Dual Fuel Systems For Combination Natural Gas-Gasoline Burning Engines By Engine Model

MODEL	DESCRIPTION	PART NO.
ABD, ABND	Combination gas-gasoline (Obsolete)	LZ26-12
ACND, BKND	Combination gas-gasoline (Obsolete)	LZ51E5 or LZ52C4
AEHD	Natural gas fuel system (Obsolete)	LZ48F3
AEHD	Combination gas-gasoline (Obsolete)	LZ48F3
AEND, AENLD	Natural gas fuel system	LZ48Z1
AEND, AENLD	Combination gas-gasoline	LZ48Z1
AFHD, AGHD	Combination gas-gasoline (Obsolete)	LZ48K4
AFHD, AGHD	Natural gas fuel system (Obsolete)	LZ48K4
AGND	Combination gas-gasoline	LZ64A1
AHHD	Combination gas-gasoline (Obsolete)	LZ48H1
AHHD	Natural gas fuel system (Obsolete)	LZ48H1
AKD, AKND	Combination gas-gasoline (Obsolete)	LZ26A8
S10D, S12D	Natural gas fuel system (Obsolete)	L89S1
TED, TFD, THD	Combination gas-gasoline and natural gas	LZ48C3 (open engine)
TED, TFD, THD	Combination gas-gasoline and natural gas (Obsolete)	LZ48C6 (power unit)
TED, TFD, THD	Natural gas fuel system	LZ48C3 (open engine)
TED, TFD, THD	Natural gas fuel system (Obsolete)	LZ48C6 (power unit)
VE4D	Combination gas-gasoline and natural gas (Obsolete)	LZ45-15
VF4D	Combination gas-gasoline and natural gas (Obsolete)	LZ45-32
VE4D	Combination gas-gasoline (Obsolete)	LZ45-15 (power unit)
VF4D	Combination gas-gasoline (Obsolete)	LZ45-32 (power unit)
VE4D	Natural gas fuel system (Obsolete)	LZ45-15 (open engine and power unit)
VF4D	Natural gas fuel system (Obsolete)	LZ45-32 (open engine and power unit)
VF4D	Natural gas with Met-R-Flo carburetor (Algas)	L92B per SK1275F
VF4D	Natural gas with Met-R-Flo carburetor (Algas)	L92C (with lock-off switch) per SK1275F1

Dual Fuel Systems For Combination Natural Gas-Gasoline Burning Engines By Engine Model (Cont.)

MODEL	DESCRIPTION	PART NO.
VG4D	Natural gas fuel system (Algas) (Obsolete)	L94B per SK1262G
VG4D	Natural gas fuel system (Algas)	L94C (with lock-off switch) per SK1262G1
VH4D	Combination gas-gasoline and natural gas (Obsolete)	LZ48-29 (open engine)
VH4D	Combination gas-gasoline and natural gas (Obsolete)	LZ48-29 (power unit)
VH4D	Natural gas fuel system (Obsolete)	LZ48-29 (open engine and power unit)
VP4D, VG4D	Combination gas-gasoline and natural gas (Obsolete)	LZ54J2 (open engine)
VP4D, VG4D	Combination gas-gasoline and natural gas (Obsolete)	LZ54J2 (power unit)
VP4D, VG4D	Natural gas fuel system (Obsolete)	LZ54J2 (open engine)
VR4D	Combination gas-gasoline and natural gas (Obsolete)	LZ56B4 (open engine)
VR4D	Combination gas-gasoline and natural gas (Obsolete)	LZ56B4 (power unit)
VR4D	Natural gas fuel system (Obsolete)	LZ72A
V461D	Combination gas-gasoline and natural gas (Obsolete)	LZ56B13
V461D	Natural gas fuel system (Obsolete)	LZ72A

No natural gas system available for S14D or TJD models.

Dual Fuel Systems For Combination Natural Gas-Gasoline Burning Engines By Part Number

PART NO.	DESCRIPTION	MODEL
L89S1	Natural gas fuel system	S10D, S12D
L92B per SK1275F	Natural gas with Met-R-Flo carburetor (Algas)	VF4D
L92C (with lock-off switch) per SK1275F1	Natural gas with Met-R-Flo carburetor (Algas)	VF4D
L94B per SK1262G	Natural gas fuel system (Algas)	VG4D
L94C (with lock-off switch) per SK1262G1	Natural gas fuel system (Algas)	VG4D
LZ26-12	Combination gas-gasoline	ABD, ABND
LZ26A8	Combination gas-gasoline	AKD, AKND
LZ45-15	Combination gas-gasoline and natural gas	VE4D
LZ45-15 (power unit)	Combination gas-gasoline	VE4D
LZ45-15 (open engine and power unit)	Natural gas fuel system	VE4D
LZ45-32	Combination gas-gasoline and natural gas	VF4D
LZ45-32 (power unit)	Combination gas-gasoline	VF4D
LZ45-32(open engine and power unit)	Natural gas fuel system	VF4D
LZ48C3 (open engine)	Combination gas-gasoline and natural gas	TED, TFD, THD
LZ48C3 (open engine)	Natural gas fuel system	TED, TFD, THD
LZ48C6 (power unit)	Combination gas-gasoline and natural gas	TED, TFD, THD
LZ48C6 (power unit)	Natural gas fuel system	TED, TFD, THD
LZ48F3	Combination gas-gasoline	AEHD
LZ48F3	Natural gas fuel system	AEHD
LZ48K4	Combination gas-gasoline	AFHD, AGHD
LZ48K4	Natural gas fuel system	AFHD, AGHD
LZ48H1	Combination gas-gasoline	AHHD
LZ48H1	Natural gas fuel system	AHHD
LZ48Z1	Natural gas fuel system	AEND, AENLD
LZ48Z1	Combination gas-gasoline	AEND, AENLD
LZ48-29 (open engine)	Combination gas-gasoline and natural gas	VH4D
LZ48-29 (power unit)	Combination gas-gasoline and natural gas	VH4D

Dual Fuel Systems For Combination Natural Gas-Gasoline Burning Engines By Part Number (Cont.)

PART NO.	DESCRIPTION	MODEL
LZ48-29 (open engine and power unit)	Natural gas fuel system	VH4D
LZ51E5 or LZ52C4	Combination gas-gasoline	ACND, BKND
LZ54J2 (open engine)	Combination gas-gasoline and natural gas	VP4D, VG4D
LZ54J2 (power unit)	Combination gas-gasoline and natural gas	VP4D, VG4D
LZ54J2 (open engine)	Natural gas fuel system	VP4D, VG4D
LZ56B4 (open engine)	Combination gas-gasoline and natural gas	VR4D
LZ56B4 (power unit)	Combination gas-gasoline and natural gas	VR4D
LZ56B13	Combination gas-gasoline and natural gas	V461D
LZ64A1	Combination gas-gasoline	AGND
LZ72A	Natural gas fuel system	VR4D
LZ72A	Natural gas fuel system	V461D

L89S1 Natural Gas Fuel System

GENERAL INFORMATION

The Garretson no. 039E gas regulator is a single diaphragm type regulator which will accurately regulate the flow of gas to the carburetor and will automatically shut off the supply when the engine demand has ceased.

The gas regulator, as illustrated on page 2, should be installed as close to the carburetor as possible, and it is preferred that it be mounted in a vertical position.

The gas pressure to the regulator should be 7" to 10" water column, or 4 to 6 ounces per square inch, when using natural gas of 1000 B.T.U. content.

STARTING

STARTING PROCEDURE

1. Check crankcase oil level.
2. Open valve at gas main.
3. Disengage clutch, if furnished.
4. Close gas regulator valve on carburetor, then open approximately 4 turns.
5. Close priming cup valve, and fill cup with "regular grade" gasoline. Then open valve so that the gasoline enters carburetor. Be sure priming cup is clean when adding gasoline.
6. Set throttle about 1/2 open if variable speed governor control is furnished. With a fixed speed governor, spring will hold throttle open for starting.
7. Close choke on carburetor by pushing choke lever down (lever in horizontal position). Turn engine over to compression with starter sheave and then turn back one-half turn. Wind rope fully on sheave and pull briskly to turn crankshaft over.

   With starting motor, pull out ignition switch (tag reads "TO STOP PUSH IN"), and depress starter button.

After engine starts open choke fully (push lever up).

Switching from gasoline starting to natural gas operation is done automatically, as suction from the carburetor is transmitted to a diaphragm in the regulator, which in turn controls the flow of natural gas to the carburetor.

The following, gas regulator valve and idle screw adjustments, need only be made the first time the engine is started or after a long shutdown, and if the B.T.U. content of gas is changed.

While engine is running and warmed up, adjust the gas regulator valve on the carburetor, for smoothest operation. The proper adjustment will depend upon the B.T.U. content of the gas.

The initial setting, of the idle adjusting screw on the carburetor, is approximately 6-1/2 turns open from its seat. With engine running at low idle speed, adjust for smooth operation. The idle adjustment on regulator is inoperative, since an external idle line is not used.

The gas primer on the regulator is only used if engine is started directly on natural gas, however, on this model engine, starting is best accomplished by priming with gasoline.

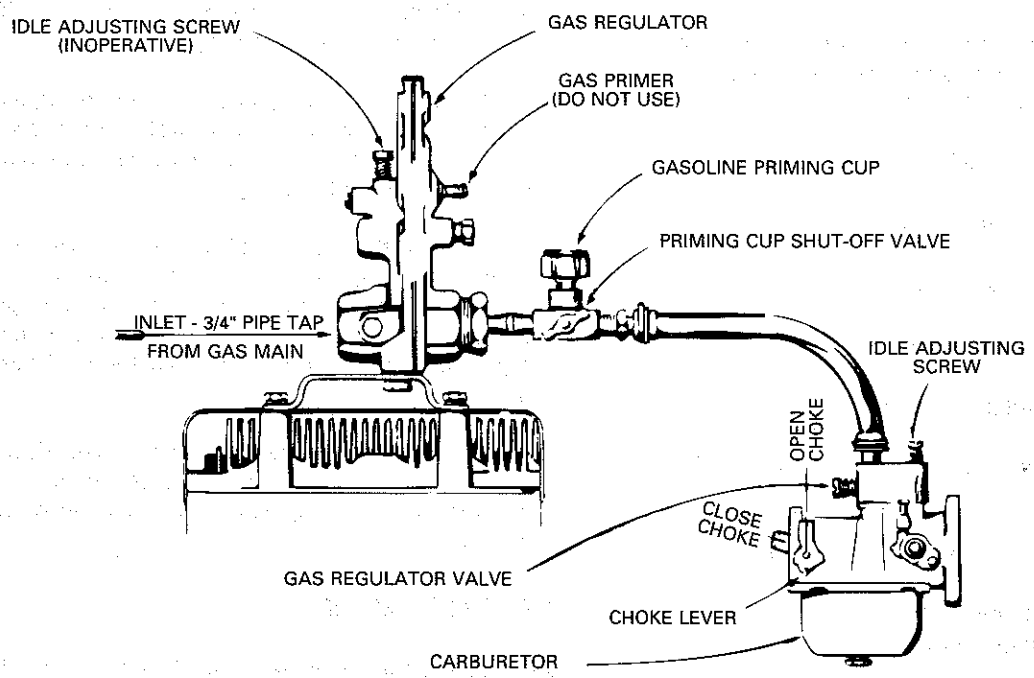
STOPPING ENGINE

Let engine run at idle speed (1000 to 1200 R.P.M.) for a few minutes. This will cool the internal and external parts of the engine much faster than abruptly shutting off the engine from full load speed.

For short intervals of operation, the engine can be stopped by depressing the magneto ground switch and holding down until engine stops.

