material..... 3 Binding Paper - 1.

Remarks: Also, "Excursions in Science and Engineering,"
 "Electrons Drive the Wheels" and "The Lamp of Research".

ANNOTATED BIBLIOGRAPHY Unit General
 Author General Electric Co. Date 1937
 Title The Research Laboratory of the G. E. Co.
 No. Chapters 1 Pages 6 Price Free
 Publisher General Electric Co.
 Addresses Schenectady, New York.

TEXT:

Comprehensive..... Abbreviated 3 Elementary..... Advanced 3
 General 3 Specific..... Questions: Thought 0 Informative 0

MAKE-UP:

Legibility..... 3 Illustrations 11 - 3.
 Quality of Material..... 3 Binding Paper - 3

Remarks: Also, "Progress In Pictures".

ANNOTATED BIBLIOGRAPHY Unit.....General.....

Author.....Publicity Department..... Date.....Monthly.....

Title.....Library Service.....

No. Chapters.....1..... Pages.....47..... Price.....Free.....

Publisher.....General Electric Co.....

Addresses.....Schenectady, New York.....

TEXT:

Comprehensive..... Abbreviated.....3..... Elementary..... Advanced.....3.....

General..... Specific.....3..... Questions: Thought.....0..... Informative.....0.....

MAKE-UP:

Legibility.....3..... Illustrations.....0.....

Quality of Material.....3..... Binding.....1.....

Remarks: It gives a list of new bulletins published by
G. E. Co.

ANNOTATED BIBLIOGRAPHY Unit.....General.....

Author.....Ernest Greenwood..... Date.....1931.....

Title.....Modern Electric Service in the American Home.....

No. Chapters.....9..... Pages.....42..... Price.....Free.....

Publisher.....National Electric Light Association.....

Addresses.....420 Lexington Ave., New York, N. Y.....

TEXT:

Comprehensive..... Abbreviated.....3..... Elementary.....3..... Advanced.....

General.....3..... Specific..... Questions: Thought.....0..... Informative.....0.....

MAKE-UP:

Legibility.....2..... Illustrations.....31 - 2.....

Quality of Material.....2..... Binding.....Paper - 1.....

Remarks: Humorous.

ANNOTATED BIBLIOGRAPHY Unit General
 Author P. H. Hyland, M. E. Date 1938
 Title The Design of a Steam Electric Generating Station
 No. Chapters 8 Pages 154 Price free
 Publisher College of Engineering University of Wisconsin
 Addresses Madison, Wisconsin.

TEXT:

Comprehensive 3 Abbreviated _____ Elementary _____ Advanced 3
 General _____ Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 2 Illustrations 90 - 2
 Quality of Material 2 Binding Spiral - 2

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General
 Author D.C. & J.P. Jackson & Black Date 1933
 Title Electricity and Magnetism
 No. Chapters 23 Pages 585 Price \$ 1.90
 Publisher The Macmillan Company
 Addresses New York, N.Y.

TEXT:

Comprehensive 3 Abbreviated _____ Elementary 1 Advanced 2
 General 3 Specific _____ Questions: Thought 2 Informative 1

MAKE-UP:

Legibility 3 Illustrations 437 - 2
 Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General

Author Janette Mfg. Co. Date 1938

Title Janette Rotary Converters

No. Chapters 1 Pages 12 Price Free

Publisher Janette Manufacturing Co.

Addresses 556 West Monroe Street. Chicago, Illinois.

TEXT:

Comprehensive..... Abbreviated 3 Elementary 1 Advanced 2

General..... Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility..... 2 Illustrations 17 - 3

Quality of Material..... 2 Binding Paper - 1

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General

Author E. W. Jones Date 1935

Title Essentials of Applied Electricity

No. Chapters 12 Pages 257 Price \$1.36

Publisher The Bruce Publishing Co.

Addresses Chicago, Illinois.

TEXT:

Comprehensive..... 2 Abbreviated..... 1 Elementary..... 3 Advanced..... 0

General..... 3 Specific..... Questions: Thought..... 1 Informative..... 2

MAKE-UP:

Legibility..... 3 Illustrations..... 130 - 3

Quality of Material..... 3 Binding Cloth - 3

Remarks: A good Ninth Grade Industrial Arts text.

ANNOTATED BIBLIOGRAPHY

Unit GeneralAuthor E. W. Jones Date 1937Title General ElectricityNo. Chapters 23 Units. Pages 89 Price \$.80Publisher The McCormick - Mathews Co.Addresses Wichita, Kansas.

TEXT:

Comprehensive..... Abbreviated 3..... Elementary 3..... Advanced.....General 3..... Specific..... Questions: Thought 2..... Informative 1.....

MAKE-UP:

Legibility..... 2..... Illustrations 92 - 3Quality of Material 3..... Binding paper - 3Remarks: Good for a short course in Junior High School

ANNOTATED BIBLIOGRAPHY

Unit GeneralAuthor Lee M. Klinefelter Date.....Title Electrical Occupation.No. Chapters..... Pages..... Price \$2.00Publisher E. P. Dutton and Company, Inc.Addresses New York, N. Y.

TEXT:

Comprehensive 2..... Abbreviated 1..... Elementary 3..... Advanced.....General 3..... Specific..... Questions: Thought 0..... Informative 0.....

