



California Vocational Agriculture Curriculum Guidelines Instructional Unit

SMALL GAS ENGINES: CARBURETION

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SMALL GAS ENGINES: CARBURETION

Unit Goals:

To assist the student in developing their ability to recognize the different types of carburetion systems on small engines and to be able to maintain them.

Unit Performance Objectives:

The student will:

1. Be familiar with terminology used regarding carburetion systems.
2. List the purpose of each component of a fuel system.
3. Identify 3 types of fuel filters.
4. Identify 3 types of air cleaners.
5. Identify parts of the carburetor.

Teaching Outline

- I. Terminology Used in Carburetion and Fuel Systems
 - A. Air cleaner - Filters dust and dirt from the air entering carburetor.
 - B. Air foil - Tube in a stream of air inside the venturi which creates an air pattern with low pressure on one side.
 - C. Atomization - Breaking of a liquid into tiny particles to aid in vapor formation.
 - D. Carburetor - Automatically mixes fuel and air in the proper proportion for a combustible mixture.
 - E. Fuel filter - Prevents dirt or foreign matter from entering carburetor.
 - F. Fuel line - Carries fuel from the fuel tank to carburetor.
 - G. Fuel pump - Pumps fuel from the fuel tank to carburetor.
 - H. Fuel tank - Acts as a reservoir to store fuel for engine use.
 - I. Metering - Correct proportion of fuel and air needed for good combustion.
 - J. Vaporization - Changing a substance into a gaseous state.
 - K. Venturi - Restriction in the carburetor which makes the air speed go up, causing a high vacuum.
- II. Fuel Supplies and Filters - provides a clean supply of fuel to the carburetor.
(TM - 1, 2, 3)
 - A. Sediment bowl
 - B. Screen in fuel tank
 - C. Filter attached to end of hose (in tank)
- III. Air Cleaners - provides a clean air supply to the carburetor. (For every one gallon of fuel used, the engine uses 10,000 gallons of air.)
(TM - 4)
 - A. Dry (paper)
 - B. Oil bath
 - C. Wire mesh
 - D. Polyurethane (foam)
- IV. Carburetion - a carburetor working properly automatically mixes fuel and air in proper proportion for a combustible mixture.
 - A. Function of a carburetor
 - 1. Breakup (atomizes) the fuel into a fine spray and mixes it with air to make a mixture that will burn readily.
 - 2. It regulates the ratio of fuel to air.
 - 3. It regulates the amount of the fuel-air mixture going into a combustion chamber.

Suggested Learning Activities

Suggested Resource Materials

- | | |
|------|---|
| I. | 1. Have engines in shop. Show students different parts relating to carburetion. |
| II. | 2. TM - 1, 2, 3 |
| III. | 3. TM - 4 |

IV. B. Types of Carburetors

1. Float (Flow-Jet) - Fuel tank is located above carburetor in this system (TM - 5) and fuel flows in by gravity.
2. Suction-left (Vacu-jet) - Vacuum from the engine intake stroke (downward motion of the piston on 4-cycle engine, or upward motion of the piston on a 2-cycle engine.) Causes low pressure in the venturi. Atmospheric pressure forces fuel into low pressure area of the venturi and then into the engine.
3. Diaphragm (Pulsa-jet) - This type of carburetor uses a spring loaded diaphragm for regulating fuel into the carburetor fuel chamber. The use of this diaphragm allows engine to be operated at any angle making it adaptable on multi-position engines. It is also used on horizontal and vertical shaft engines.
4. Parts of the carburetor (Float type) (TM - 8):
 - a. Fuel inlet
 - b. Float needle valve
 - c. Float needle
 - d. Float
 - e. Nozzle
 - f. Packing nut
 - g. Needle valve
 - h. Idle valve
 - i. Venturi
 - j. Throttle valve
 - k. Choke valve
5. Adjustment of carburetor
 - a. Start engine and run long enough to warm it to operating temperature.
NOTE: If engine is out of adjustment so that it will not start, close the needle valve by turning it clockwise. Then open needle valve 1 to 1 1/2 turns counterclockwise.
 - b. Move engine control to run engine at normal operating speed.
 - 1) Turn needle valve in clockwise until engine starts to lose speed (lean mixture).
 - 2) Then slowly turn needle valve out counterclockwise past the point of smoothest operation until engine just begins to run unevenly (rich mixture).
 - 3) Turn needle back clockwise to mid-point (smoothest operation) between rich and lean mixture.
 - 4) Final adjustment of the needle valve should be slightly to the rich side (counterclockwise) of the mid-point.
 - c. Move engine control to SLOW. Turn idle adjusting screw until a fast idle is obtained - (1750 R.P.M.). If the engine idles at a speed lower than 1750 R.P.M., it may not accelerate properly. It is not practical to attempt to obtain acceleration from speeds below 1750 R.P.M., since the richer mixture which would be required, would be too rich for normal operating speeds.
 - d. To check adjustment move engine control from SLOW to FAST speed. Engine should accelerate smoothly. If engine tends to stall or die out increase idle speed or re-adjust carburetor, usually to a slightly richer mixture.