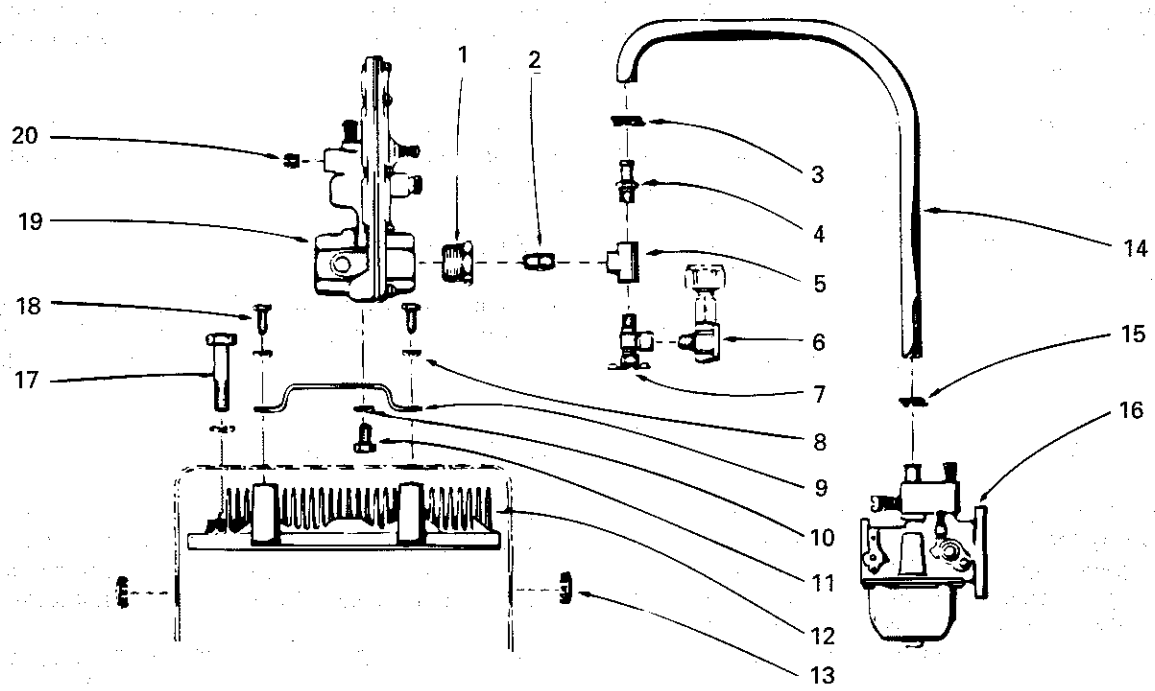
To properly shut off the engine after the days work, close the shut-off valve at the main gas supply and allow the engine to run until the gas in the carburetor and fuel lines is used up, at which time the engine will stop.

L89S1 Natural Gas Fuel System



L89S1 Natural Gas Fuel System

USE WITH MODELS S10D, S12D



NOTE: The following, replace or are in addition to parts found in the Standard S10D and S12D Instruction and Parts List Manual.

ITEM	PART NO.	DESCRIPTION	QTY
1	XK142	Reducer bushing, 3/4" to 1/8" (NLA)	1
2	RF794	Pipe nipple, 1/8" x 3/4" long	1
3	LK25	Hose clamp	1
4	RF1476	Straight connector (NLA)	1
5	XK63A	Tee (NLA)	1
6	RG44	Priming cup	1
7	RG45	Shut-off valve	1
8	PE3	Lock washer, 1/4"	2
9	PG1195	Bracket (NLA)	1
10	PE4	Lock washer, 5/16"	2
11	XD13	Screw, 5/16"-18 thread x 1/2" long	2
12	AB114	Cylinder head (replaces standard head on S12D)	1
13	PF163	Button plug	2
14	LL184-6	Gas line (NLA)	1
15	LK27	Hose clamp	1
16	L89S1	Carburetor (replaces standard for S10D, S12D) (NLA)	1
17	XD31	Screw, 3/8"-16 thread x 1-3/4" long	3
18	XD5	Screw, 1/4"-20 thread x 5/8" long	2
19	L101	Gas regulator, Garretson no. 039E	1
20	PF18	Plug, 1/8" pipe	1

L92B, L92C Natural Gas With Met-R-Flo Carburetor (Algas) Per SK1275F, SK1275F1

Power adjusting valve is of a simple air bleed design. A dial on the carburetor diaphragm body indicates the rich and lean settings. By means of a screwdriver, set scribe mark on head of power adjusting valve, between number 2 and 3 on dial. This setting has been calibrated to meet average loading and operating conditions.

A more accurate, and recommended adjustment, is accomplished with a fuel analyzer: With the engine warmed up and operating at FULL LOAD, turn power adjusting valve clockwise, toward rich marking on dial, until a reading of 13 to 1 air fuel ratio is registered by the gas analyzer (14 to 1 if gasoline analyzer is used).

A very slight movement of the power valve between number 2 and 3 on dial is required for an efficient setting.

HARD STARTING

Hard starting only, with a smooth idle, will NOT be caused by the fuel system. It will be ignition, starter drag, spark plugs, low voltage, etc. The first sign of a natural-gas carburetion problem will show up in a rough idle and hard starting. The combination of the two could indicate trouble in the fuel system.

The hard starting can be caused by a leaking solenoid or filter lock-off, too high a carburetor regulator pressure, or a dirty or worn carburetor diaphragm assembly.

ROUGH IDLE

If the idle adjustment can be adjusted both rich and lean, but a smooth idle is not reached in between, the trouble is NOT in the fuel system. Look for vacuum leaks or electrical trouble.

If a smooth idle can only be obtained by a rich setting of the idle adjustment, there is foreign material on the carburetor fuel valve.

CARBURETOR

Remove main cover and diaphragm, clean thoroughly with solvent, blow dry with air hose, inspect for damage or wear. See Service Parts and Instructions, form ML-32.

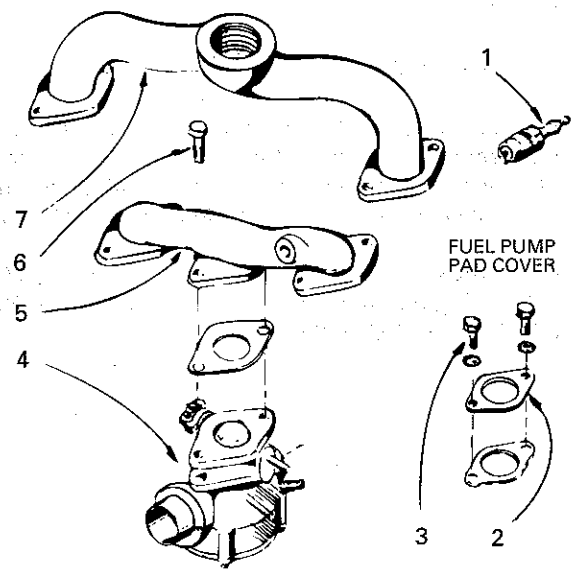
SOLENOID LOCK-OFF

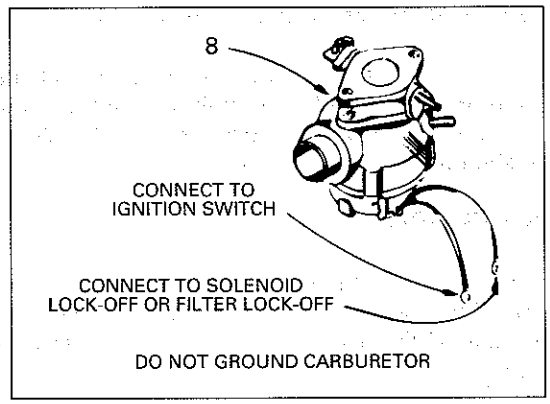
When energized, a "click" should be heard. To service, disassemble and clean. Check coil by energizing and observing magnetism on plunger or with screw driver through center of coil. Check plunger seat if leaking.

ELECTRICAL and ENGINE TROUBLES - Refer to Model VF4D Engine Instruction Book under TROUBLES, CAUSES and REMEDIES.

L92B, L92C Natural Gas With Met-R-Flo Carburetor (Algas) Per SK1275F, SK1275F1

USE WITH MODEL VF4D





CARBURETOR PER SK1275F1

NOTE: SK1275F1 has provision for automatic lock-off. All parts are the same for both SK1275F and SK1275F1 except where noted.

The following special parts are for factory built Natural Gas engines. These parts are in addition to, or replace parts found in the standard VF4D Instruction and Parts List manual.

ITEM	PART NO.	DESCRIPTION	QTY
—	AB100B	Cylinder head (not illustrated)	2
1	YD35	Spark plug, Champion no. D9J	4
2	SA69	Cover	1
3	XD4	Screw, 1/4"-20 thread x 1/2" long	2
4	L92B	Carburetor, SK1275F, Algas ind. no. 01-0015	1
5	LC264	Manifold	1
6	XD16	Screw, 5/16"-18 thread x 7/8" long	2
7	LD233	Manifold (NLA)	1
8	L92C	Carburetor, SK1275F1 with lock-off switch, Algas ind. no. 01-0014	1

L94B, L94C Natural Gas Fuel System (Algas) Per SK1262G, SK1262G1

HARD STARTING

Hard starting only, with a smooth idle, will NOT be caused by the fuel system. It will be ignition, starter drag, spark plugs, low voltage, etc. The first sign of a natural-gas carburetion problem will show up in a rough idle and hard starting. The combination of the two could indicate trouble in the fuel system.

The hard starting can be caused by a leaking solenoid or filter lock-off, too high a carburetor regulator pressure, or a dirty or worn carburetor diaphragm assembly.

ROUGH IDLE

If the idle adjustment can be adjusted both rich and lean, but a smooth idle is not reached in between, the trouble is NOT in the fuel system. Look for vacuum leaks or electrical trouble.

If a smooth idle can only be obtained by a rich setting of the idle adjustment, there is foreign material on the carburetor fuel valve.

CARBURETOR

Remove main cover and diaphragm, clean thoroughly with solvent, blow dry with air hose, inspect for damage or wear. See Service Parts and Instructions, form ML-32.

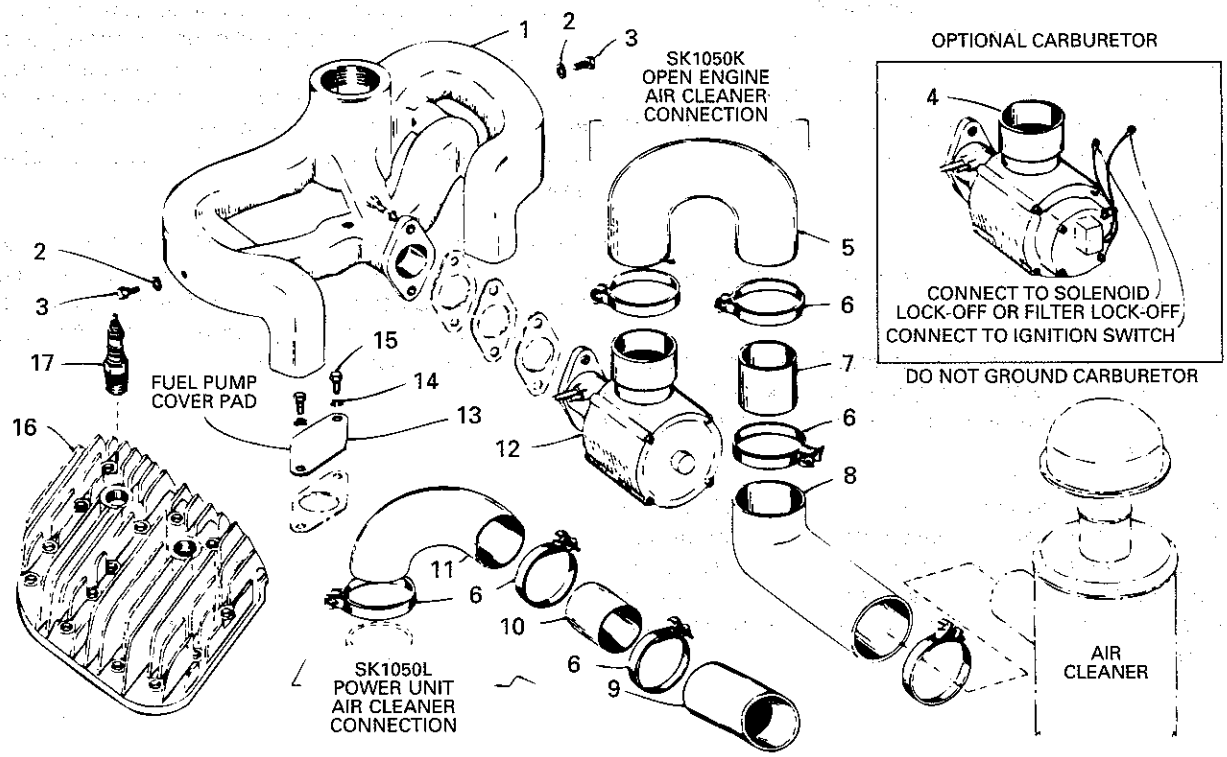
SOLENOID LOCK-OFF

When energized, a "click" should be heard. To service, disassemble and clean. Check coil by energizing and observing magnetism on plunger or with screw driver through center of coil. Check plunger seat if leaking.