MAKE-UP:

Legibility..... 3..... Illustrations 211 - 3Quality of Material 3..... Binding cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General
 Author John O. Kroshenbuehl Date 1937
 Title Design Data for Electric Wiring and Illumination
 No. Chapters 2 Pages 54 Price
 Publisher John S. Swift Co. Inc.
 Addresses Chicago, Illinois.
 TEXT:
 Comprehensive Abbreviated 3 Elementary Advanced 3
 General Specific 3 Questions: Thought 0 Informative 0
 MAKE-UP:
 Legibility 3 Illustrations 2
 Quality of Material 2 Binding Spiral - 2
 Remarks:

ANNOTATED BIBLIOGRAPHY Unit General
 Author H. G. Lehmann Date 1934
 Title Shop Projects in Electricity
 No. Chapters 21 Pages 190 Price \$.96
 Publisher American Book Co.
 Addresses Chicago, Illinois.
 TEXT:
 Comprehensive Abbreviated 3 Elementary 3 Advanced
 General Specific 3 Questions: Thought 2 Informative 1
 MAKE-UP:
 Legibility 3 Illustrations 170 - 2
 Quality of Material 3 Binding Cloth - 3
 Remarks: A book of easy projects for beginners.

ANNOTATED BIBLIOGRAPHY Unit General

Author Earl P. Miller Date 1932

Title Rural Electrification in Oklahoma.

No. Chapters Pages 135 Price Free

Publisher Oklahoma A. & M. College

Addresses Stillwater, Oklahoma

TEXT:

Comprehensive Abbreviated 1 Elementary Advanced 3

General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 2 Illustrations 34 - 3

Quality of Material 3 Binding Paper - 1

Remarks: Experiment Station Bulletin No. 207.

ANNOTATED BIBLIOGRAPHY Unit General

Author L. D. Perry & R. O. Buck Date 1923

Title Practical Problems In Electrical Construction.

No. Chapters 20 Pages 66 Price \$1.00

Publisher The Bruce Publishing Co.

Addresses Milwaukee, Wisconsin.

TEXT:

Comprehensive Abbreviated 3 Elementary 3 Advanced

General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 25 - 2

Quality of Material 3 Binding Cloth - 3

Remarks: A book of small projects.

ANNOTATED BIBLIOGRAPHY Unit General
 Author C. F. Peterson Date 1936
 Title Fundamentals of Electricity.
 No. Chapters 43 lessons. Pages 111 Price \$.96
 Publisher The Bruce Publishing Co.
 Addresses Milwaukee, Wisconsin.

TEXT:

Comprehensive..... Abbreviated 3 Elementary 3 Advanced.....
 General 3 Specific..... Questions: Thought..... Informative 3.....

MAKE-UP:

Legibility..... 3 Illustrations 123 - 1
 Quality of Material..... 3 Binding Paper - 1.
 Remarks: Mostly elementary wiring circuits.

ANNOTATED BIBLIOGRAPHY Unit General
 Author Stuart Plumley Date 1938
 Title Arc Welding
 No. Chapters..... 4 Pages 31 Price Free
 Publisher Smith Welding Equipment Corp.
 Addresses 2619 Fourth St. Southeast, Minneapolis, Minn.

TEXT:

Comprehensive..... Abbreviated 3 Elementary 3 Advanced.....
 General..... Specific 3 Questions: Thought 1 Informative 2.....

MAKE-UP:

Legibility..... 3 Illustrations 36 - 2
 Quality of Material..... 2 Binding Paper - 1.
 Remarks:

ANNOTATED BIBLIOGRAPHY

Unit GeneralAuthor Morgan H. Potter Date 1939Title Electric Welding.No. Chapters 21 Pages 121 Price \$1.25Publisher American Technical SocietyAddresses Chicago, Illinois.

TEXT:

Comprehensive 1 Abbreviated 2 Elementary 2 Advanced 1General 0 Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 72 - Good 3.Quality of Material 3 Binding Cloth - 3.

Remarks:

ANNOTATED BIBLIOGRAPHY

Unit GeneralAuthor J. P. Schaenger, B. S. Date 1935 - 1937Title Rural Electrification.No. Chapters 25 Pages 266 Price \$1.47Publisher The Bruce Publishing Co.Addresses Chicago, Illinois.

TEXT:

Comprehensive 1 Abbreviated 2 Elementary 3 Advanced 0General 1 Specific 2 Questions: Thought 0 Informative 3

MAKE-UP:

Legibility 3 Illustrations 160 - 3Quality of Material 3 Binding Cloth - 3.

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General

Author S. Raymond Smith Date 1933

Title Elementary Industrial Electricity

No. Chapters 18 Pages 287 Price \$2.00

Publisher McGraw - Hill Book Company Inc.

Addresses New York, N. Y.

TEXT:

Comprehensive 2 Abbreviated 1 Elementary 2 Advanced 1

General 3 Specific Questions: Thought 2 Informative 1

MAKE-UP:

Legibility 3 Illustrations 332

Quality of Material 3 Binding Cloth 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General

Author William H. Timbie Date 1937

Title Elements of Electricity

No. Chapters 16 Pages 569 Price \$3.00

Publisher John Wiley & Sons Inc.

