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ABSTRACT

Several intermediate performance objectives and corresponding criterion measures are listed for each of eight terminal objectives for a basic welding course. The materials were developed for a 36-week (2 hours daily) course developed to teach the fundamentals of welding shop work, to become familiar with the operation of the welding shop equipment, to become familiar with those basic skills and trade technology required by the welder in doing welding work, and to diagnose and solve technical problems as expected of an apprentice welder. Titles of the eight terminal objectives sections are Orientation; Safety; Math Review; Hand Tools; Measurements; Flame Cutting and Gas Welding Terms; Oxyacetylene Equipment, Maintenance, and Adjustments; and Gas Welding, Flame Cutting, and Torch Brazing. (This manual and 54 others were developed for various secondary level vocational courses using the System Approach for Education (SAFE) guidelines.) (HD)

WELDING

BASIC COURSE

PERFORMANCE OBJECTIVES

CAREER EDUCATION

DR. JOHN T. GUNNING

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Duval County Public Schools

July, 1973

A C K N O W L E D G E M E N T S

This manual was developed using System Approach For Education (SAFE) Guidelines.

Appreciation and recognition are extended to the following educator who has assisted in the preparation of this manual:

Mr. Art Hilton, Coordinator
School Industry Education

and to the writer of this manual:

Mr. Kenneth Vincent, Instructor

cover design & printing by:

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WELDING - BASIC

Accreditation No. 9943

Length of course: 36 hours

Time Block: 2 hours daily

COURSE DESCRIPTION

This course has been developed to teach the fundamentals of Welding Shop Work, to become familiar with the operation of the welding shop equipment, to become familiar with those basic skills and trade technology required by the welder in doing welding work, to diagnose and solve technical problems as expected of an Apprentice Welder. First year students will qualify in the following:

a. Orientation
b. General Safety
c. Mathematics
d. Hand Tools
e. Measurements
f. Gas Welding Terminology
g. Oxyacetylene Equipment
h. Gas Welding and Cutting Operations

WELDING - BASIC

9943

SYLLABUS OF TERMINAL PERFORMANCE OBJECTIVES

0.0

CURRICULUM OBJECTIVE

To design, develop, and implement a learner oriented course in the field of welding for senior high school students in the Duval County School System. Obtainment of this objective will be evidenced by the participants ability to:

1. Demonstrate to the instructor 75% of the below required entry level job requirement skills.
2. Assemble, adjust, and properly operate both manual and automatic gas cutting equipment and given an oral explanation on the principles involved with 100% accuracy.
3. Assemble, adjust, select materials, and properly operate gas welding equipment and weld specified steel joints (all positions).
4. Assemble, adjust, select materials, and properly operate (T.I.G.) welding equipment welding aluminum and stainless steel in the flat position.
5. Assemble, adjust, select materials, and properly operate (M.I.G) welding equipment and weld specified steel joints (all positions).

Student prerequisites are: Must be physically fit and cannot have a physical handicap of the type that would restrict the student from performing job duties, must have normal vision, student attain at least 40% in reading and math on the Florida State-Wide 9th grade test.

The above prerequisites are not written to exclude students from this program, however, students not possessing these prerequisites will not be considered in success prediction for this course.

ACCREDITATION NUMBER 9943

COURSE TITLE: WELDING (BASIC)

TERMINAL PERFORMANCE
OBJECTIVE NO. 1.0 ORIENTATION

The student will demonstrate his knowledge of career opportunities in the field of Welding and other related metal trades, industrial activities, and student hand book by passing a written test with 80% proficiency.