Suggested Learning Activities

Suggested Resource Materials

IV.

1. TM - 5, 6, 7
2. TM - 8
3. Have students adjust carburetor's while engine is running.

NOTE: Flooding can occur if the engine is tipped at an angle for a prolonged period of time, if the engine is cranked repeatedly when the spark plug wire is disconnected or if carburetor mixture is adjusted to rich.

In case of flooding, move the governor control to the "Stop" position and pull the starter rope at least six times. (Crank electric starter models for at least 5 seconds).

When the control is placed in the "Stop" position the governor spring holds the throttle in a closed (idle) position. Cranking the engine with a closed throttle creates a higher vacuum which opens the choke rapidly, permitting the engine to clear itself of excess fuel.

Then move the control to "Fast" position and start engine. If engine continues to flood, lean carburetor needle valve - 1/8 to 1/4 turn clockwise.

Suggested Learning Activities

Suggested Resource Materials

Student Evaluation

1. List the terms defined:

- A. _____ Filters dust and dirt from the air entering the carburetor
- B. _____ Breaking of liquid into tiny particles to air vapor formation
- C. _____ Pumps fuel from the fuel tank to carburetor
- D. _____ Correct proportion of fuel and air needed for good combustion
- E. _____ Restriction in the carburetor which makes the air speed up, causing a high vacuum