Addresses New York, N. Y.

TEXT:

Comprehensive 3 Abbreviated Elementary Advanced 2

General 3 Specific Questions: Thought 3 Informative

MAKE-UP:

Legibility 3 Illustrations 300 - 2

Quality of Material 3 Binding Cloth 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General
 Author William H. Timbie Date 1931
 Title Essentials of Electricity
 No. Chapters 10 Pages 306 Price \$2.00
 Publisher John Wiley & Sons Inc.
 Addresses New York, N.Y.

TEXT:

Comprehensive 1 Abbreviated 2 Elementary 2 Advanced 1
 General 3 Specific Questions: Thought 3 Informative

MAKE-UP:

Legibility 3 Illustrations 220 - 2
 Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General
 Author W. H. Timbie Date 1924
 Title Industrial Electricity
 No. Chapters 18 Pages 735 Price \$3.50
 Publisher John Wiley and Sons Inc.
 Addresses New York, N.Y.

TEXT:

Comprehensive 3 Abbreviated Elementary Advanced 3
 General 3 Specific Questions: Thought 3 Informative

MAKE-UP:

Legibility 3 Illustrations 468 - 2
 Quality of Material 3 Binding Cloth - 2

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General
 Author W. H. Timbie & Higbie Date 1916
 Title Alternating Current Electricity
 No. Chapters 9 Pages 729 Price \$4.00
 Publisher John Wiley and Sons Inc.
 Addresses New York, N.Y.

TEXT:

Comprehensive 3 Abbreviated 3 Elementary 3 Advanced 3
 General 3 Specific 3 Questions: Thought 3 Informative 3

MAKE-UP:

Legibility 3 Illustrations 338 - 2
 Quality of Material 3 Binding Cloth - 2

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General
 Author F. E. Tustison Date 1926
 Title Job Sheets for the Practical Electrical Shop
 No. Chapters 7 Pages 80 Price \$.68
 Publisher The Bruce Publishing Co.
 Addresses Milwaukee, Wisconsin.

TEXT:

Comprehensive 3 Abbreviated 3 Elementary 3 Advanced 3
 General 3 Specific 3 Questions: Thought 3 Informative 3

MAKE-UP:

Legibility 3 Illustrations 130 - 3
 Quality of Material 3 Binding Looseleaf.

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General

Author Charles F. Underhill Date 1933

Title Electrons At Work

No. Chapters 26 Pages 354 Price \$3.00

Publisher McGraw-Hill Book Company Inc.

Addresses New York. N.Y.

TEXT:

Comprehensive 3 Abbreviated Elementary Advanced 3

General 3 Specific Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 215 - 1

Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General

Author Ralph H. Walters Date 1930

Title Experimental Electricity

No. Chapters 59 Exp. Pages 145 Price \$1.50

Publisher McGraw - Hill Book Company

Addresses 390 Seventh Ave. New York.

TEXT:

Comprehensive Abbreviated 3 Elementary 1 Advanced 2

General 2 Specific 1 Questions: Thought 2 Informative 1

MAKE-UP:

Legibility 3 Illustrations 35 - 1

Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit General
 Author G. A. Willoughby Date 1932
 Title Practical Electricity for Beginners
 No. Chapters 12 Pages 101 Price \$1.00
 Publisher The Manual Arts Press
 Addresses Peoria, Illinois.

TEXT:

Comprehensive 1 Abbreviated 2 Elementary 3 Advanced
 General 3 Specific Questions: Thought Informative 3

MAKE-UP:

Legibility 3 Illustrations 60 - 1
 Quality of Material 2 Binding Cloth - 3.
 Remarks: A good eighth grade reference.

ANNOTATED BIBLIOGRAPHY Unit General
 Author Forrest B. Wright Date 1935
 Title Electricity in the Home and on the Farm
 No. Chapters 10 Pages 309 Price \$2.50
 Publisher John Wiley & Sons Inc.
 Addresses New York, M.Y.

TEXT:

Comprehensive 2 Abbreviated 1 Elementary 3 Advanced
 General 2 Specific 1 Questions: Thought 1 Informative 2

MAKE-UP:

Legibility 3 Illustrations 226 - 2
 Quality of Material 3 Binding Cloth - 3
 Remarks: A good elementary reference.

MOTOR MAINTENANCE AND REPAIRING.

ANNOTATED BIBLIOGRAPHY Unit Motors
 Author Bodine Electric Co. Date 1938
 Title Fractional Horsepower Motors.
 No. Chapters Pages 42 Price Free
 Publisher Bodine Electric Company
 Addresses Chicago, Illinois

TEXT:

Comprehensive Abbreviated 3 Elementary Advanced 3
 General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 3
 Quality of Material 3 Binding Paper - 1

Remarks: This is a folder of very good material. It contains specific information on the Bodine motors.

ANNOTATED BIBLIOGRAPHY Unit Motors
 Author D. H. Braymer Date 1920
 Title Armature Winding and Motor Repair
 No. Chapters 1 Pages 515 Price \$3.00
 Publisher McGraw - Hill Book Company
 Addresses 370 Seventh Ave. New York, N. Y.