No.	Intermediate Performance Objectives	No.	Criterion Measures
1.1	The student will with 80% proficiency pass a written test on career opportunities in the welding shop and related metal trades	1.1	1. What is the average hourly pay scale? 2. Is it necessary to belong to a union? 3. What are the chances for advancement? 4. Name (4) job positions in the welding field. 5. What are the determining factors for advancement?
1.2	The student will with 80% accuracy answer questions about student organizations available to him.	1.2	1. Name one club especially designed for the industrial education student. 2. What does VICA mean? 3. Who can belong to VICA? 4. What benefits are derived from belonging to VICA? 5. How much does it cost to join VICA?
1.3	The student will with 80% proficiency pass a written test on the "student hand book".	1.3	1. How many credits are received for completing this course? 2. Does this school have a dress code, and would this apply in the shop area? 3. What is the designated area for this class during a fire drill? 4. How many hours are needed before a student can work on the S.I.E. program? 5. Name at least (2) reasons that a student could fail this course?

ACCREDITATION NUMBER 9943

COURSE TITLE: WELDING (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

ORIENTATION

No.	Intermediate Performance Objectives	No.	Criterion Measures
1.4	Given a list of job titles the student will select with 80% accuracy those titles related to the Welding Trade.	1.4	Circle those trades related to the Welding Trade: 1. Pipefitter 2. Shipfitter 3. Ironworker 4. Sheetmetal 5. Dispatcher 6. Partsman 7. Foreman
1.5	The student will with 100% accuracy answer questions about the apprenticeship program.	1.5	1. How old must you be to apply? 2. How long is the program? 3. What are the beginning wages per hour?
1.6	The student will with 100% accuracy identify positions of management in the school shop.	1.6	1. What are the duties of the shop foreman? 2. What are the duties of the safety foreman? 3. What are the duties of the tool-room foreman?

COURSE TITLE: WELDING (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SAFETY (GENERAL)

After a series of lectures and demonstrations on safety practices, 80% of the students will answer 70% of the questions on a written test.

No.	Intermediate Performance Objectives	No.	Criterion Measures
		2.0	(25) question test attached.
2.1	Given problems in good housekeeping procedures, students will orally solve 80% of the questions.	2.1	Explain, and demonstrate when necessary the safe housekeeping procedures in the following situations: 1. pieces of metal on the floor 2. grease and/or oil on the floor 3. chips and metal shavings on machinery 4. oily rags on floor and/or machinery
2.2	Student will demonstrate the correct way to lift heavy objects with 100% accuracy.	2.2	Demonstrate the correct position for lifting with: 1. knees and legs 2. hands 3. back
2.3	The student will write at least 5 safety hazards that are peculiar to the welding trade with 100% accuracy.	2.3	Identify 5 safety regulations. Example: fighting, pushing, shoving others, throwing anything to or at another person, etc.

1. The safe way for lifting a heavy object is to keep your back straight and use your legs to do the lifting. T or F

2. Which of the following best describes good housekeeping in the welding shop.
   a) A place for everything and everything in it's place.
   b) Cleanliness and neatness.
   c) Disposal cans to receive waste.
   d) All of these.

3. Why is it dangerous to leave pieces of metal on the floor?

4. Oil or grease that drips on the floor is a safety hazard because a person might slip and fall causing injury. T or F

5. How should metal chips and shavings be removed from the drill press?
   a) With compressed air.
   b) With the fingers.
   c) With a brush and pickup.
   d) None of these.

6. What must be done with oily rags?
   a) Throw them in the trash can.
   b) Throw them in a corner.
   c) Put them in a special metal container.
   d) None of these.

7. Can lifting a long heavy piece of steel angle cause an accident?

8. A person should never run his fingers along the edge of any metal. T or F

9. Never allow another person to start any shop machinery for you. T or F

10. All tools and other objects should be kept away from the moving parts of ALL shop machinery. T or F

11. Hard toe shoes contribute to personal safety in the welding shop. T or F

12. (yes) or (no) Can long apron tie-strings create safety hazards?

SAFETY CON'T.

13. Watches and rings should be removed before starting to work because:
    a) They may become damaged if worn on the job.
    b) Wearing a watch tends to make a man a clock watcher.
    c) Watches and rings can become caught on moving parts of the machine causing injury to the operator.
    d) All of these.