ELECTRICAL and ENGINE TROUBLES - Refer to Model VG4D Engine Instruction Book under TROUBLES, CAUSES and REMEDIES.

L94B, L94C Natural Gas Fuel System (Algas) Per SK1262G, SK1262G1

USE WITH MODEL VG4D



NOTE: SK1262G1 has provision for automatic lock-off. All parts are the same for both SK1262G and SK1262G1 except the carburetor.

The following special parts are for factory built Natural Gas engines. These parts are in addition to, or replace parts found in the standard VG4D Instruction and Parts List manual.

ITEM	PART NO.	DESCRIPTION	QTY
1	LD240B3	Manifold	1
2	PH30A	Washer	2
3	XD3	Screw, 1/4"-20 thread x 3/8" long	2
4	L94C	Carburetor with lock-off switch, SK1262G1, Algas ind. no. 01-0020 (optional)	1
5	LL158-3	Elbow (open engine)	1
6	LK9	Hose clamp, 2-3/8" I.D.	4
7	LJ212	Tube (open engine)	1
8	LL158-4	Elbow (open engine)	1
9	LL158-6	Elbow (power unit) (NLA)	1
10	LJ358-1	Tube (power unit)	1
11	LL158-5	Elbow (power unit) (NLA)	1
12	L94B	Carburetor, SK1262G, Algas ind. no. 01-0019 (NLA)	1
13	SA69	Cover	1
14	PE3	Lock washer, 1/4"	2
15	XD4	Screw, 1/4"-20 thread x 1/2" long	2
16	AB97B	Cylinder head	2
17	YD35	Spark plug, Champion no. D9J	4

The Garretson no. 039E Gas Regulator (Ref. 1) should be mounted as close to the carburetor (Ref. 6) as possible and the gas main to the regulator should be a 3/4" pipe size. The gas pressure to the regulator should be 7" to 10" water column (4 to 6 ounces per square inch) when used with natural gas (1100 B.T.U.).

TO START ENGINE

The gas regulator valve (Ref. 9) at the carburetor should be closed.

Fill the carburetor (Ref. 6) with gasoline by opening the shut-off cock below the gasoline tank. Adjust the gasoline needle valve so it is open approximately 3/4 to 1-1/4 turns.

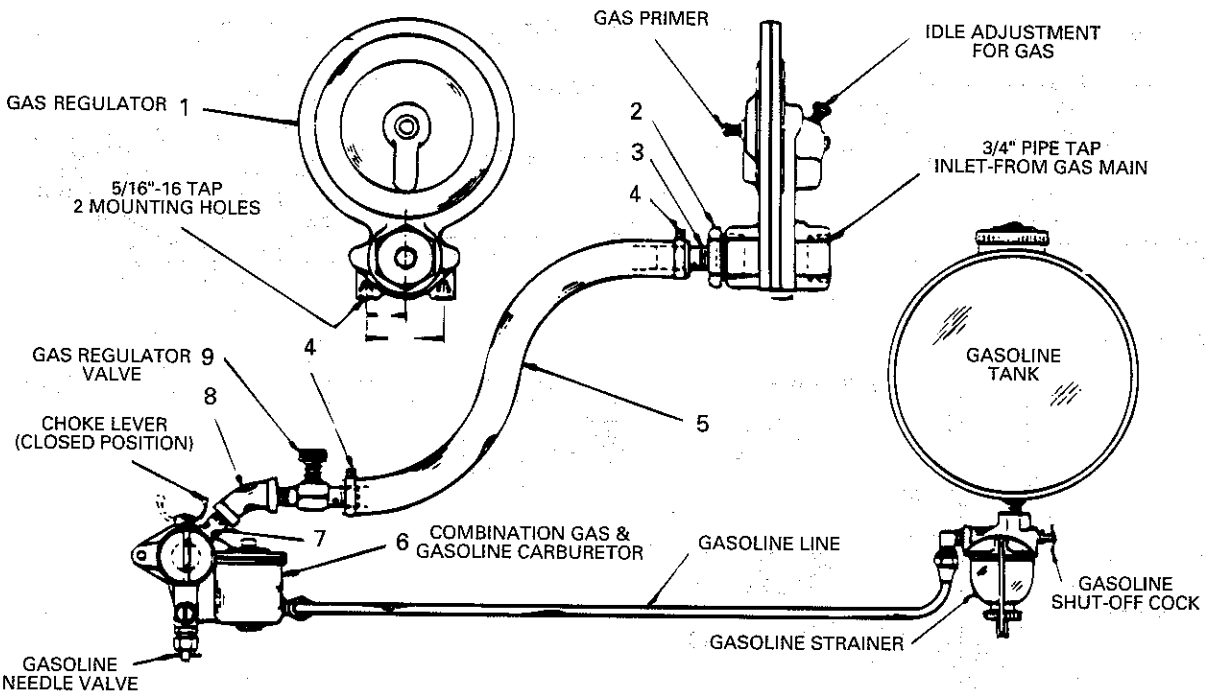
With the magneto switch in the operating position and the choke lever on the carburetor closed, crank the engine over slowly until the compression stroke is reached, then pull up on the crank rapidly to carry it across the top of the stroke. Repeat this operation if necessary.

With the engine operating on gasoline, to switch to gas, shut off the gasoline supply and open the gas regulator valve (Ref. 9) about one turn. When the gasoline is used up in the carburetor, the gas regulator valve should be adjusted to give the smoothest operation. (The proper adjustment will depend upon the B.T.U. content of the gas.)

When operating on BUTANE or PROPANE GAS, a Pressure Reducing Valve is necessary in the line between the storage gas tank and the gas regulator on the engine, as the pressure in gas tank may be 100 lbs. or over, and this must be reduced to 6 or 7 ounces.

LZ26-12, LZ26A8 Combination Gas-Gasoline

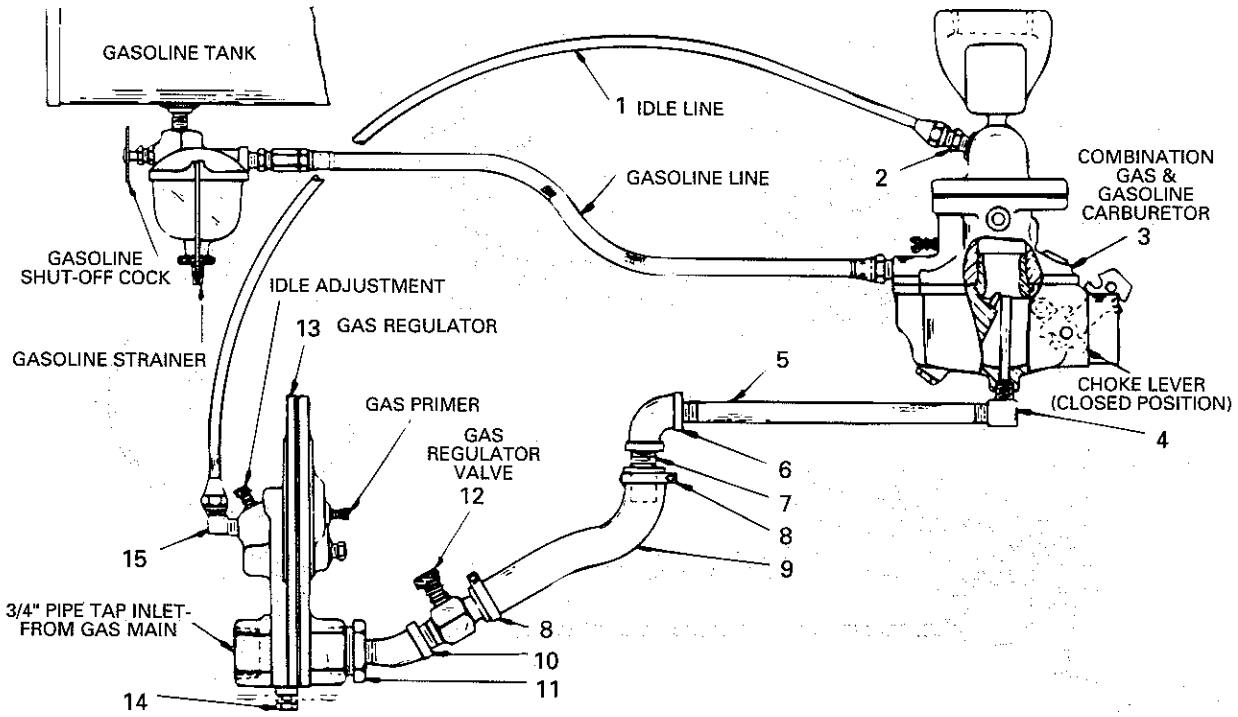
USE WITH MODELS ABD, ABND, AKD, AKND



ITEM	PART NO.	DESCRIPTION	QTY
—	AE73C	Inlet valve (ABD, ABND)	1
—	AE73D	Stellite exhaust valve (ABD, ABND)	1
—	AE74C	Inlet valve (AKD, AKND)	1
—	AE74D	Stellite exhaust valve (AKD, AKND)	1
—	DB184A	Piston (ABD) (use standard piston for models ABND, AKD, AKND) (NLA)	1
—	HG156D	Stellite exhaust insert (ABD, ABND)	1
—	HG273D	Stellite exhaust insert (AKD, AKD)	1
1	L101	Gas regulator, Garretson no. 039E	1
2	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
3	RF997	Hose connector	1
4	LK20	Hose clamp, 7/8" I.D.	2
5	LL54	Rubber hose, 1/2" I.D. - 3 ply x 18" long (NLA)	1
6	LZ26-12	Carburetor assembly (ABD, ABND) (includes 7-9; includes carburetor) (obsolete)	1
—	LZ26A8	Carburetor assembly (AKD, AKND) (includes 7-9; includes carburetor) (obsolete)	1
7	RF934	Pipe nipple, 1/8" x 1" long	1
8	XK116	Pipe elbow, 1/8" x 45°	1
9	L28-4	Gas regulator valve	1