2. List 3 types of air cleaners.

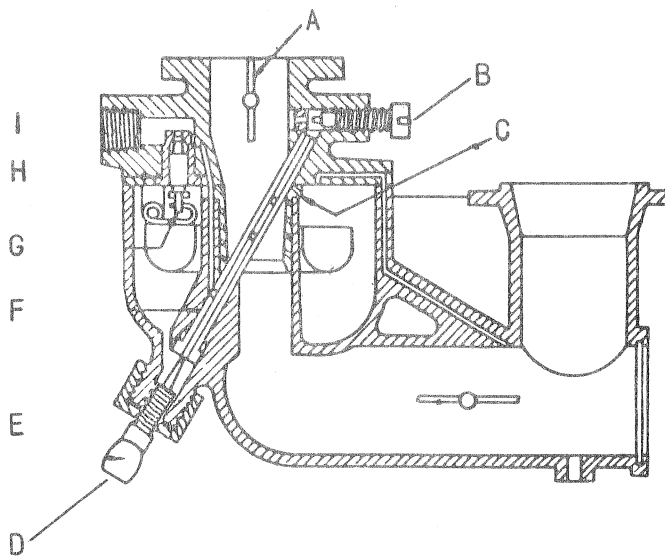
- A. _____
- B. _____
- C. _____

3. List 3 functions of a carburetor.

- A. _____
- B. _____
- C. _____

4. Identify the parts of a carburetor:

PARTS OF A FLOAT CARBURETOR

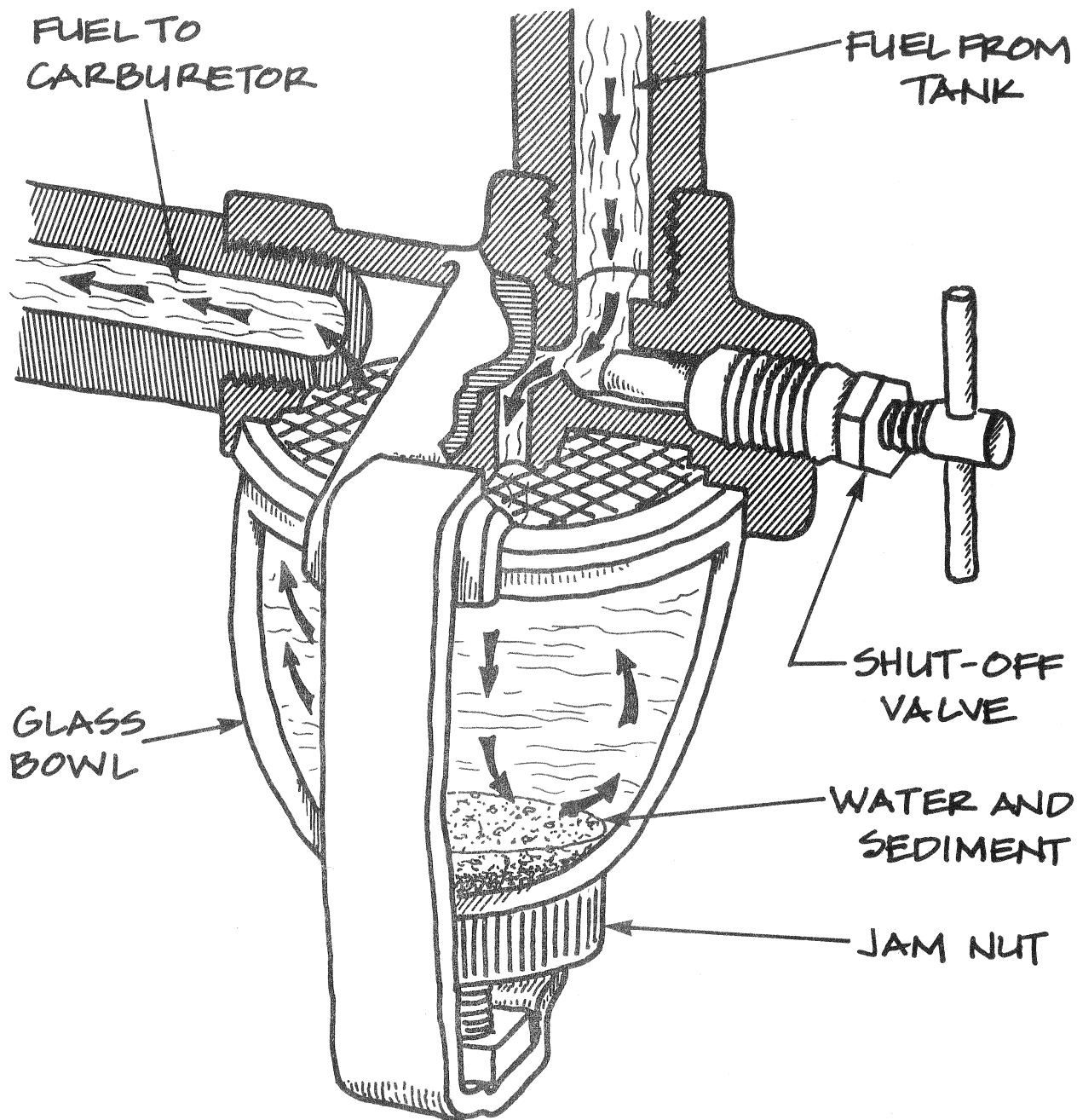


- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____
- G. _____
- H. _____
- I. _____

FUEL FILTER

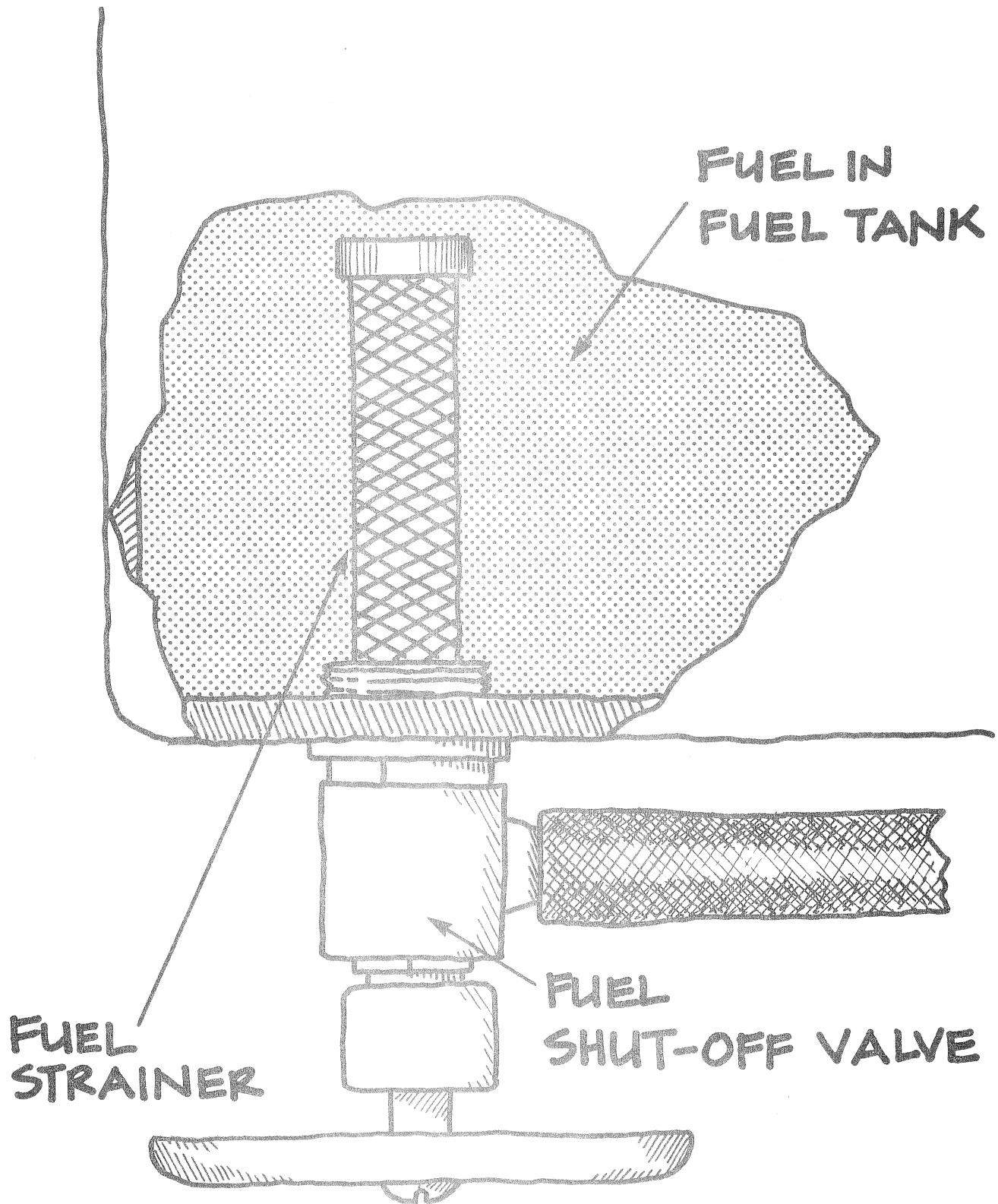
(GLASS SEDIMENT BOWL AND SCREEN)