14. The workman should be very careful when using a hammer that is chipped. T. or F.

15. Never use a hammer that has a loose or split handle. T. or F.

16. Before using a hammer, the workman should make sure:
    a) The wedge is in place.
    b) There is no oil, grease and dirt on the face and handle.
    c) He has the right size hammer for the job.
    d) None of these.
    e) All of these.

17. In using a chisel and hammer, keep the chisel head free from burring by grinding it if necessary. T. or F.

18. Where possible avoid using adjustable wrenches on machinery..Why?
    a) Adjustable wrenches are expensive.
    b) Adjustable wrenches are frequently lost.
    c) Because adjustable wrenches are not designed to withstand excessive pressure when in use.
    d) None of these.

19. A hacksaw blade should be mounted with the teeth pointed away from the handle and toward the front on the frame. T. or F.

20. What is the most common cause of accidents while using the drill press?
    a) Drilling too vast.
    b) Drilling too slow.
    c) Not having the work securely fastened.
    d) None of these.

21. What kind of safety equipment should always be worn while grinding metal?
    a) Hat.
    b) High top shoes.
    c) Safety shield.
    d) Long sleeve shirt.

SAFETY CON'T.

22. What kind of fire-fighting agent is used to fight a class "A" fire?
    a) CO^2
    b) Water
    c) Foam
    d) None of these.

23. What kind of firefighting equipment is used to fight a class "B: fire?
    a) CO^2
    b) Water
    c) Foam
    d) None of these

24. What kind of firefighting equipment is used to fight a class "C" fire?
    a) CO^2
    b) Water
    c) Foam
    d) None of these.

25. A person should never throw tools or other objects to another person while working in the shop. T. or F.

ANSWER SHEET ON SAFETY

1. True
2. All of these.
3. A workman may step on a piece, slip and fall causing a serious injury.
4. True
5. With a brush and pickup (c)
6. Put them into a special container. (c)
7. True
8. True
9. True
10. True
11. True
12. Yes
13. Watches and rings can become caught on moving parts of the machine causing injury to the operator. (c)
14. True
15. True
16. All of these (e)
17. True
18. Because adjustable wrenches are not designed to withstand excessive pressure when in use. (c)
19. True
20. Not having work securely fastened. (c)
21. Safety shield (c)
22. Water (b)
23. Foam (c)
24. CO^2 (a)
25. True

ACCREDITATION NUMBER 9943

COURSE TITLE: WELDING (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

MATH REVIEW

Upon completion of the unit on basic math the student will with at least 75% accuracy pass a teacher-made test.

No.	Intermediate Performance Objectives	No.	Criterion Measures
		3.0	Teacher-made test attached.
3.1	Given problems involving the four fundamental operations in math, the student will solve 75% correctly.	3.1	Multiply: 432 by 103 Add: 899 to 6,173 Subtract: 785 from 1,233 Divide: 10,766 by 16
3.2	Given (5) problems involving decimals, the student will solve 80% correctly	3.2	Add .031 to 1.3 Subtract 2.061 from 2.8 Multiply: 1.08 by .02 Divide: 2.36 by .2 Divide: 134.4 by .2
3.3	Given (5) problems involving fractions, the student will solve 80% correctly.	3.3	Add: $\frac{1}{2}$ to $\frac{1}{2}$ Subtract: $\frac{1}{4}$ from $\frac{1}{2}$ Multiply: $\frac{1}{2}$ times $\frac{1}{2}$ Divide: $\frac{1}{4}$ into $\frac{1}{2}$ Divide: $\frac{1}{2}$ into $\frac{1}{2}$
3.4	Given (5) problems involving whole numbers and fractions, the student will solve 80% correctly.	3.4	Add: $1\frac{1}{2}$ to $1\frac{1}{2}$ Subtract: $1\frac{1}{4}$ from $1\frac{1}{2}$ Multiply: $2\frac{1}{2}$ by 2 Divide: $1\frac{1}{2}$ into $1\frac{1}{2}$ Divide: $2\frac{1}{4}$ by 4