LZ45-15, LZ45-32 Combination Gas-Gasoline

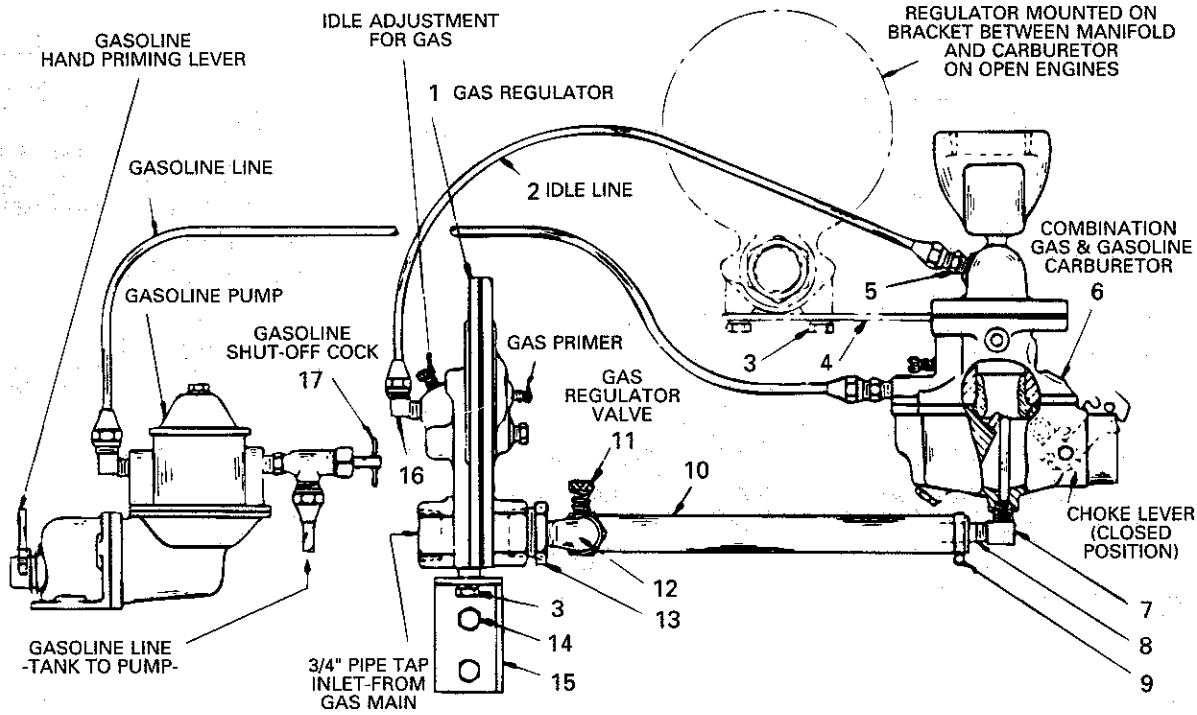
USE WITH MODELS VE4D, VF4D POWER UNITS



ITEM	PART NO.	DESCRIPTION	QTY
—	AB100B	Cylinder head (VE4D)	2
—	AB100B	Cylinder head (VF4D)	2
—	AE75D	Stellite exhaust valve	4
—	AF51	Valve spring	4
—	HG273D	Stellite exhaust valve seat insert	4
1	RM450	Idle line, 20-3/4" long	1
2	RF269	Straight fitting	1
3	LZ45-15	Stromberg carburetor (VE4D) (NLA)	1
—	LZ45-32	Stromberg carburetor (VF4D) (NLA)	1
4	L28A1	Gas jet	1
5	RF1247	Pipe nipple, 1/4" x 6-1/2" long (replaces RF1028) (NLA)	1
6	XK22	Elbow, 1/4" x 90°	1
7	RF997	Hose connector	1
8	LK20	Hose clamp, 7/8" I.D.	2
9	LL114	Gas line, 1/2" I.D. - 3 ply x 6" long (replaces LL87) (NLA)	1
10	XK65	Street ell, 1/4" x 45° (NLA)	1
11	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
12	L28A2	Gas regulator valve	1
13	L101	Gas regulator, Garretson no. 039E	1
14	XD13	Screw, 5/16"-18 thread x 1/2" long	2
15	RF1225	Elbow	1

LZ45-15, LZ45-32 Combination Gas-Gasoline And Natural Gas

USE WITH MODELS VE4D, VF4D OPEN ENGINES AND POWER UNITS

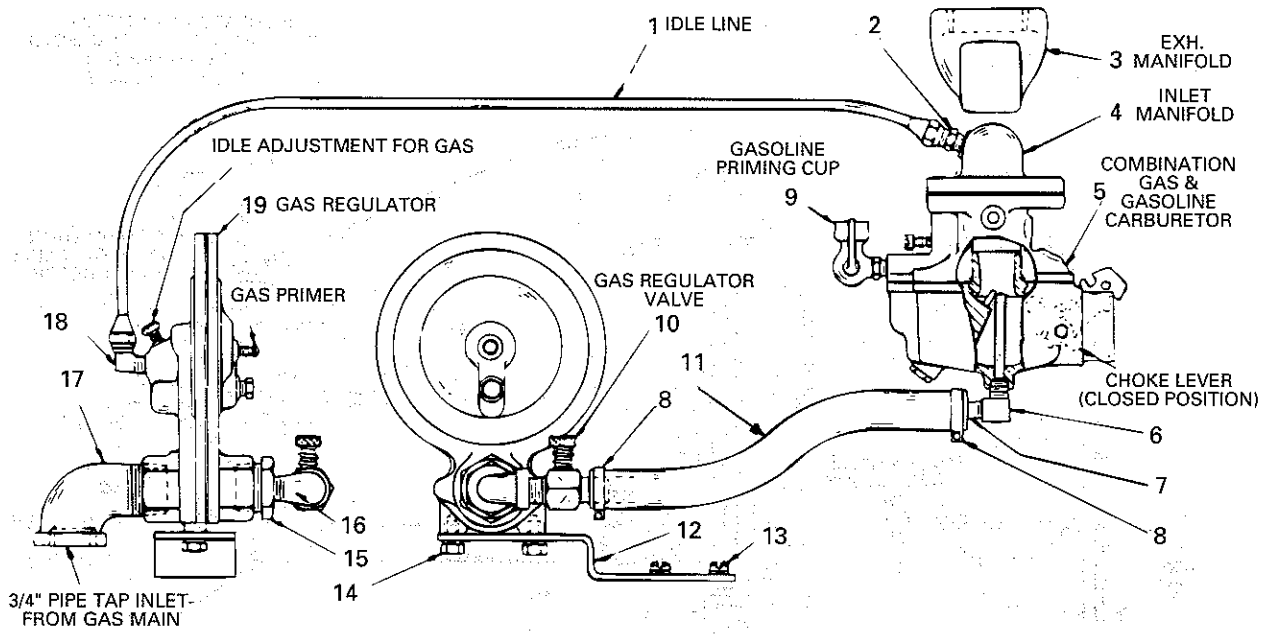


ITEM	PART NO.	DESCRIPTION	QTY
—	AB100B	Cylinder head (VE4D)	2
—	AB100B	Cylinder head (VF4D)	2
—	AE75D	Stellite exhaust valve	4
—	AF51	Valve spring	4
—	HG273D	Stellite exhaust valve seat insert	4
1	L101	Gas regulator, Garretson no. 039E	1
2	RM846	Idle line, 13-3/4" long	1
3	XD13	Screw, 5/16"-18 thread x 1/2" long	2
4	PG386	Straight bracket (NLA)	1
5	RF269	Straight fitting	1
6	LZ45-15	Stromberg carburetor (VE4) (NLA)	1
—	LZ45-32	Stromberg carburetor (VF4) (NLA)	1

ITEM	PART NO.	DESCRIPTION	QTY
7	L28A1	Gas jet	1
8	RF997	Hose connector	1
9	LK20	Hose clamp, 7/8" I.D.	2
10	LL71	Gas line, 1/2" I.D. - 3 ply x 7-1/2" long	1
—	LL66	Gas line, 12" long	1
11	L28A2	Gas regulator valve	1
12	XK37	Street ell, 1/4" x 90°	1
13	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
14	XD14	Screw, 5/16"-18 thread x 5/8" long	2
15	Bi207	Bracket (NLA)	1
16	RF1225	Elbow	1
17	RG22	Shut-off cock	1

LZ45-15, LZ45-32 Natural Gas Fuel System

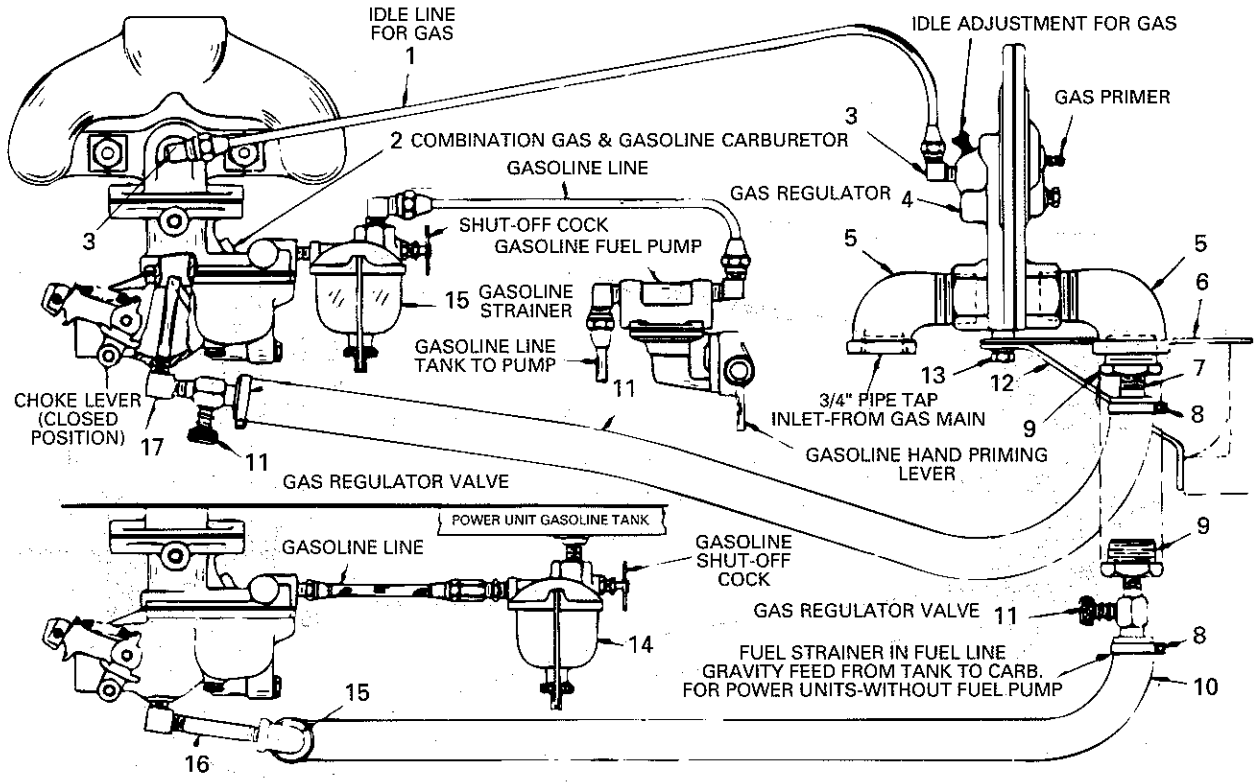
USE WITH MODELS VE4D, VF4D OPEN ENGINES AND POWER UNITS



ITEM	PART NO.	DESCRIPTION	QTY
—	AB100B	Cylinder head (VE4D)	2
—	AB100B	Cylinder head (VF4D)	2
—	AE75D	Stellite exhaust valve	4
—	AF51	Valve spring	4
—	HG273D	Stellite exhaust valve seat insert	4
1	RM731	Idle line, 9-3/4" long (NLA)	1
2	RF269	Straight fitting	1
3	LD233	Exhaust manifold (NLA)	1
4	LC264-3	Inlet manifold (NLA)	1
5	LZ45-15	Stromberg carburetor (VE4) (obsolete)	1
—	LX45-32	Stromberg carburetor (VF4) (obsolete)	1
6	L28A1	Gas jet	1
7	RF997	Hose connector	1
8	LK20	Hose clamp, 7/8" I.D.	2
9	RG12	Priming cup (NLA)	1
10	L28A2	Gas regulator valve	1
11	LL86	Gas line, 1/2" I.D. - 3 ply x 6-1/2" long	1
12	BI265A	Bracket	1
13	XB75	Screw, 1/4"-20 thread x 3/4" long	2
14	XD13	Screw, 5/16"-18 thread x 1/2" long	2
15	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
16	XK37	Street ell, 1/4" x 90°	1
17	XK24	Street ell, 3/4" x 90°	1
18	RF1225	Elbow	1
19	L101	Gas regulator, Garretson no. 039E	1