TEXT:

Comprehensive 3 Abbreviated Elementary Advanced 3
 General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 301 - 3
 Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit Motors

Author D. H. Braymer & A. C. Roe Date 1925

Title Rewinding Small Motors

No. Chapters 25 Pages 247 Price \$2.50

Publisher McGraw-Hill Book Company Inc.

Addresses 370 Seventh Ave. New York, N. Y.

TEXT:

Comprehensive 3 Abbreviated Elementary 1 Advanced 2

General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 210 - 3

Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit Motors.

Author Century Electric Company Date 1939

Title Century-Fractional Horse Power Motors.

No. Chapters Pages 24 Price Free

Publisher Century Electric Company

Addresses St. Louis, Missouri

TEXT:

Comprehensive Abbreviated 3 Elementary 1 Advanced 2

General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 39 - 3

Quality of Material 3 Binding Paper - 1

Remarks: Also, nine other very attractive pamphlets.

ANNOTATED BIBLIOGRAPHY

Unit MotorsAuthor C. E. Crofoot Date 1939Title Construction DataNo. Chapters 5 pamphlets Pages 36 Price FreePublisher General Electric CompanyAddresses Schenectady, N.Y.

TEXT:

Comprehensive..... Abbreviated 3 Elementary..... Advanced 3General..... Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility..... 3 Illustrations 50 - 3Quality of Material..... 3 Binding Paper - 1Remarks: They are for $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$ H. P. Motors, D. C.Generators and capacitor Motors. Very good references.

ANNOTATED BIBLIOGRAPHY

Unit Motors.Author Publication A. E. B. 100.1 Date 1935Title Electric Machinery CatechismNo. Chapters 1 Pages 48 Price FreePublisher Fairbanks, Morse & Co.Addresses Chicago, Illinois.

TEXT:

Comprehensive..... 2 Abbreviated 1 Elementary..... 1 Advanced..... 2General..... 1 Specific..... 2 Questions: Thought..... 3 Informative.....

MAKE-UP:

Legibility..... 3 Illustrations 90 - 3Quality of Material..... 3 Binding Paper - 1

Remarks:

ANNOTATED BIBLIOGRAPHY Unit Motors

Author General Electric Co. Date 1939

Title G. E. Motors.

No. Chapters _____ Pages 120 Price Free

Publisher General Electric Co.

Addresses Schenectady, N. Y.

TEXT:

Comprehensive 3 Abbreviated _____ Elementary _____ Advanced 3

General _____ Specific 3 Questions: Thought _____ Informative _____

MAKE-UP:

Legibility 3 Illustrations 3

Quality of Material 3 Binding Spiral - 2

Remarks: Also, "Industrial Control Progress" and "Magnet Wire."

ANNOTATED BIBLIOGRAPHY Unit Motors

Author Ideal Commutator Dresser Co. Date 1939

Title Ideal Catalog and Handbook

No. Chapters _____ Pages 84 Price Free

Publisher Ideal Commutator Dresser Co.

Addresses Sycamore, Illinois.

TEXT:

Comprehensive _____ Abbreviated 3 Elementary _____ Advanced 3

General _____ Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 3

Quality of Material 3 Binding Paper - 1

Remarks: Also, "Variable Speed Transmission."

ANNOTATED BIBLIOGRAPHY

Unit MotorsAuthor Moreton - Dunlap - Drinkall Date 1939Title Armature Winding.No. Chapters 8 Pages 280 Price \$2.00Publisher American Technical SocietyAddresses Chicago, Illinois.

TEXT:

Comprehensive 3 Abbreviated Elementary Advanced 3General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 233 - 3Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY

Unit Motors.Author Westinghouse Electric Co. Date 1939Title Westinghouse Induction Motors & ControlNo. Chapters 1 Pages 12 Price FreePublisher Westinghouse Electric Manufacturing Co.Addresses 303 East Brady Station, Tulsa, Oklahoma

TEXT:

Comprehensive Abbreviated 3 Elementary 2 Advanced 1General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 87 - 3Quality of Material 3 Binding Paper - 1

Remarks: Also "Engineering Progress 1938", "5 Point Protection Against Corrosion" and "4 Point To Check in Motor starters."

ANNOTATED BIBLIOGRAPHY Unit Motors

Author George A. Willoughby Date 1930

Title Electric Motor Work

No. Chapters 75 Units. Pages 196 Price \$1. 76

Publisher The Manual Arts Press

Addresses Peoria, Illinois

TEXT:

Comprehensive 1 Abbreviated 2 Elementary 2 Advanced 1

General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 132 - 3

Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit

Author Date

Title

No. Chapters Pages Price

Publisher

Addresses

TEXT:

Comprehensive Abbreviated Elementary Advanced

General Specific Questions: Thought Informative

MAKE-UP:

Legibility Illustrations

Quality of Material Binding

Remarks:

BUILDING WIRING.

ANNOTATED BIBLIOGRAPHY

Unit WiringAuthor Arthur L. AbbottDate 1937Title National Electrical Code HandbookNo. Chapters 35 Pages 561 Price \$3.00Publisher McGraw-Hill Book CompanyAddresses New York, N. Y.