MATH REVIEW TEST

1. $\begin{array}{r} 375 \\ +142 \\ \hline \end{array}$

2. $\begin{array}{r} 209 \\ +199 \\ \hline \end{array}$

3. $\begin{array}{r} 158 \\ +\ 62 \\ \hline \end{array}$

4. $\begin{array}{r} 1425 \\ 1766 \\ +1555 \\ \hline \end{array}$

5. $\begin{array}{r} 4978 \\ -3879 \\ \hline \end{array}$

6. $\begin{array}{r} -\ 20098 \\ -\ 19999 \\ \hline \end{array}$

7. $\begin{array}{r} 17665 \\ -16767 \\ \hline \end{array}$

8. $\begin{array}{r} 98776 \\ -89898 \\ \hline \end{array}$

9. $\begin{array}{r} 4988 \\ \times\ 90 \\ \hline \end{array}$

10. $\begin{array}{r} 2333 \\ \times\ 262 \\ \hline \end{array}$

11. $\begin{array}{r} 287 \\ \times 96 \\ \hline \end{array}$

12. $\begin{array}{r} 8991 \\ \times 44 \\ \hline \end{array}$

13. Divide: 25 into 125

14. Divide: 35 into 666

15. Divide: 42 into 888

16. Divide: 68 into 8849

17. $\frac{1}{2} \times \frac{1}{2} =$

18. $\frac{1}{2} \times \frac{1}{4} =$

19. $\frac{1}{4} \times \frac{1}{4} =$

20. $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} =$

21. Divide: 1/8 into 1/4=

22. Divide: 1/4 into 1/2=

23. Divide: 1/2 into 1=

24. Divide: 1/8 into 1/2=

25. $\begin{array}{r} 4\frac{1}{3} \\ +5\frac{1}{3} \\ \hline \end{array}$

26. $\begin{array}{r} 6\frac{1}{4} \\ 7\frac{1}{4} \\ +8\frac{1}{4} \\ \hline \end{array}$

27. $\begin{array}{r} 9\frac{1}{4} \\ 9\frac{1}{2} \\ +5\frac{1}{4} \\ \hline \end{array}$

28. $\begin{array}{r} 10\frac{1}{4} \\ 12\frac{1}{4} \\ +29\frac{1}{2} \\ \hline \end{array}$

29. $\begin{array}{r} 4\frac{1}{2} \\ -2\frac{1}{4} \\ \hline \end{array}$

30. $\begin{array}{r} 8\frac{1}{2} \\ -3\frac{1}{4} \\ \hline \end{array}$

31. $\begin{array}{r} 9\frac{1}{2} \\ -8\frac{1}{4} \\ \hline \end{array}$

32. $\begin{array}{r} 10\frac{1}{2} \\ -2\frac{1}{4} \\ \hline \end{array}$

ACCREDITATION NUMBER 9943

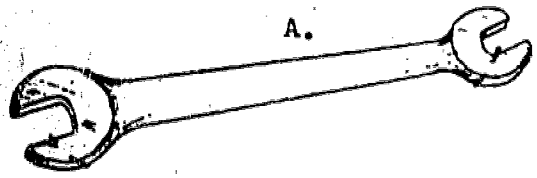
COURSE TITLE: WELDING (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

HAND TOOLS

After completion of instruction on the care and proper use of basic hand tools the student will with 80% accuracy identify (10) selected hand tools and demonstrate their proper use.