LZ48C3, LZ48C6 Combination Gas-Gasoline And Natural Gas

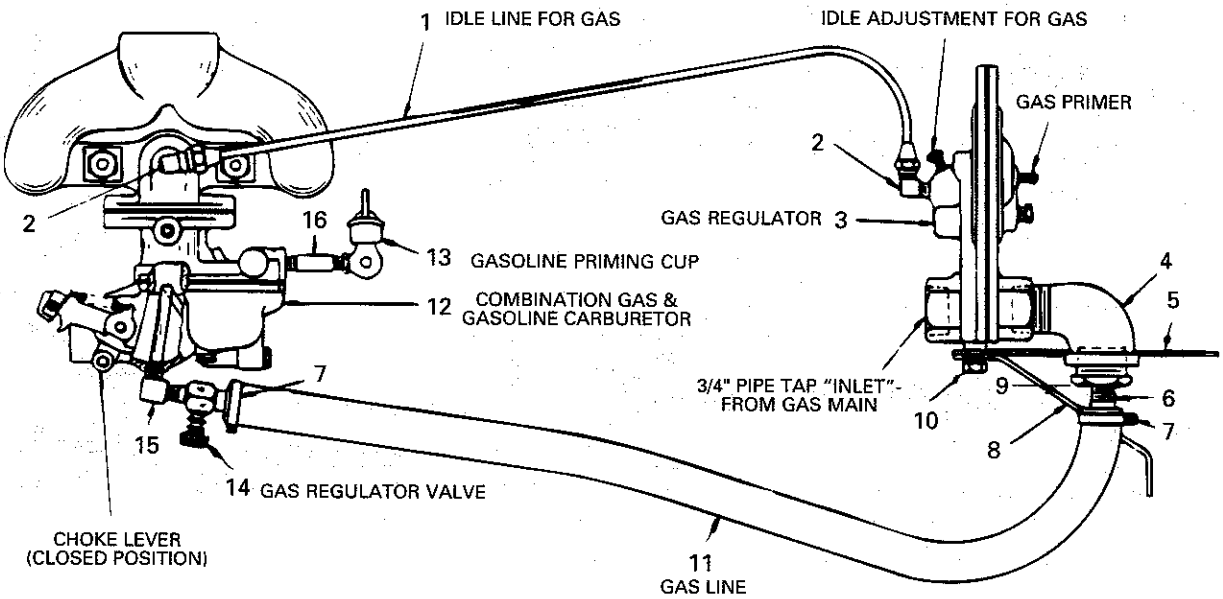
USE WITH MODELS TED, TFD, THD 2-CYLINDER OPEN ENGINES AND POWER UNITS



ITEM	PART NO.	DESCRIPTION	QTY
—	AE75D	Stellite exhaust valve	2
—	AF51	Valve spring	2
—	HG273D	Stellite exhaust valve seat insert	2
1	RM391	Idle line, 15-1/2" long (NLA)	1
2	LZ48C3	Zenith carburetor	1
—	LZ48C6	Zenith carburetor (obsolete)	1
3	RF1225	Elbow	2
4	L101	Gas regulator, Garretson no. 039E	1
5	XK24	Street ell, 3/4" x 90°	1
6	PG494	Bracket (NLA)	1
7	RF997	Hose connector	1
8	LK20	Hose clamp, 7/8" I.D.	2
9	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
10	LL66	Gas line, 1/2" I.D. - 3 ply x 12" long (open engine)	1
—	LL70	Gas line, 8-1/2" long (NLA)	1
11	L28A2	Gas regulator valve	1
12	PG495	Brace (open engine) (NLA)	1
13	XD13	Screw, 5/16"-18 thread x 1/2" long	2
14	LP19	Fuel strainer, Tillotson no. OW418	1
15	XK22	Elbow, 1/4" x 90°	1
16	RF383-1	Pipe nipple, 1/4" x 6" long (NLA)	1
17	L28A1	Carbruetor venturi tube	1

LZ48C3 Natural Gas Fuel System

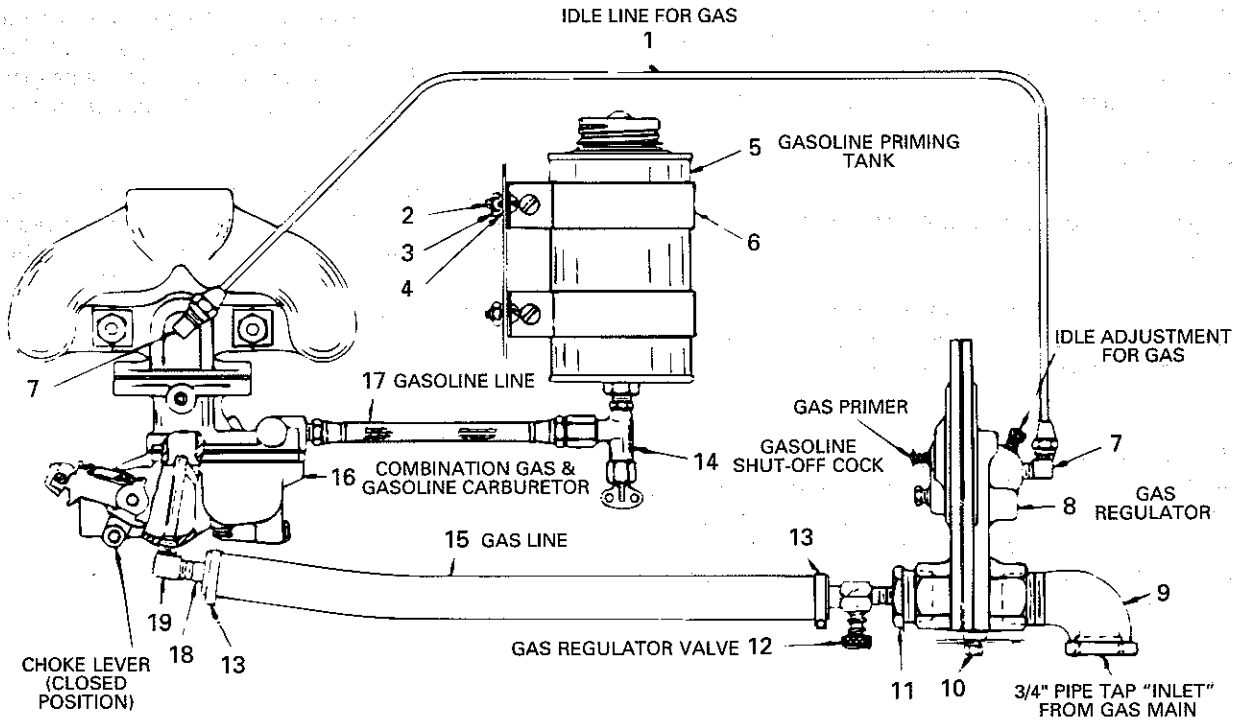
USE WITH MODELS TED, TFD, THD 2-CYLINDER OPEN ENGINES



ITEM	PART NO.	DESCRIPTION	QTY
—	AE75D	Stellite exhaust valve	2
—	AF51	Valve spring	2
—	HG273D	Stellite exhaust valve seat insert	2
1	RM391	Idle line, 15-1/2" long (NLA)	1
2	RF1225	Elbow	2
3	L101	Gas regulator, Garretson no. 039E	1
4	XK24	Street ell, 3/4" x 90°	1
5	PG494	Bracket (NLA)	1
6	RF997	Hose connector	1
7	LK20	Hose clamp, 7/8" I.D.	2
8	PG495	Brace (NLA)	1
9	XD19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
10	XD13	Screw, 5/16"-18 thread x 1/2" long	2
11	LL66	Gas line, 1/2" I.D. - 3 ply x 12" long	1
12	LZ48C3	Zenith carburetor	1
13	RG12	Priming cup (NLA)	1
14	L28A2	Gas regulator valve	1
15	L28A1	Carburetor venturi tube	1
16	RF170A	Pipe coupling, 1/8"	1

LZ48C6 Natural Gas Fuel System

USE WITH MODELS TED, TFD, THD 2-CYLINDER POWER UNITS



ITEM	PART NO.	DESCRIPTION	QTY
—	AE75D	Stellite exhaust valve	2
—	AF51	Valve spring	2
—	HG273D	Stellite exhaust valve seat insert	2
—	WE261A12	Rear house panel (NLA)	1
1	RM1161	Idle line, 22-1/2" long	1
2	XA34	Round head screws, 1/4"-20 thread x 1/2" long	4
3	PD77	Hexagon nuts, 1/4"-20 thread	4
4	PE3	Lock washer, 1/4"	4
5	† WE94	Gasoline priming tank (NLA)	1
6	PG161	Strap	2
7	RF1225	Elbow	2
8	L101	Gas regulator, Garretson no. 039E	1
9	XK24	Street ell, 3/4" x 90°	1
10	XD13	Screw, 5/16"-18 thread x 1/2" long	2
11	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
12	L28A2	Gas regulator valve	1
13	LK20	Hose clamp, 7/8" I.D.	2
14	RG22	Shut-off cock	1
15	LL70	Gas line, 1/2" I.D. - 3 ply x 8-1/2" long	1
16	LZ48C6	Zenith carburetor (obsolete)	1
17	RM1049A	Fuel line	1
18	RF997	Hose connector	1
19	L28A1	Carburetor venturi tube	1

† On units which do not have provisions for mounting gasoline priming tank, use RG12 priming cup with RF170A coupling in carburetor fuel inlet.

The Garretson no. 039E Gas Regulator (Ref. 12) should be mounted as close to the carburetor (Ref. 4) as possible and the gas main to the regulator should be a 3/4" pipe size. The gas pressure to the regulator should be 7" to 10" water column (4 to 6 ounces per square inch) when used with natural gas (1100 B.T.U.).

TO START ENGINE

The gas regulator valve (Ref. 6) at the carburetor should be closed.

Fill the carburetor (Ref. 4) with gasoline by opening the shut-off cock below the gasoline tank. Adjust the gasoline needle valve so it is open approximately 3/4 to 1-1/4 turns.

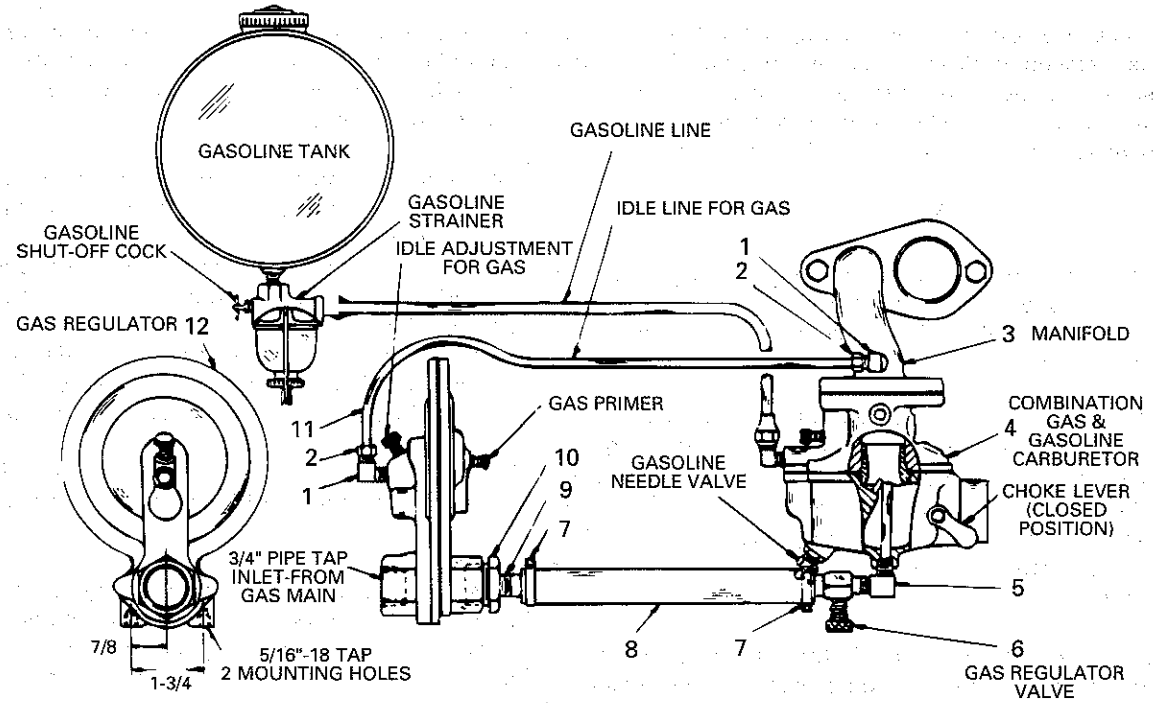
With the magneto switch in the operating position and the choke lever on the carburetor closed, crank the engine over slowly until the compression stroke is reached, then pull up on the crank rapidly to carry it across the top of the stroke. Repeat this operation if necessary.