TM-1



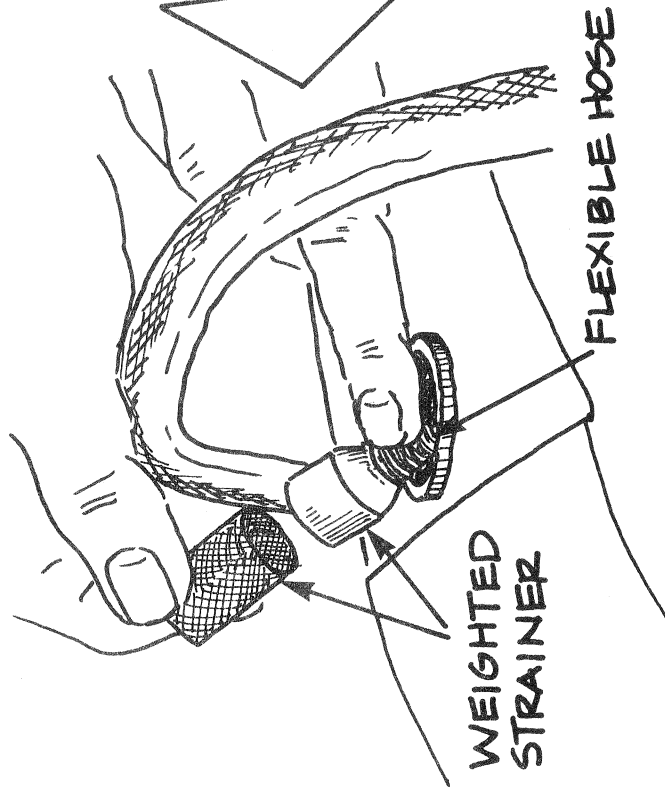
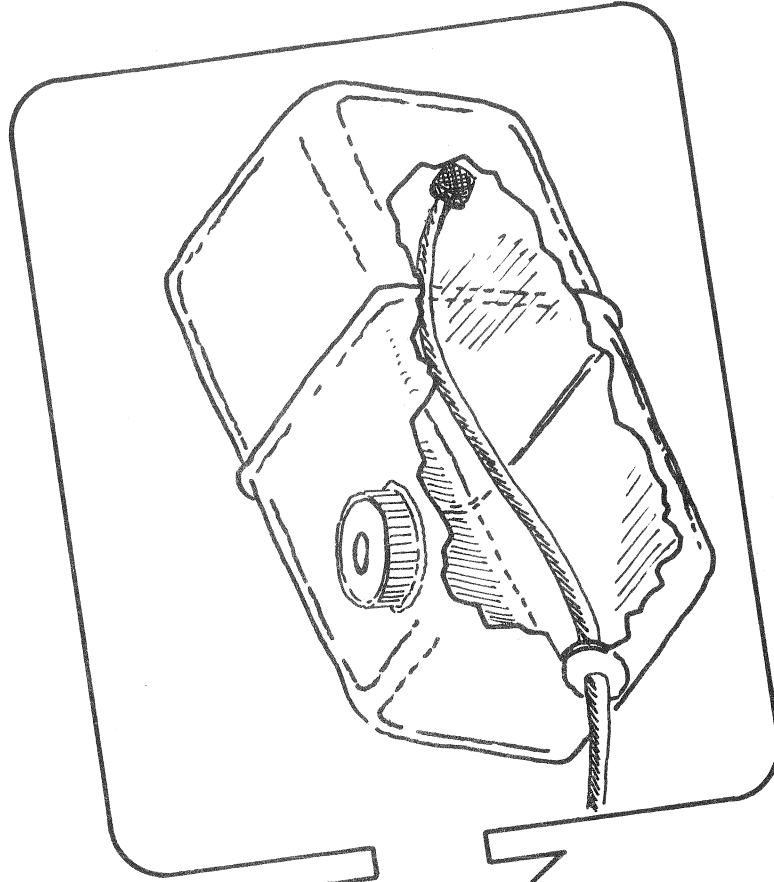
FUEL FILTER (SCREEN IN TANK)