No.	Intermediate Performance Objectives	No.	Criterion Measures
		4.0	Identify (10) selected hand tools. (Tool list attached)
4.1	The student will with 100% accuracy name (3) different types of screwdrivers.	4.1	Name (3) different types of screwdrivers.
4.2	The student will with 100% accuracy name the types of hammers used in the welding trade and their uses.	4.2	Name the different types of hammers and select the proper hammer for chipping flux from a weld.
4.3	The student will with 100% accuracy name (3) types of pliers used in the welding trade and their uses.	4.3	Name (3) types of pliers and select the proper pair for clamping metal parts together.
4.4	The student will with 75% accuracy identify (4) types of wrenches and describe their proper usage.	4.4	Identify (4) types of wrenches and describe their proper use.
4.5	The student will with 100% accuracy name (3) different types of saws used in the welding trade.	4.5	Identify the different types of saws used in the welding trade.
4.6	The student will with 100% accuracy identify (3) classes of chisels.	4.6	Identify (3) classes of chisels.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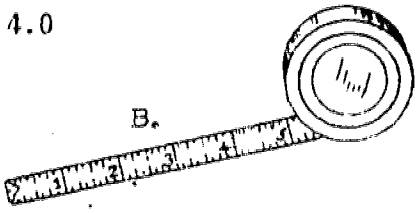
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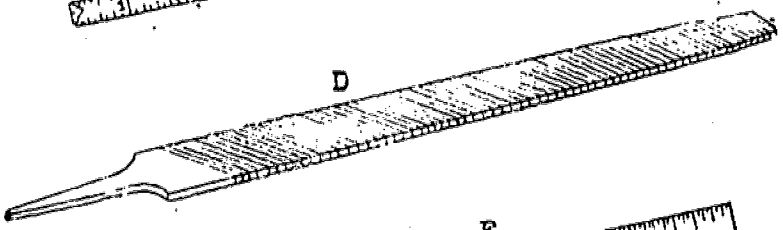
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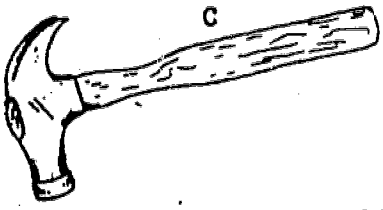
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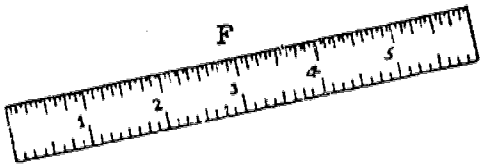
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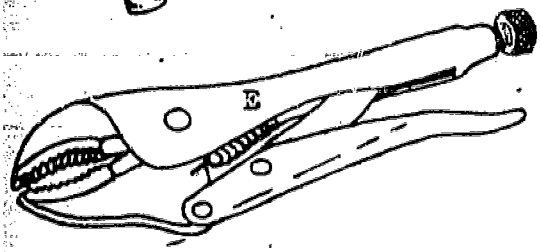
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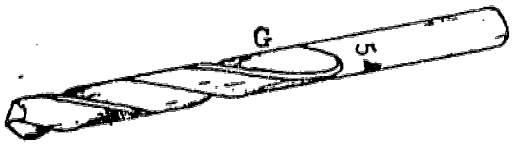
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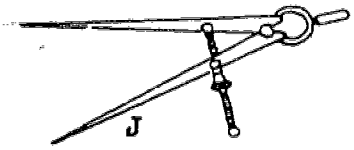
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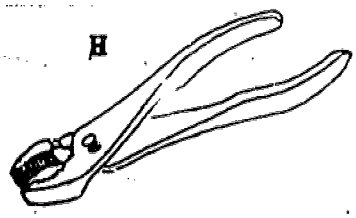
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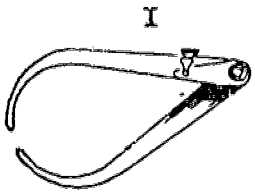
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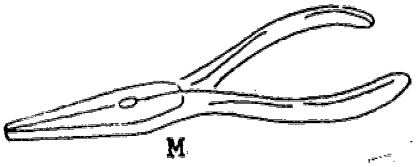
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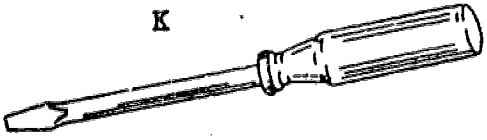
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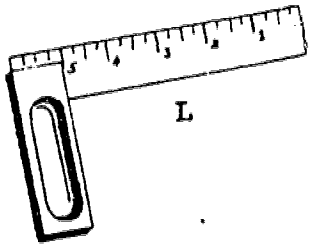
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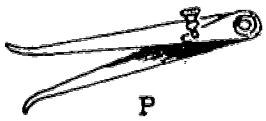
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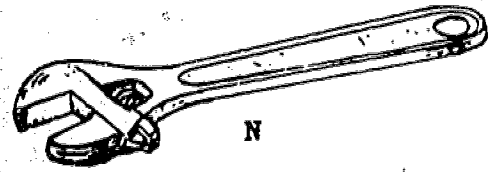
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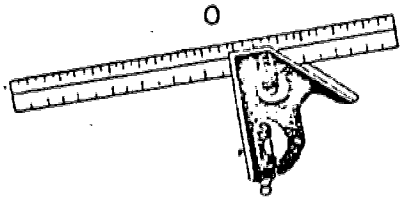
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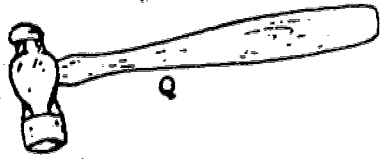
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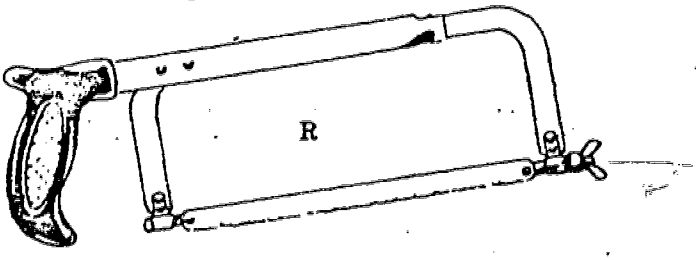
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ACCREDITATION NUMBER 9943