With the engine operating on gasoline, to switch to gas, shut off the gasoline supply and open the gas regulator valve (Ref. 6) about one turn. When the gasoline is used up in the carburetor, the gas regulator valve should be adjusted to give the smoothest operation. (The proper adjustment will depend upon the B.T.U. content of the gas.)

When operating on BUTANE or PROPANE GAS, a Pressure Reducing Valve is necessary in the line between the storage gas tank and the gas regulator on the engine, as the pressure in gas tank may be 100 lbs. or over, and this must be reduced to 6 to 7 ounces.

LZ48F3, LZ48K4, LZ48H1 Combination Gas-Gasoline

USE WITH MODELS AEHD, AFHD, AGHD, AHHD



ITEM	PART NO.	DESCRIPTION	QTY
—	AB63E-3	Cylinder head (AEHD) (NLA)	1
—	AB81-1	Cylinder head (AFHD) (NLA)	1
—	AB81	Cylinder head (AGHD)	1
—	AB82E	Cylinder head (AHHD)	1
—	AE76E	Inlet valve (AFHD, AGHD, AHHD)	1
—	AE75D	Stellite exhaust valve (AEHD)	1
—	AE76D	Stellite exhaust valve (AFHD, AGHD, AHHD)	1
—	AF51	Exhaust valve spring (AEHD)	1
—	HG273D	Stellite exhaust insert (AEHD)	1
—	HG272D	Stellite exhaust insert (AFHD, AGHD, AHHD)	1
1	RF1123	Elbow (NLA)	2
2	RF1124	Nut (NLA)	2
3	LD232-4	Manifold (AEHD) (NLA)	1
—	LD230-3	Manifold (AFHD, AGHD) (NLA)	1
—	LD231-3	Manifold (AHHD) (NLA)	1

ITEM	PART NO.	DESCRIPTION	QTY
4	LZ48F3	Carburetor (AEHD) (replaces LZ45B5) (obsolete)	1
—	LZ48K4	Carburetor (AFHD) (replaces LZ45A6) (obsolete)	1
—	LZ48K4	Carburetor (AGHD) (replaces LZ45A7) (obsolete)	1
—	LZ48H1	Carburetor (AHHD) (replaces LZ45A8) (obsolete)	1
5	L28A1	Gas jet	1
6	L28A2	Gas regulator valve	1
7	LK20	Hose clamp, 7/8" I.D.	2
8	LL54	Rubber hose, 1/2" I.D. - 3 ply x 18" long (NLA)	1
9	RF997	Hose connector	1
10	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
11	RF744	Copper tubing, 3/16" O.D. x 36" long (NLA)	1
12	L101	Gas regulator, Garretson no. 039E	1

The Garretson no. 039E Gas Regulator (Ref. 1) should be installed as close to the carburetor (Ref. 5) as possible. The gas pressure to the regulator should be 7" to 10" Water Column (4 to 6 ounces per square inch) when used with natural gas (1100 B.T.U. content).

TO START ENGINE

There are two methods by which the engine can be started, one directly on natural gas and the other by a prime of gasoline. The gasoline starting method is usually easier.

When starting on gasoline, fill the carburetor float chamber by means of the priming cup (Ref. 10) furnished on the carburetor, with a good grade of gasoline. Adjust the gasoline needle valve below the carburetor so it is open approximately 3/4 to 1-1/4 turns. The gas regulator valve (Ref. 7) at the carburetor should be closed.

With the magneto switch in the running position and the choke lever on the carburetor in the closed position, the engine should be cranked. Repeat this operation if engine does not start on the first try.

After engine starts, the gas regulator valve (Ref. 7) should be opened and adjusted for smoothest engine operation. (The proper adjustment will depend upon the B.T.U. content of the gas.)

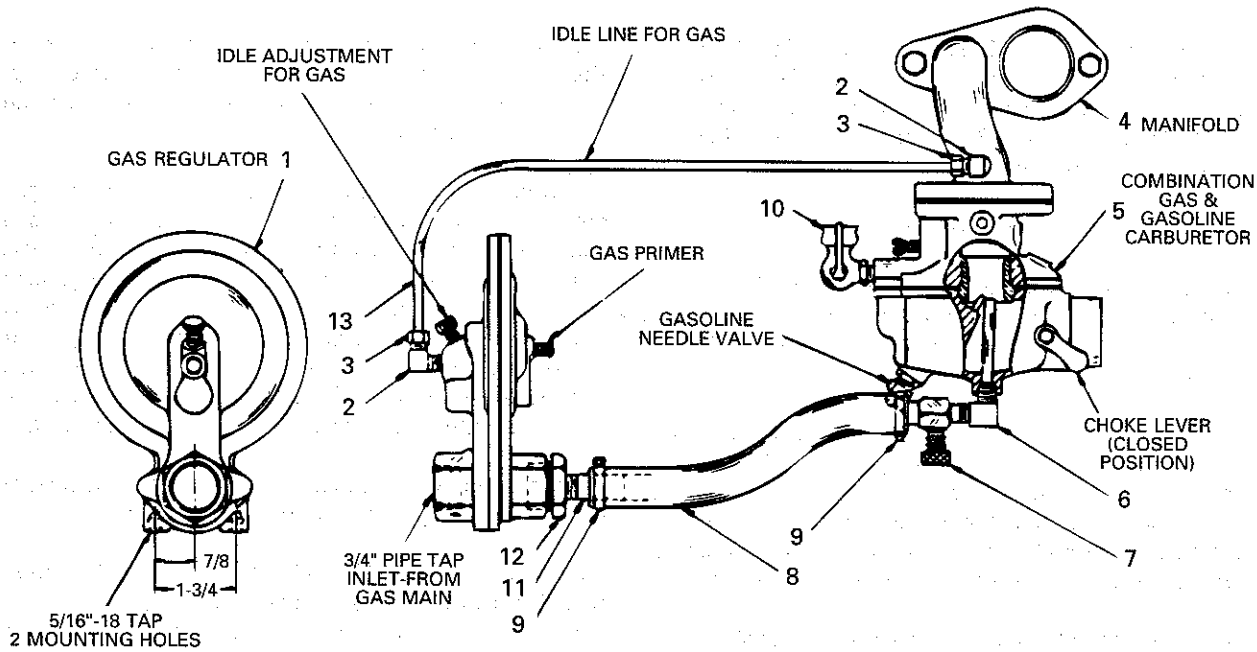
When starting on natural gas directly, open the gas regulator valve approximately 3 turns and do not close choke on carburetor. With the magneto switch in the running position, the gas primer on the gas regulator should be depressed and quickly released, then crank engine. Repeat if necessary. (Do not hold the primer down for any length of time as this will result in too rich a mixture.) After engine starts, the gas regulator valve (Ref. 7) should be adjusted for smoothest operation.

With the engine running slowly, adjust idle adjustment screw on the regulator for smooth operation.

When operating on BUTANE or PROPANE GAS, a pressure Reducing Valve is necessary in this line between the storage gas tank and the gas regulator on the engine, as the pressure in gas tank may be 100 lbs. or over, and this must be reduced to 6 or 7 ounces.

LZ48F3, LZ48K4, LZ48H1 Natural Gas Fuel System

USE WITH MODELS AEHD, AFHD, AGHD, AHHD



ITEM	PART NO.	DESCRIPTION	QTY
—	AB63F	Cylinder head (AEHD) (NLA)	1
—	AB81-1	Cylinder head (AFHD) (NLA)	1
—	AB81	Cylinder head (AGHD, AHHD)	1
—	AE76E	Inlet valve (AFHD, AGHD, AHHD)	1
—	AE75D	Stellite exhaust valve (AEHD)	1
—	AE76D	Stellite exhaust valve (AFHD, AGHD, AHHD)	1
—	AF51	Exhaust valve spring (AEHD)	1
—	HG273D	Stellite exhaust insert (AEHD)	1
—	HG272D	Stellite exhaust insert (AFHD, AGND, AHHD)	1
1	L101	Gas regulator, Garretson no. 039E	
2	RF1123	Elbow (NLA)	2
3	RF1124	Nut (NLA)	2
4	LD232-4	Manifold (AEHD) (NLA)	1
—	LD230-3	Manifold (AFHD, AGHD) (NLA)	1
—	LD231-3	Manifold (AHHD) (NLA)	1
5	LZ48F3	Carburetor (AEHD) (replaces LZ45B5) (obsolete)	1
—	LZ48K4	Carburetor (AFHD) (replaces LZ45A6) (obsolete)	1
—	LZ48K4	Carburetor (AGHD) (replaces LZ45A7) (obsolete)	1
—	LZ48H1	Carburetor (AHHD) (replaces LZ45A8) (obsolete)	1
6	L28A1	Gas jet	1
7	L28A2	Gas regulator valve	1
8	LL54	Rubber hose, 1/2" I.D. - 3 ply x 18" long (NLA)	1
9	LK20	Hose clamp, 7/8" I.D.	2
10	RG12	Priming cup (NLA)	1
11	RF997	Hose connector	1
12	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
13	RF744	Copper tubing, 3/16" O.D. x 36" long (NLA)	1

The Garretson no. 039E Gas Regulator (Ref. 1) should be installed as close to the carburetor (Ref. 2) as possible. The gas pressure to the regulator should be 7" to 10" Water Column (4 to 6 ounces per square inch) when used with natural gas (1100 B.T.U. content).

TO START ENGINE

There are two methods by which the engine can be started, one directly on natural gas and the other by a prime of gasoline. The gasoline starting method is usually easier.

When starting on gasoline, fill the carburetor float chamber by means of the priming cup (Ref. 6) furnished on the carburetor, with a good grade of gasoline. Adjust the gasoline needle valve below the carburetor so it is open approximately 3/4 to 1-1/4 turns. The gas regulator valve (Ref. 9) at the carburetor should be closed.

With the magneto switch in the running position and the choke lever on the carburetor in the closed position, the engine should be cranked. Repeat this operation if engine does not start on the first try.

After engine starts, the gas regulator valve (Ref. 9) should be opened and adjusted for the smoothest operation. (The proper adjustment will depend upon the B.T.U. content of the gas.)