TM-2

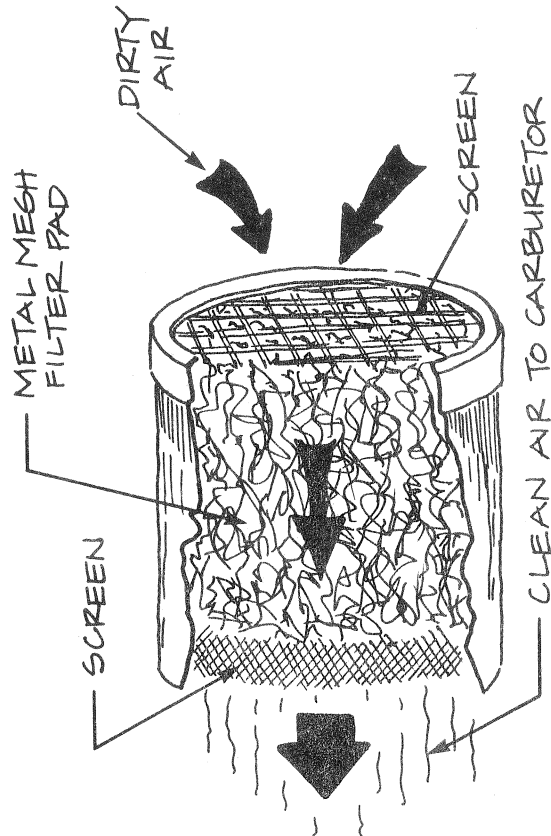


FUEL FILTER

FILTER ATTACHED TO END OF FLEXIBLE FUEL HOSE

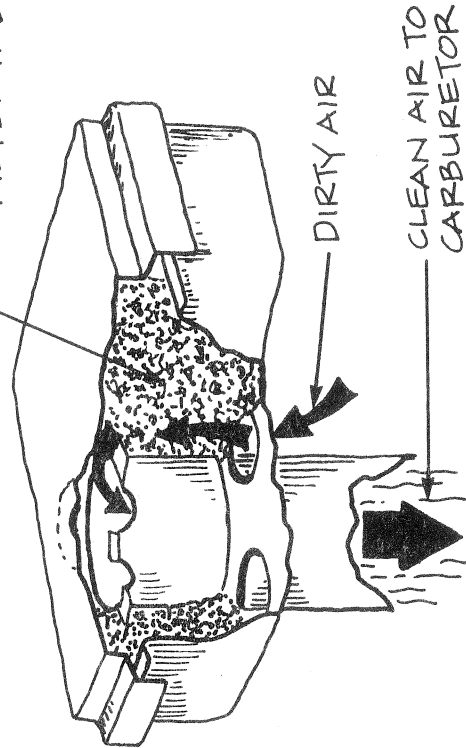


AIR CLEANERS

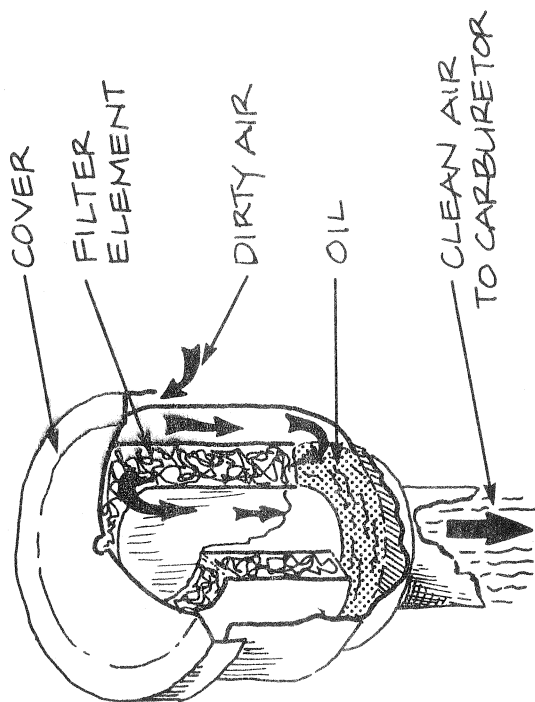


Wire Mesh type

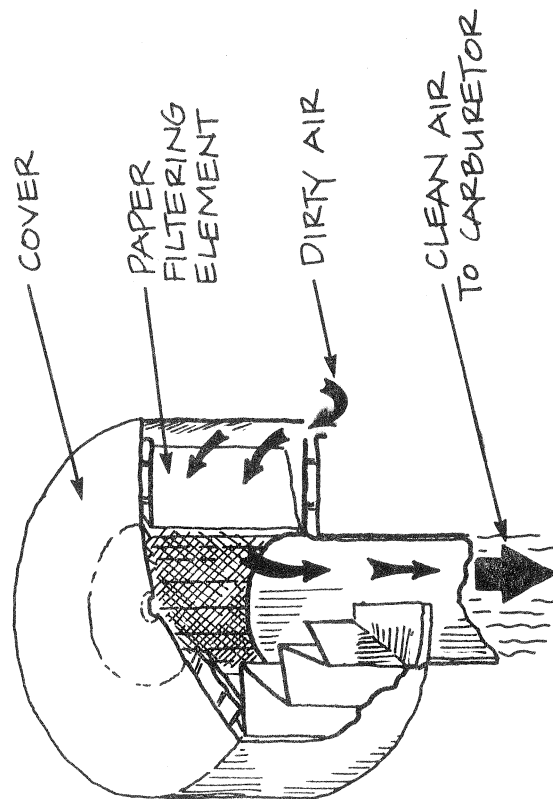
POLYURETHANE
FILTER PAD



Polyurethane type