COURSE TITLE: WELDING (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

MEASUREMENTS

After a series of lectures and demonstrations with measuring devices 80% of the students will demonstrate their ability to measure accurately to 100% efficiency.

No.	Intermediate Performance Objectives	No.	Criterion Measures
5.1	Student will demonstrate 100% proficiency in the care and use of various measuring tools.	5.1	Given a combination steel square, explain: 1. care and use 2. how to hold 3. readings on pieces of metal provided by the instructor
5.2	The student will with 100% proficiency demonstrate ability to use the combination steel square with squaring head attachment.	5.2	Given a piece of metal and the combination square, draw four "layouts" accurately.
5.3	The student will demonstrate at 100% accuracy his ability to use the trammel.	5.3	Given a piece of metal and the trammel layout a 10 5/8" circle.
5.4	Student will demonstrate 100% proficiency in the use of a surface gage.	5.4	Mark 4 1/2" holes 2" apart on a piece of metal, using a surface plate and a surface gage.

COURSE TITLE: WELDING (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

FLAME CUTTING AND GAS WELDING TERMS

Upon completion of this unit on "Flame Cutting", and "Gas Welding" terms, the student will demonstrate his knowledge of terms with 75% proficiency.

No.	Intermediate Performance Objectives	No.	Criterion Measures
6.1	Given lectures and demonstrations on flame cutting and gas welding terms, the student will write or orally describe terms with at least 75% accuracy.	6.1	1. Define the term "root pass". 2. Define the term "bead". 3. Define the term "base metal". 4. Define the term "filler rod". 5. Define the term "kerf". 6. Define the term "gouging". 7. Define the term "burning". 8. Define the term "penetration". 9. Define the term "undercut". 10. Define the term "oxidizing".
6.2	Given lectures and demonstrations on special cutting process terms, the student will with 75% proficiency answer a written test on these subjects.	6.2	1. Will metal burn? 2. Is the oxygen lance consumed as it is used for cutting? 3. Are regular cutting torches used in combination with the oxygen lance? 4. Describe powder cutting?

ACCREDITATION NUMBER 9943

COURSE TITLE: WELDING (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

OXYACETYLENE EQUIPMENT, MAINTENANCE AND ADJUSTMENT

Upon completion of a series of lectures and demonstrations on oxyacetylene equipment, encompassing the parts, their functions, manipulation and safety precautions, 80% of the students will be able to demonstrate 70% accuracy on both the written and oral test, and perform with 70% efficiency on a given performance test.