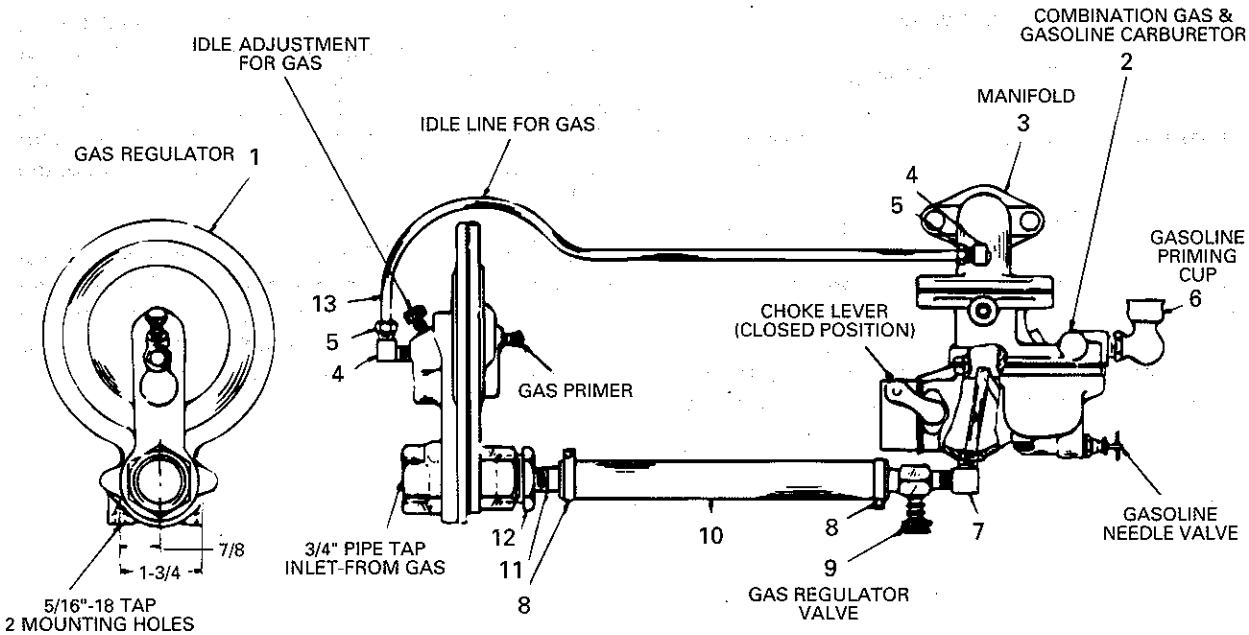
When starting on natural gas directly, open the gas regulator valve approximately 3 turns and do not close choke on carburetor. With the magneto switch in the running position, the gas primer on the gas regulator should be depressed and quickly released, then crank engine. Repeat if necessary. (Do not hold the primer down for any length of time as this will result in too rich a mixture.) After engine starts, the gas regulator valve (Ref. 9) should be adjusted for smoothest operation.

With the engine runnig slowly, adjust idle adjustment screw on the regulator for smooth operation.

When operating on BUTANE or PROPANE GAS, a Pressure Reducing Valve is necessary in the line between the storage gas tank and the gas regulator on the engine, as the pressure in gas tank may be 100 lbs. or over, and this must be reduced to 4 to 6 ounces.

LZ48Z1 Natural Gas Fuel System

USE WITH MODELS AEND, AENLD



ITEM	PART NO.	DESCRIPTION	QTY
—	AE75D	Stellite exhaust valve	1
—	AF51	Exhaust valve spring	1
—	HF445	Spacer	1
—	HG273D	Stellite exhaust insert	1
1	L101	Gas regulator, Garretson no. 039E	1
2	LZ48Z1	Carburetor assembly (includes 7, 9)	1
3	LC269A1	Manifold	1
4	RF1123	Elbow (NLA)	2
5	RF1124	Nut	2
6	RG12	Priming cup (NLA)	1
7	L28A1	Gas jet	1
8	LK20	Hose clamp, 7/8" I.D.	2
9	L28A2	Gas regulator valve	1
10	LL54	Rubber hose, 1/2" I.D. - 3 ply x 18" long	1
11	RF997	Hose connector	1
12	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
13	RF744	Copper tubing, 3/16" O.D. x 36" long (NLA)	1

The Garretson no. 039E Gas Regulator (Ref. 12) should be mounted as close to the carburetor (Ref. 2) as possible and the gas main to the regulator should be a 3/4" pipe size. The gas pressure to the regulator should be 7" to 10" water column (4 to 6 ounces per square inch) when used with natural gas (1100 B.T.U.).

TO START ENGINE

The gas regulator valve (Ref. 6) at the carburetor should be closed.

Fill the carburetor (Ref. 2) with gasoline by opening the shut-off cock below the gasoline tank. Adjust the gasoline needle valve so it is open approximately 3/4 to 1-1/4 turns.

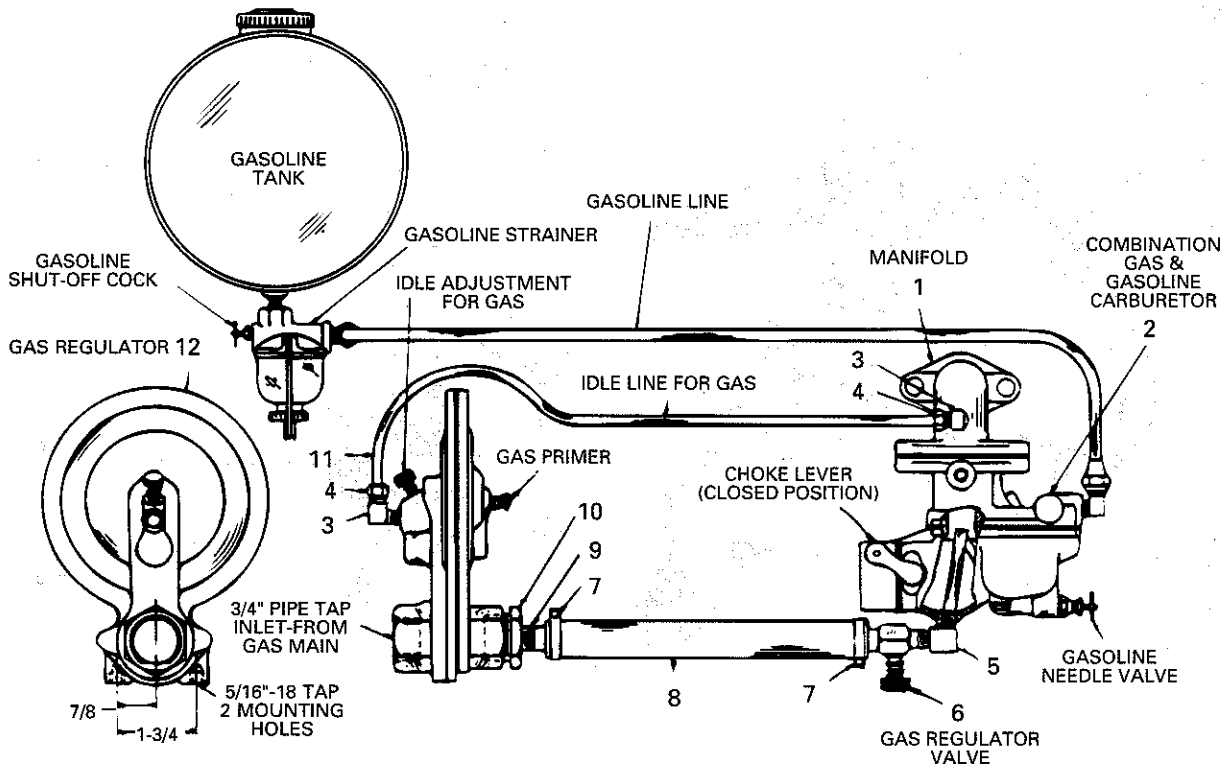
With the magneto switch in the operating position and the choke lever on the carburetor closed, crank the engine over slowly until the compression stroke is reached, then pull up on the crank rapidly to carry it across the top of the stroke. Repeat this operation if necessary.

With the engine operating on gasoline, to switch to gas, shut off the gasoline supply and open the gas regulator valve (Ref. 6) about one turn. When the gasoline is used up in the carburetor, the gas regulator valve should be adjusted to give the smoothest operation. (The proper adjustment will depend upon the B.T.U. content of the gas.)

When operating on BUTANE or PROPANE GAS, a Pressure Reducing Valve is necessary in the line between the storage gas tank and the gas regulator on the engine, as the pressure in gas tank may be 100 lbs. or over, and this must be reduced to 4 to 6 ounces.

LZ48Z1 Combination Gas-Gasoline

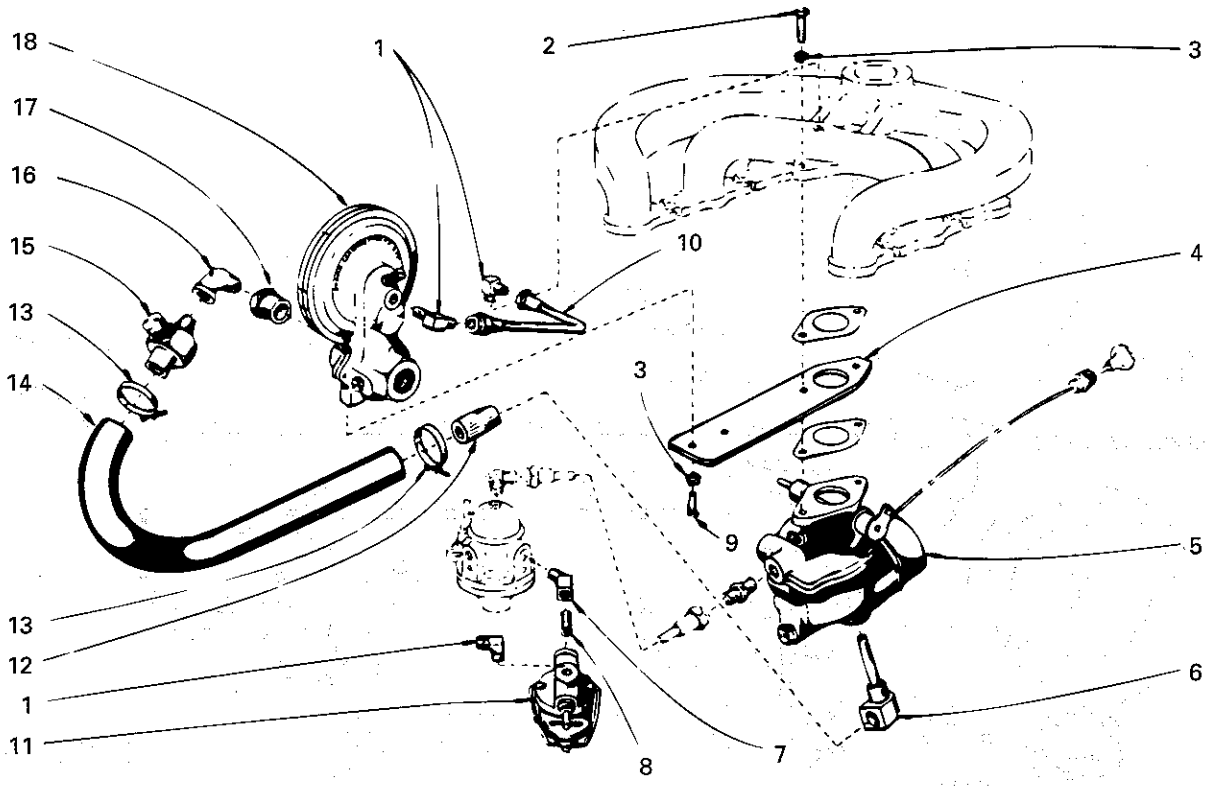
USE WITH MODELS AEND, AENLD



ITEM	PART NO.	DESCRIPTION	QTY
—	AE75D	Stellite exhaust valve	1
—	AF51	Exhaust valve spring	1
—	HG273D	Stellite exhaust insert	1
1	LC269A1	Manifold	1
2	LZ48Z1	Carburetor assembly (includes 5, 6)	1
3	RF1123	Elbow (NLA)	2
4	RF1124	Nut (NLA)	2
5	L28A1	Gas jet	1
6	L28A2	Gas regulator valve	1
7	LK20	Hose clamp, 7/8" I.D.	2
8	LL54	Rubber hose, 1/2" I.D. - 3 ply x 18" long (NLA)	1
9	RF997	Hose connector	1
10	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
11	RF744	Copper tubing, 3/16" O.D. x 36" long (NLA)	1
12	L101	Gas regulator, Garretson no. 039E	1