TEXT:

Comprehensive 3 Abbreviated Elementary Advanced 3General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 2 Illustrations 379 - 2Quality of Material 2 Binding Leatherite - 3

Remarks:

ANNOTATED BIBLIOGRAPHY

Unit WiringAuthor Form 5087 - 10 - 35Date 1938Title Electrical Wires and CablesNo. Chapters 29 Pages 125 Price FreePublisher American Steel and Wire Co.Addresses 208 S. LaSalle Street, Chicago, Illinois

TEXT:

Comprehensive Abbreviated 3 Elementary 1 Advanced 2General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 3Quality of Material 3 Binding Paper - 2

Remarks:

ANNOTATED BIBLIOGRAPHY

Unit WiringAuthor Form 5871 - A. Date 1938Title Rubber Insulated Building Wires and CablesNo. Chapters 1 Pages 47 Price FreePublisher American Steel and Wire Co.Addresses 208 S. LaSalle Street, Chicago, Ill.

TEXT:

Comprehensive..... Abbreviated 3 Elementary 1 Advanced 2General 3 Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 3Quality of Material 3 Binding Paper - 1Remarks: Also, "Cords and Cables" and "Park Way Cables."

ANNOTATED BIBLIOGRAPHY

Unit WiringAuthor The Arrow-Hart Electric Co. Date 1939Title Your Home With Adequate Wiring.No. Chapters 1 Pages 13 Price FreePublisher The Arrow-Hart & Hegeman Electric Co.Addresses Hartford, Connecticut.

TEXT:

Comprehensive..... Abbreviated 3 Elementary 3 Advanced.....General 3 Specific..... Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 28 - 3Quality of Material 3 Binding Paper - 1Remarks: Also "Arrow Wiring Devices" Catalogue No. 26.

ANNOTATED BIBLIOGRAPHY

Unit WiringAuthor Ray Baines and H. S. Hinrick Date 1929Title Wiring the FarmsteadNo. Chapters 1 Pages 20 Price FreePublisher Kansas State Agricultural CollegeAddresses Extension Service, Manhattan, Kansas.

TEXT:

Comprehensive..... Abbreviated 3..... Elementary 1..... Advanced 2.....General..... Specific 3..... Questions: Thought 0..... Informative 0.....

MAKE-UP:

Legibility 3..... Illustrations 17 - 3.....Quality of Material 2..... Binding Paper - 1.....Remarks: Also, "Farm Lighting," "Electricity Operated
Water Systems" and "Electric Motors for the Farm."

ANNOTATED BIBLIOGRAPHY

Unit WiringAuthor Catalogue No. 37 Date 1937Title Bryant Superior Wiring DevicesNo. Chapters 1 Pages 100 Price FreePublisher The Bryant Electric Co.Addresses Bridgeport, Conn.

TEXT:

Comprehensive..... Abbreviated 3..... Elementary 1..... Advanced 2.....General..... Specific 3..... Questions: Thought 0..... Informative 0.....

MAKE-UP:

Legibility 3..... Illustrations 3.....Quality of Material 3..... Binding Spiral - 2.....

Remarks:

ANNOTATED BIBLIOGRAPHY

Unit WiringAuthor Bussman Mfg. Co Date 1930Title Fuseology. A Handbook on Fuses.No. Chapters Pages 16 Price FreePublisher Bussman Mfg. Co.Addresses St. Louis, Mo.

TEXT:

Comprehensive Abbreviated 3 Elementary 2 Advanced 1General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 2 Illustrations 3 - 2Quality of Material 3 Binding Paper 1Remarks: Other information on "Buss Fusetron" and "Buss
Fustats."

ANNOTATED BIBLIOGRAPHY

Unit WiringAuthor Terrell Craft Date 1924Title Wiring for Light and Power.No. Chapters 60 Pages 551 Price \$3.00Publisher McGraw-Hill Book CompanyAddresses 370 Seventh Ave. New York, N. Y.

TEXT:

Comprehensive 3 Abbreviated Elementary 1 Advanced 2General 2 Specific 1 Questions: Thought Informative 3

MAKE-UP:

Legibility 2 Illustrations 552 - 2Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit Wiring
 Author Cutler-Hammer Inc. Date 1937
 Title Catalog of Safety Switches and Service Equipment.
 No. Chapters Pages 57 Price Free
 Publisher Cutler-Hammer Inc.
 Addresses 12th & St. Paul Ave., Milwaukee, Wis.
 TEXT:
 Comprehensive Abbreviated 3 Elementary 1 Advanced 2
 General Specific 3 Questions: Thought 0 Informative 0
 MAKE-UP:
 Legibility 3 Illustrations 2
 Quality of Material 3 Binding Paper - 1.
 Remarks:

ANNOTATED BIBLIOGRAPHY Unit Wiring.
 Author General Electric Co. Date 1939
 Title G. E. Buyers Guide
 No. Chapters Pages 52 Price Free
 Publisher General Electric Supply Corp.
 Addresses Oklahoma City, Oklahoma
 TEXT:
 Comprehensive 2 Abbreviated 1 Elementary 3 Advanced
 General Specific 3 Questions: Thought 0 Informative 0
 MAKE-UP:
 Legibility 2 Illustrations 3
 Quality of Material 2 Binding Paper - 1
 Remarks: Also "Within the New American Home" and "The
Home that Runs Itself."