No.	Intermediate Performance Objectives	No.	Criterion Measures
7.1	The basic welding student given an oxyacetylene welding and/or flame cutting outfit, will orally identify at least 90% of the parts on the oxyacetylene equipment.	7.1	Identify 90% of the parts (by oral identification) on an oxyacetylene welding outfit.
7.2	The student will with 100% accuracy orally explain the function of the regulators.	7.2	What is the function of the regulator diaphram, adjusting screw and gauges?
7.3	The student will with 100% accuracy explain the function of the gas cutting torch.	7.3	Define the purpose of the needle valves on the cutting torch.
7.4	The student will with 100% accuracy explain safety features on the oxygen and acetylene cylinders.	7.4	Explain the function of the oxygen and acetylene cylinder safety devices
7.5	The student will with 100% proficiency pass a written test on various welding gases and safety rules required for welding.	7.5	1) What is the temperature produced by an oxyacetylene flame? 2) What kind of welding gas is odorless, tastless, and dangerously explosive? 3) What two agents are required to produce acetylene gas? 4) How many pounds pressure are there in a full bottle of oxygen? 5) How many pounds of pressure are there in a full bottle of acetylene?

ACCREDITATION NUMBER 9943

COURSE TITLE: WELDING (BASIC)

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

OXYACETYLENE EQUIPMENT, MAINTENANCE AND ADJUSTMENT

No.	Intermediate Performance Objectives	No.	Criterion Measures
		7.5	6) What chemical is used in cylinders to keep acetylene gas safe from explosion? 7) What substance is extremely dangerous around oxygen equipment. 8) Acetylene gas should never be used in excess of how many P.S.I.? 9) What kind of eye protection should always be worn when gas welding or flame burning? 10) What is the only substance that should be used when checking for leaks on oxyacetylene equipment?
7.6	Given an oxyacetylene outfit with gas welding and/or flame cutting torch, the student will with 85% accuracy set up and test the equipment.	7.6	Properly and safely set up acetylene equipment.

8.1	Properly assemble the equipment, safely light the torch, and adjust the the flame.
8.2	Properly and safely operate manual flame cutting equipment cutting straight lines through mild steel.
8.3	Properly and safely operate automatic flame cutting equipment cutting straigth lines through mild steel.
8.4	Properly and safely lay beads on flat steel plate without filler rod with gas welding equipment.
8.5	Student will properly and safely lay beads on steel plate with the use of filler rod using gas welding equipment.

ACCREDITATION NUMBER 9943

COURSE TITLE: WELDING (BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

GAS WELDING, FLAME CUTTING AND TORCH BRAZING

Upon completion ofa series of lectures and demonstrations on lighting and operating the oxyacetylene equipment, the student will be able to adjust the equipment, light the torch, adjust the flame, weld sample plates, cut metal with the torch, and observe all safety precautions with 80% accuracy.

No.	Intermediate Performance Objectives	No.	Criterion Measures
8.1	The student will assemble flame cutting equipment, light the torch, and adjust flame with 100% accuracy.	8.1	Student will properly assemble the equipment, safely light the torch, and adjust the flame.
8.2	The student will cut straight lines through mild steel plate using an oxyacetylene flame with 80% proficiency. (manual equipment)	8.2	Student will properly and safely operate manual flame cutting equipment cutting straight lines through mild steel.
8.3	The student will cut straight lines through mild steel plates using an oxyacetylene flame with 80% proficiency. (Automatic equipment)	3	Student will properly and safely operate automatic flame cutting equipment cutting straight lines through mild steel.
8.4	Assigned a gas welding station with all necessary equipment and materials, the student will lay beads on flat plate without filler rod with 80% proficiency.	8.4	Student will properly and safely lay beads on flat steel plate without filler rod.
8.5	Assigned a gas welding station with all necessary equipment and materials, the student will lay beads on flat steel plate using filler rod with 80% proficiency.	8.5	Student will properly and safely lay beads on steel plate with the use of filler rod.