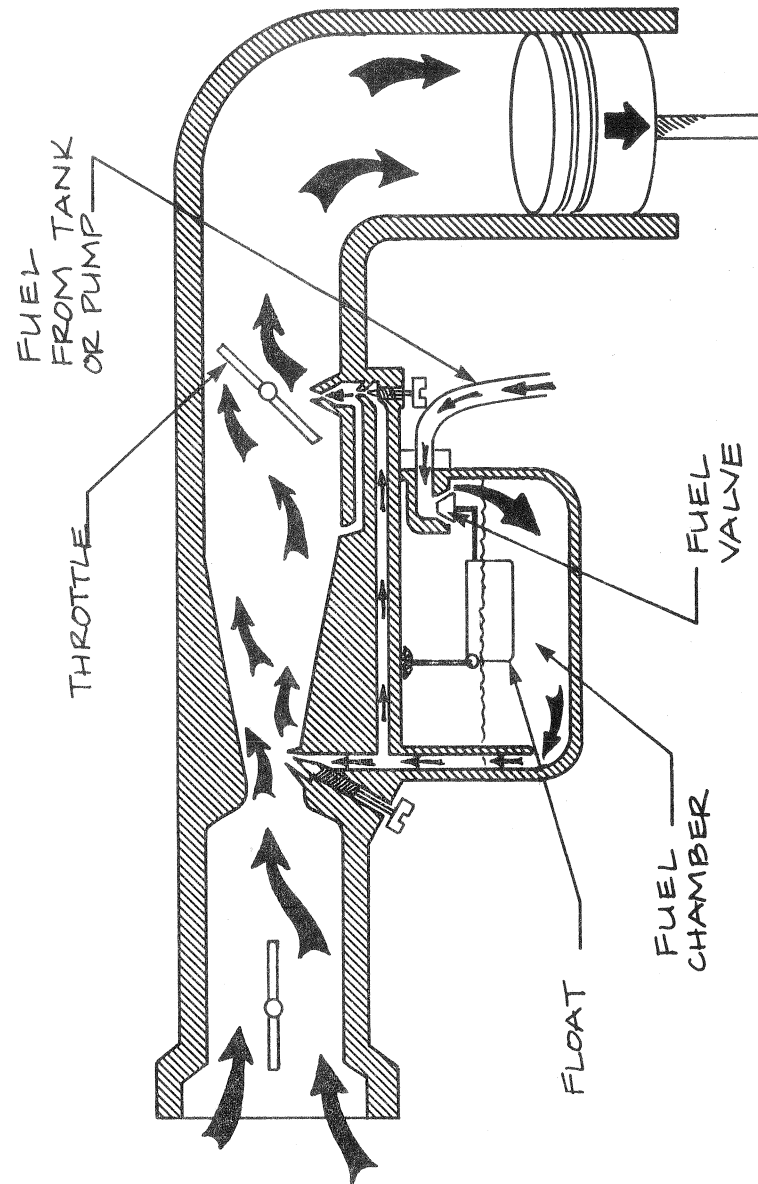
Oil-Bath type



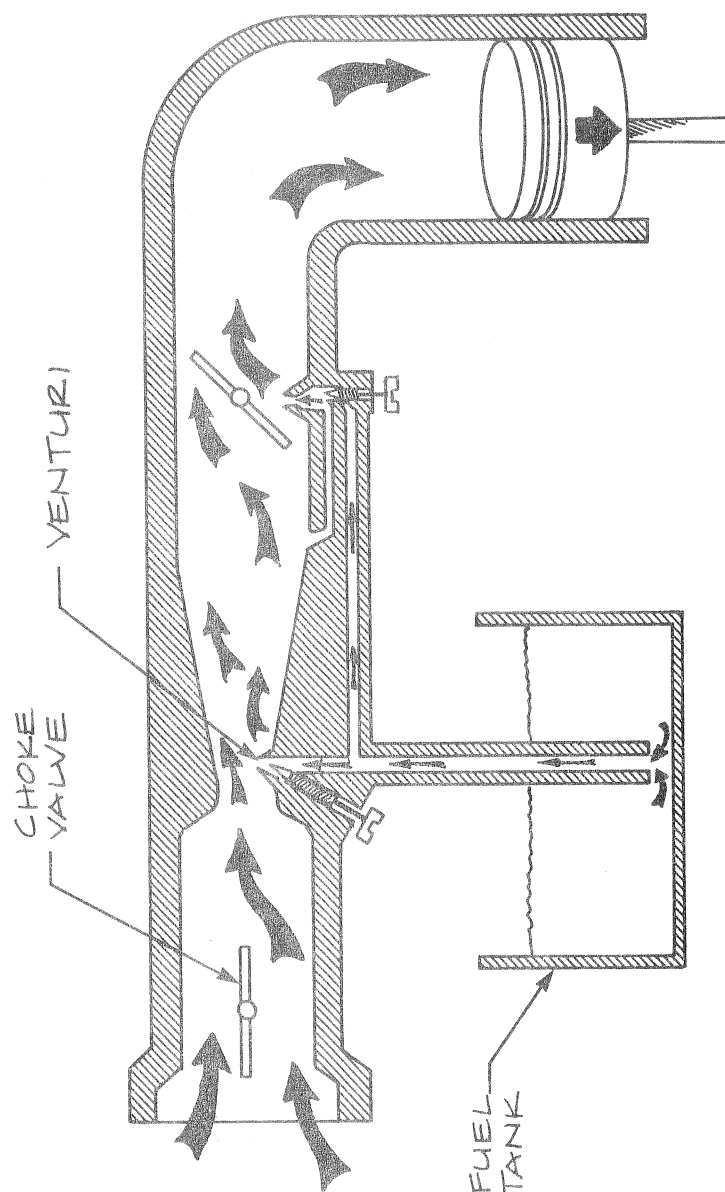
Dry-Filter type

TM-4

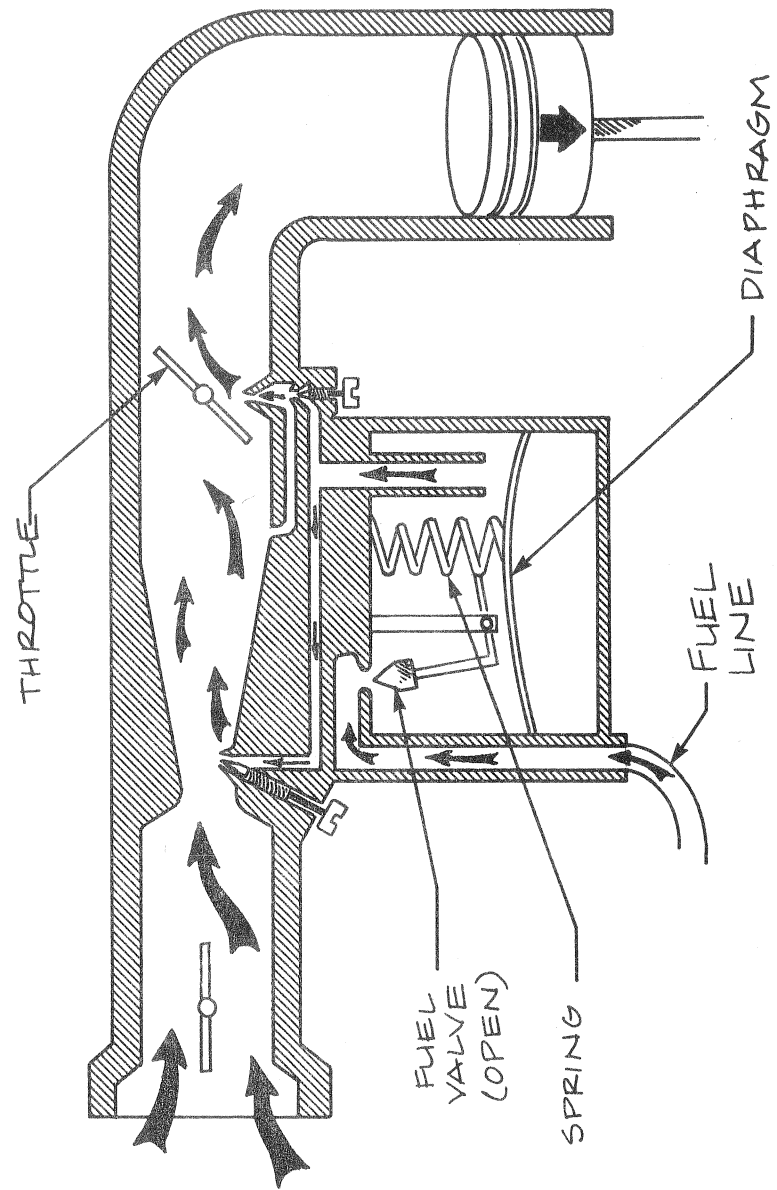
FLOAT TYPE CARBURETOR



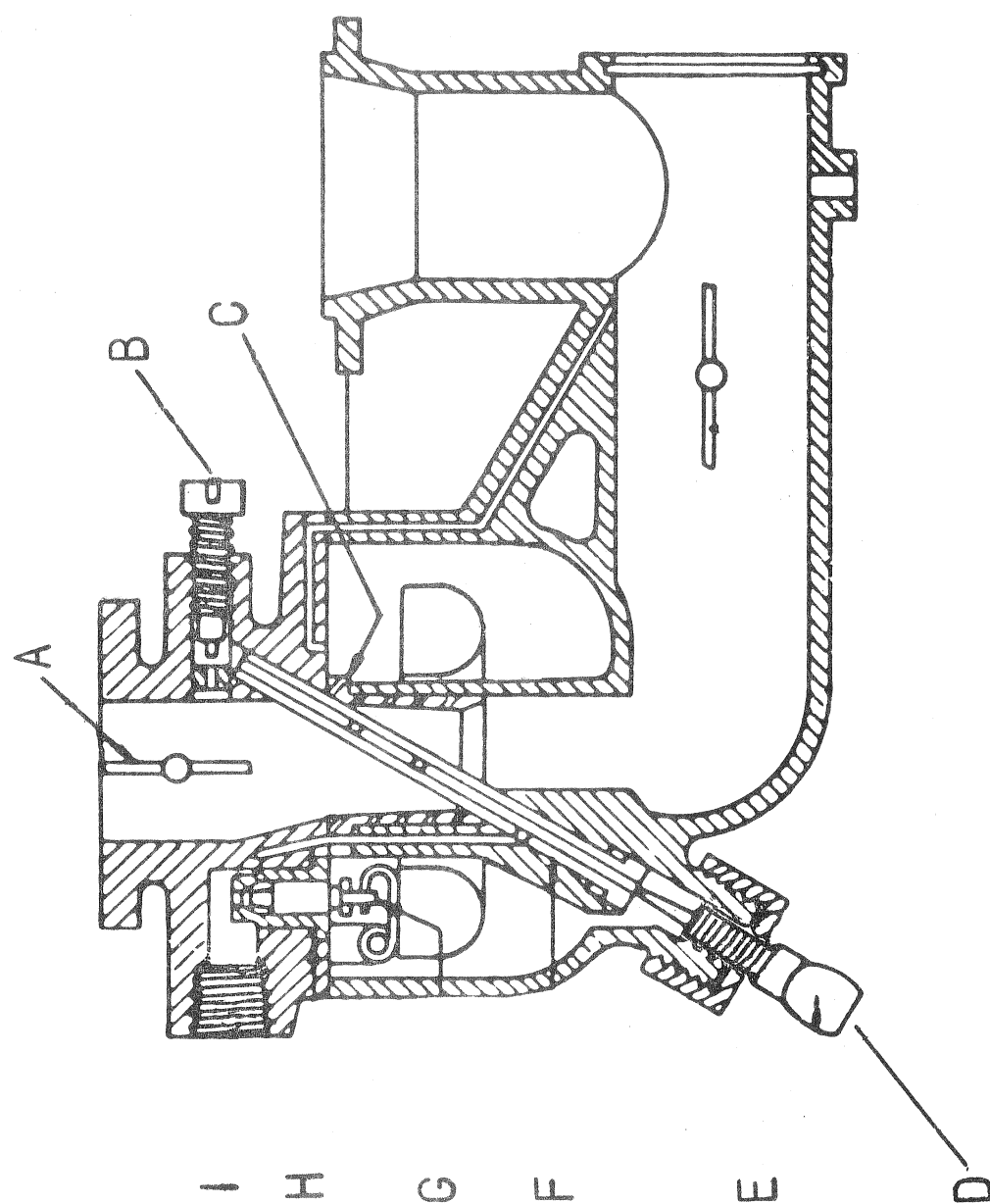
SUCTION LIFT TYPE CARBURETOR



DIAPHRAM TYPE CARBURETOR



PARTS OF A FLOAT CARBURETOR



A. B. C. D. E. F. G. H. I.

I. H. G. F. E. D.

PARTS OF A FLOAT CARBURETOR

TM-8A

- A. Throttle Valve
- B. Idle Valve
- C. Venturi
- D. Needle Valve
- E. Packing Nut
- F. Nozzle
- G. Float Needle
- H. Float Needle Seat
- I. Fuel Inlet

General References

Briggs & Stratton Corp.
Milwaukee, Wisconsin 53201

MAVEC
Mid-America Vocational Curriculum Consortium
1515 West Sixth Avenue
Stillwater, Oklahoma 74074

AAVIM
American Association for Vocational Instructional Materials
Engineering Center
Athens, Georgia 30602

Texas Curriculum Materials
Vocational Instructional Materials
Texas A & M University
College Station, Texas 77843