ANNOTATED BIBLIOGRAPHY

Unit Wiring

Author Nela Park Engineering Dept. Date 1931
 Title Home Lighting Fundamentals
 No. Chapters 11 Pages 36 Price Free
 Publisher General Electric Company
 Addresses Schenectady, New York.

TEXT:

Comprehensive 1 Abbreviated 2 Elementary 2 Advanced 1
 General 2 Specific 1 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 39 - 3
 Quality of Material 3 Binding Paper - 1

Remarks: Also, "Electric Helps for the Farm Family."

ANNOTATED BIBLIOGRAPHY

Unit Wiring

Author J. A. Moyer & F. J. Wostrel Date 1930
 Title Industrial Electricity and Wiring.
 No. Chapters 19 Pages 469 Price \$3.00
 Publisher McGraw-Hill Book Co.
 Addresses New York, N.Y.

TEXT:

Comprehensive 3 Abbreviated Elementary Advanced 3
 General Specific 3 Questions: Thought 1 Informative 2

MAKE-UP:

Legibility 3 Illustrations 281 - 2
 Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit Wiring

Author National Electric Prod. Corp. Date 1938

Title La-In Surface Raceways, Catalogue

No. Chapters 1 Pages 84 Price Free

Publisher National Electric Products Corp.

Addresses Pittsburg, Pa.

TEXT:

Comprehensive..... Abbreviated 3 Elementary..... Advanced 3

General..... Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility..... 3 Illustrations 3

Quality of Material..... 3 Binding Paper - 1.

Remarks:

ANNOTATED BIBLIOGRAPHY Unit Wiring

Author A. I. Nelson & C. H. Dunlap Date 1931

Title Interior Electric Wiring

No. Chapters 12 Pages 253 Price \$2.46

Publisher American Technical Society

Addresses Chicago, Ill.

TEXT:

Comprehensive..... 2 Abbreviated 1 Elementary 1 Advanced 2

General..... 2 Specific 1 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility..... 3 Illustrations 327 - 3

Quality of Material..... 3 Binding Cloth - 3.

Remarks: A very good reference.

ANNOTATED BIBLIOGRAPHY Unit Wiring
 Author A. A. Schuhler Date 1936
 Title Electric Wiring
 No. Chapters 9 Pages 387 Price \$2.50
 Publisher McGraw-Hill Book Company Inc.
 Addresses New York, N.Y.

TEXT:

Comprehensive 3 Abbreviated 1 Elementary 1 Advanced 2
 General 1 Specific 2 Questions: Thought 1 Informative 2

MAKE-UP:

Legibility 3 Illustrations 305 - 2
 Quality of Material 3 Binding Cloth - 2.

Remarks:

ANNOTATED BIBLIOGRAPHY Unit Wiring
 Author Earl Whiteborne, Editor Date Monthly
 Title Electrical Contracting
 No. Chapters 96 Pages 96 Price \$2.00 Pr. Yr.
 Publisher McGraw-Hill Publishing Co., Inc.
 Addresses 99 - 129 North Broadway, Albany, N. Y.

TEXT:

Comprehensive 2 Abbreviated 1 Elementary 1 Advanced 3
 General 2 Specific 1 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 3
 Quality of Material 3 Binding 2

Remarks: A good trade magazine.

BATTERY SERVICING
AND
REPAIRING.

ANNOTATED BIBLIOGRAPHY Unit Battery

Author Form 1296 Date 1929

Title Manual for Exide Batteries

No. Chapters 10 Pages 57 Price Free

Publisher The Electric Storage Battery Co

Addresses Philadelphia, Pa.

TEXT:

Comprehensive Abbreviated 3 Elementary 1 Advanced 2

General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 2 Illustrations 44 - 3

Quality of Material 3 Binding Paper - 1

Remarks: A very good reference.

ANNOTATED BIBLIOGRAPHY Unit Battery

Author Form 2480 Date 1937

Title Fundamentals of a Storage Battery

No. Chapters Pages 12 Price Free

Publisher The Electric Storage Battery Co.

Addresses Philadelphia, Pa.

TEXT:

Comprehensive Abbreviated 3 Elementary 3 Advanced

General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 9 - 3

Quality of Material 3 Binding Paper - 1

Remarks:

ANNOTATED BIBLIOGRAPHY Unit Battery

Author Form 1369 Date 1937

Title Installing and Operating Exide Batteries

No. Chapters Pages 15 Price Free

Publisher The Electric Storage Battery Co.

Addresses Philadelphia, Pa.

TEXT:

Comprehensive Abbreviated 3 Elementary 3 Advanced

General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 5 - 3

Quality of Material 3 Binding Paper 1

Remarks:

ANNOTATED BIBLIOGRAPHY Unit Battery

Author O. A. Witte Date 1926

Title The Automobile Storage Battery

No. Chapters 17 Pages 523 Price

Publisher Amu Engineering Institute Inc.

Addresses Chicago, Ill.

TEXT:

Comprehensive 3 Abbreviated Elementary 1 Advanced 2

General 1 Specific 2 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 323 - 3

Quality of Material 3 Binding Cloth - 3

Remarks:

RADIO WORK.