ACCREDITATION NUMBER 7742

COURSE TITLE: Welding - Basic

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

GAS WELDING, FLAME CUTTING AND TORCH BRAZING

No.	Intermediate Performance Objectives	No.	Criterion Measures
8.6	Assigned a gas welding station with all necessary equipment and materials, the student student will weld 'butt' joints in the flat position with 80% proficiency.	8.6	Prepare plates of thin gage mild steel and properly weld 'butt' joints in the flat position. Using gas welding equipment.
8.7	Assigned a gas welding station with all necessary equipment and materials, the student will weld 'lapp' joints in flat position with 80% proficiency.	8.7	Prepare plates of thin gage mild steel and properly weld 'lapp' joints in the flat position. Using gas welding equipment.
8.8	Assigned a gas welding station with all necessary equipment and materials, the student will weld 'tee' joints in the flat position with 80% proficiency.	8.8	Prepare plates of thin gage mild steel and properly weld 'tee' joints in the flat position. Using gas welding equipment.
8.9	Assigned a gas welding station with all necessary equipment and materials, the student will weld 'butt' joints in the vertical position with 80% proficiency.	8.9	Prepare plates of thin gage mild steel and properly weld 'butt' joints in the vertical position. Using gas welding equipment.
8.10	Assigned a gas welding station with all necessary equipment and materials, the student will weld 'lapp' joints in the vertical position with 80% proficiency.	8.10	Prepare plates of thin gage mild steel and properly weld 'lapp' joints in the vertical position. Using gas welding equipment.
8.11	Assigned a gas welding station with all necessary equipment and materials, the student will weld a 'tee' joint in the vertical position with 80% proficiency.	8.11	Prepare plates of thin gage mild steel and properly weld 'tee' joints in the vertical position. Using gas welding equipment.

COURSE TITLE: Welding - Basic

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

GAS WELDING, FLAME CUTTING AND TORCH BRAZING

No.	Intermediate Performance Objectives	No.	Criterion Measures
8.12	Assigned a gas welding station with all necessary equipment and materials, the student will weld a 'butt' joint in the overhead position with 80% proficiency.	8.12	Prepare plates of thin gage mild steel and properly weld 'butt' joints in the overhead position. Using gas welding equipment.
8.13	Assigned a gas welding station with all neceaasry equipment and materials, the student will weld a 'lapp' joint in the overhead position with 80% proficiency.	8.13	Prepare plates of thin gage mild steel and properly weld 'lapp' joints in the overhead position. Using gas welding equipment.
8.14	Assigned a gas welding station with all necessaty equipment and materials, the student will weld a 'tee' joint in the overhead position with 80% proficiency.	8.14	Prepare plates of thin gage mild steel and properly weld 'tee' joints in the overhead position. Using gas welding equipment.
8.15	Assigned a gas welding station with all necessary equipment and materials, the student will demonstrate 80% proficiency torch-brazing a 'lapp' joint in the flat position.	8.15	Prepare plates of thin gage galvanized steel and properly torch-braze 'lapp' joints in the flat position. Using gas welding equipment.
8.16	Assigned a gas welding station with all necessary equipment and materials, the student will demonstrate 80% proficiency torch-brazing a 'tee' joint in the flat position.	8.16	Prepare plates of thin gage galvanized steel and properly torch-braze 'tee' joints in the flat position. Using gas welding equipment.
8.17	Assigned a gas welding station with all necessary equipment and materials, the student will demonstrate 80% proficiency torch-silver-brazing a 'lapp' joint in	8.17	Prepare plates of thin gage stainless steel and properly torch-silver-braze 'lapp' joint in the flat position. Using gas welding equipment.
8.18	Assigned a gas welding station with all necessary equipment and materials, the student will demonstrate 80% proficiency torch-silver-brazing 'tee' joints in the flat position.	8.18	Prepare plates of thin gage stainless steel and properly torch-silver-braze a 'tee' joint in the flat position. Using gas welding equipment