ANNOTATED BIBLIOGRAPHY Unit Radio
 Author Headquarters Staff Date 1939
 Title The Radio Amateur's Handbook
 No. Chapters 20 Pages 560 Price \$1.00
 Publisher American Radio Relay League Inc.
 Addresses West Hartford, Connecticut.
 TEXT:
 Comprehensive 3 Abbreviated 1 Elementary 1 Advanced 2
 General 2 Specific 1 Questions: Thought 0 Informative 0
 MAKE-UP:
 Legibility 2 Illustrations 1629 - 3
 Quality of Material 3 Binding Paper - 1
 Remarks:

ANNOTATED BIBLIOGRAPHY Unit Radio
 Author Kenneth B. Warner, Editor Date Monthly
 Title Q. S. T.
 No. Chapters 125 Pages 125 Price \$2.50
 Publisher American Radio Relay League
 Addresses West Hartford, Connecticut.
 TEXT:
 Comprehensive 2 Abbreviated 1 Elementary 1 Advanced 2
 General 3 Specific 3 Questions: Thought 0 Informative 0
 MAKE-UP:
 Legibility 2 Illustrations 2
 Quality of Material 3 Binding Paper - 1.
 Remarks: Of value to amateurs.

ANNOTATED BIBLIOGRAPHY Unit Radio
 Author F. Barrows Colton Date 1937
 Title The Miracle of Talking by Telephone.
 No. Chapters Pages 38 Price Free
 Publisher American Telephone & Telegram Co.
 Addresses Order through your local company.

TEXT:

Comprehensive Abbreviated 3 Elementary 2 Advanced 1
 General 3 Specific Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 2 Illustrations 40 - 3
 Quality of Material 3 Binding Paper - 1

Remarks: Other Pamphlets "The Telephone in America" and
 "The Magic of Communication."

ANNOTATED BIBLIOGRAPHY Unit Radio
 Author B. G. Davis Editor Date Monthly
 Title Radio News.
 No. Chapters Pages 66 Price \$2.50 per.yr.
 Publisher Ziff-Davis Company
 Addresses 608 S. Dearborn, Chicago, Illinois.

TEXT:

Comprehensive 3 Abbreviated Elementary 1 Advanced 2
 General 2 Specific 1 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 3
 Quality of Material 3 Binding Paper - 1

Remarks: An all round Radio Magazine.

ANNOTATED BIBLIOGRAPHY Unit Radio
 Author Clifford E. Denton Date 1934
 Title Short Wave Radio Handbook.
 No. Chapters 4 Pages 127 Price \$1.00
 Publisher Radio & Technical Publishing Co.
 Addresses 45 Astor Place, New York City, N. Y.
 TEXT:
 Comprehensive..... Abbreviated 3 Elementary 2 Advanced 1
 General..... Specific 3 Questions: Thought 0 Informative 0
 MAKE-UP:
 Legibility 2 Illustrations 114 - 2
 Quality of Material 2 Binding Paper - 2
 Remarks:

ANNOTATED BIBLIOGRAPHY Unit Radio
 Author Alfred A. Ghirardi Date 1936
 Title Modern Radio Servicing
 No. Chapters 32 Pages 1302 Price \$4.00
 Publisher Radio And Technical Publishing Co.
 Addresses 45 Aster Place, New York City, N. Y.
 TEXT:
 Comprehensive..... 3 Abbreviated..... Elementary..... Advanced 3
 General..... Specific 3 Questions: Thought 0 Informative 0
 MAKE-UP:
 Legibility 3 Illustrations 2
 Quality of Material 3 Binding Cloth - 2.
 Remarks:

ANNOTATED BIBLIOGRAPHY Unit Radio
 Author Alfred A. Ghirardi Date 1939
 Title Radio Trouble Stoorer's Handbook
 No. Chapters 52 Pages 518 Price \$3.00
 Publisher Radio and Technical Publishing Co.
 Addresses 45 Aster Place, New York City, N. Y.

TEXT:

Comprehensive 3 Abbreviated Elementary Advanced 3
 General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 0
 Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit Radio
 Author Alfred A. Ghirardi Date 1931
 Title Radio Physics Course
 No. Chapters 36 Pages 954 Price \$4.00
 Publisher Radio Technical Publishing Co.
 Addresses 22 West 21st. Street, New York City, N. Y.

TEXT:

Comprehensive 3 Abbreviated Elementary Advanced 3
 General 3 Specific Questions: Thought 1 Informative 2

MAKE-UP:

Legibility 2 Illustrations 502 - 2
 Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY

Unit RadioAuthor A. A. Ghirardi & B. M. Freed Date 1932Title Radio Servicing CourseNo. Chapters 9 Pages 182 Price \$1.50Publisher Radio Technical Publishing Co.Addresses 22 West 21st. Street, New York City, N. Y.

TEXT:

Comprehensive 1 Abbreviated 2 Elementary 1 Advanced 2General Specific 3 Questions: Thought 2 Informative 1

MAKE-UP:

Legibility 2 Illustrations 108 - 2Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY

Unit RadioAuthor Haan - Tate - Hayward. Date 1937Title Radio Practice.No. Chapters 6 Pages 176 Price \$1.50Publisher American Technical SocietyAddresses Chicago, Illinois.

TEXT:

Comprehensive 1 Abbreviated 2 Elementary 1 Advanced 2General 1 Specific 2 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 165 - 2Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY

Unit RadioAuthor Kenneth A. HathawayDate 1929Title A. C. Radio GuideNo. Chapters 8 Pages 297 Price \$1.50Publisher American Technical SocietyAddresses Chicago, Illinois.

TEXT:

Comprehensive..... Abbreviated 3 Elementary 1 Advanced 2General 1 Specific 2 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 67 - 2Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY

Unit RadioAuthor Charles R. Leutz.Date 1928Title Modern Radio ReceptionNo. Chapters 5 Pages 333 Price \$3.00Publisher C. R. Leutz Inc.Addresses New York City, N. Y.

TEXT:

Comprehensive 3 Abbreviated..... Elementary 1 Advanced 2General 3 Specific..... Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 160 - 2Quality of Material 3 Binding Cloth - 3Remarks: old.

ANNOTATED BIBLIOGRAPHY Unit Radio
 Author H. P. Manly Date 1938
 Title Radio and Electronic Dictionary
 No. Chapters 26 Pages _____ Price \$2.50
 Publisher Frederick J. Drake & Co.
 Addresses Chicago, Illinois.

TEXT:

Comprehensive 3 Abbreviated _____ Elementary 1 Advanced 2
 General _____ Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 2

Quality of Material 3 Binding Cloth - 3

Remarks: A very good reference for meanings of radio terms.

ANNOTATED BIBLIOGRAPHY Unit Radio
 Author J. A. Moyer & J. F. Wostrel Date 1933
 Title Radio Construction and Repairing.
 No. Chapters 19 Pages 444 Price \$2.50
 Publisher McGraw-Hill Book Company
 Addresses New York, N. Y.

TEXT:

Comprehensive 3 Abbreviated _____ Elementary 1 Advanced 2
 General 2 Specific 1 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 179 - 2

Quality of Material 3 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY Unit Radio
 Author Ohmite Mfg. Co. Date 1938
 Title Ohmite Amateur Handbook
 No. Chapters Pages 35 Price 10¢
 Publisher Ohmite Manufacturing Co.
 Addresses 4835 Tournoy St. Chicago, Ill.

TEXT:

Comprehensive Abbreviated 3 Elementary 1 Advanced 2
 General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 2 Illustrations 20 - 3.
 Quality of Material 3 Binding Paper - 1.

Remarks: Also, Ohmite Catalog.

ANNOTATED BIBLIOGRAPHY Unit Radio
 Author R. R. Ramsey Date 1929
 Title Experimental Radio
 No. Chapters 128 Pages 255 Price \$2.75
 Publisher R. R. Ramsey
 Addresses Bloomington, Indiana.

TEXT:

Comprehensive Abbreviated 3 Elementary 1 Advanced 2
 General Specific 3 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 3 Illustrations 153 - 1
 Quality of Material 2 Binding Cloth - 2

Remarks:

ANNOTATED BIBLIOGRAPHY

Unit RadioAuthor J. F. Rider Date 1932Title Servicing Receivers by Means of Resistance MeasurementsNo. Chapters 10 Pages 203 Price \$.95Publisher John F. RiderAddresses 1440 Broadway, New York City, N. Y.

TEXT:

Comprehensive 2 Abbreviated 1 Elementary Advanced 3General 1 Specific 2 Questions: Thought 0 Informative 0

MAKE-UP:

Legibility 2 Illustrations 94 - 1Quality of Material 2 Binding Cloth - 3

Remarks:

ANNOTATED BIBLIOGRAPHY

Unit Author Date Title No. Chapters Pages Price Publisher Addresses

TEXT:

Comprehensive Abbreviated Elementary Advanced General Specific Questions: Thought Informative

MAKE-UP:

Legibility Illustrations Quality of Material Binding

Remarks:

CHAPTER V.

CONCLUSION .

The diversified occupations program sets up a relationship between employer, trainee and coordinator, better expressed by the terms, job, boy and teacher, that is basic in the education of the boy. He is helping produce, give service and express himself in a worth while occupation. He has a need for further knowledge now. He is not attempting to learn something that he may need in the distant future. The boy has the guidance of both the practical business man and the mere visionary teacher.

In preparing this work the writer has found that most business men readily agree that the program is worth while and they are willing to help. This work is new to them and it takes many visits and several periods of waiting before you can secure the cooperation of the employer in preparing the schedule of processes. After some of the most disappointing beginnings the writer was able to secure some of the best material in this thesis. Greater progress can be made when the employer can be met by the coordinator at a place or time business responsibilities do not interrupt. When this cannot be done, several short visits at the employer's less busy time usually will give the coordinator sufficient information for making the schedules. A very brief outline of the business prepared by the coordinator before the conference is a big help in preparing the schedule.

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companies. When writing for free material the writer has received a much better response from letters with an explanation of the use to be made of the material requested and as accurate a statement as possible of the name, form number and date of the material.

There are great opportunities ahead for the coordinator and much work to be done in the preparation of valid, helpful student instructional aids.

Typed By:

Mrs. Edward M. Barnes.