LZ48-29 Combination Gas-Gasoline And Natural Gas

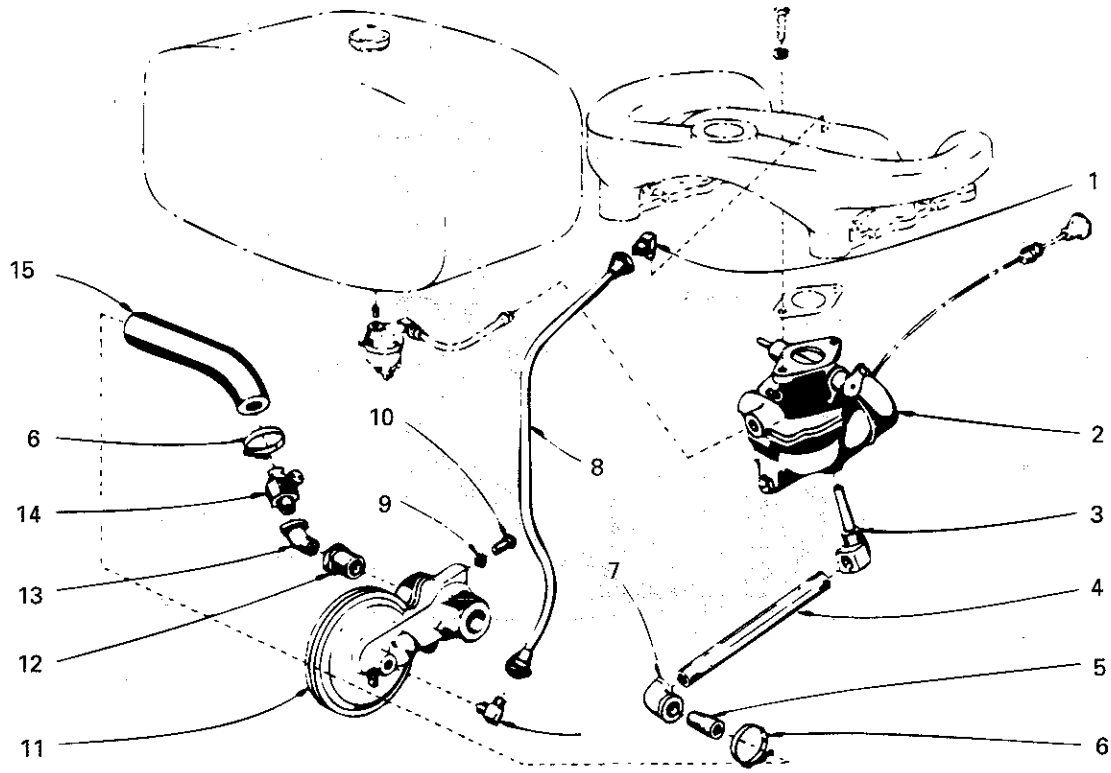
USE WITH MODEL VH4D OPEN ENGINE



ITEM	PART NO.	DESCRIPTION	QTY
—	AB100B	Cylinder head	2
—	AE75D	Stellite exhaust valve	4
—	AF51	Valve spring	4
—	HG273D	Stellite exhaust valve seat insert	4
1	RF1225	Tubing elbow	3
2	XD17	Screw, 5/16"-18 thread x 1" long	2
3	PE4	Lock washer, 5/16"	4
4	PG386	Bracket (NLA)	1
5	LZ48-29	Zenith carburetor (includes item 6) (NLA)	1
6	L28A1	Gas jet	1
7	RF1096	Street ell, 1/8" x 45°	1
8	RF794	Pipe nipple, 1/8" x 3/4" long	1
9	XD13	Screw, 5/16"-18 thread x 1/2" long	2
10	RM796	Idle line, 1/4" tubing, 6" long (NLA)	1
11	LP19	Gasoline strainer, Tillotson no. OW418T	1
12	RF997	Hose connector	1
13	LK20	Hose clamp, 7/8" I.D.	2
14	LL135	Gas line, 1/2" I.D. x 11" long, 3 ply (NLA)	1
15	L28A2	Gas regulator valve	1
16	XK37	Street ell, 1/4" x 90°	1
17	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
18	L101	Gas regulator, Garretson no. 039E	1

LZ48-29 Combination Gas-Gasoline And Natural Gas

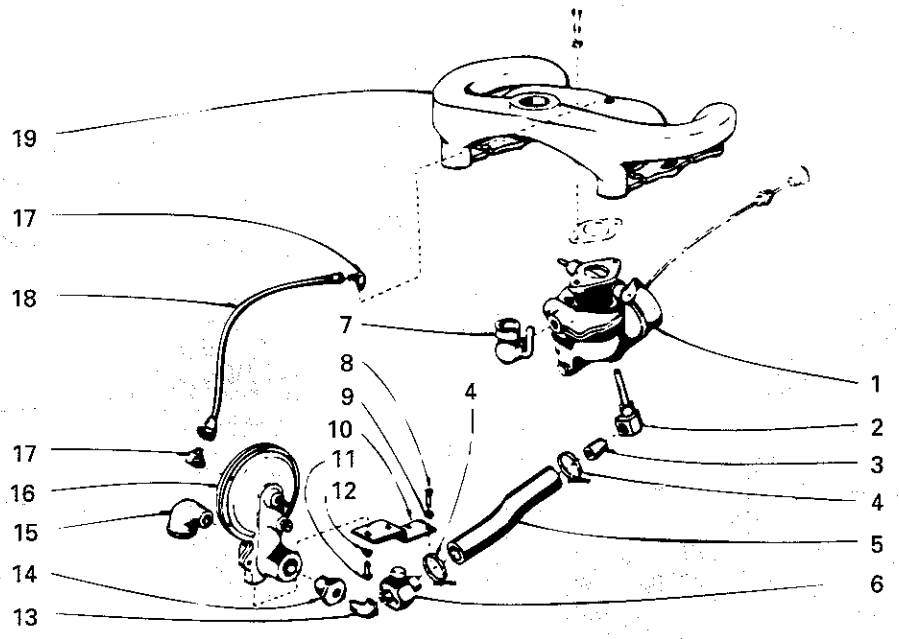
USE WITH MODEL VH4D POWER UNIT



ITEM	PART NO.	DESCRIPTION	QTY
—	AB100B	Cylinder head	2
—	AE75D	Stellite exhaust valve	4
—	AF51	Valve spring	4
—	HG273D	Stellite exhaust valve seat insert	4
1	RF1225	Tubing elbow	2
2	LZ48-29	Zenith carburetor (includes item 3) (NLA)	1
3	L28A1	Gas jet	1
4	RF1060	Pipe nipple, 1/4" x 7-1/4" long (NLA)	1
5	RF997	Hose connector	1
6	LK20	Hose clamp, 7/8" I.D.	2
7	XK22	Elbow, 1/4" x 90°	1
8	RM450	Idle line, 1/4" tubing, 20" long	1
9	PE4	Lock washer, 5/16"	2
10	XD13	Screw, 5/16"-18 thread x 1/2" long	2
11	L101	Gas regulator, Garretson no. 039E	1
12	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
13	XK65	Street ell, 1/4" x 45° (NLA)	1
14	L28A2	Gas regulator valve	1
15	LL114	Gas line, 1/2" I.D. x 6" long, 3 ply (NLA)	1

LZ48-29 Natural Gas Fuel System

USE WITH MODEL VH4D OPEN ENGINE AND POWER UNIT



ITEM	PART NO.	DESCRIPTION	QTY
—	AB100B	Cylinder head	2
—	AE75D	Stellite exhaust valve	4
—	AF51	Valve spring	4
—	HG273D	Stellite exhaust valve seat insert	4
1	LZ48-29	Zenith carburetor (includes item 2) (NLA)	1
2	L28A1	Gas jet	1
3	RF997	Hose connector	1
4	LK20	Hose clamp, 7/8" I.D.	2
5	LL86	Gas line, 1/2" I.D. x 6-1/2" long, 3 ply	1
6	L28A2	Gas regulator valve	1
7	RG12	Gasoline priming cup (NLA)	1
8	XB75	Screw, 1/4"-20 thread x 3/4" long	2
9	PE3	Lock washer, 1/4"	2
10	BI265A	Bracket	1
11	XD13	Screw, 5/16"-18 thread x 1/2" long	2
12	PE4	Lock washer, 5/16"	2
13	XK37	Street ell, 1/4" x 90°	1
14	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
15	XK24	Street ell, 3/4" x 90° pipe	1
16	L101	Gas regulator, Garretson no. 039E	1
17	RF1225	Tubing elbow	2
18	RM441	Idle line, 1/4" tubing, 10" long	1
19	LD253B1	Manifold	1

LZ51E5 Or LZ52C4 Combination Gas-Gasoline

The Garretson no. 039E Gas Regulator (Ref. 1) should be mounted as close to the carburetor (Ref. 6) as possible and the gas main to the regulator should be a 3/4" pipe size. The gas pressure to the regulator should be 7" to 10" water column (4 to 6 ounces per square inch) when used with natural gas (1100 B.T.U.).

TO START ENGINE

The gas regulator valve (Ref. 9) at the carburetor should be closed.

Fill the carburetor (Ref. 6) with gasoline by opening the shut-off cock in the strainer below the gasoline tank. Adjust the gasoline needle valve so it is open approximately 3/4 to 1-1/4 turns.

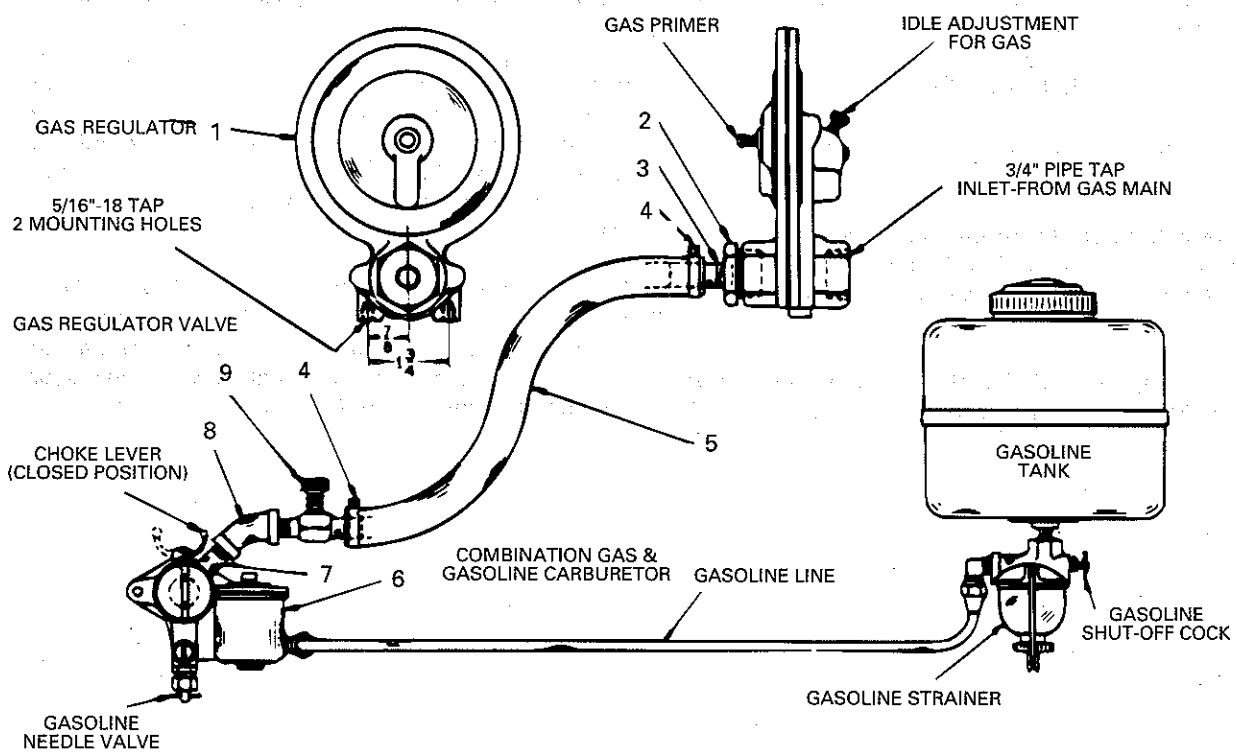
With the magneto switch in the operating position and the choke lever on the carburetor closed, crank the engine over slowly until the compression stroke is reached. Now turn the sheave back one-half turn. Rewind the rope fully and pull briskly to turn the crankshaft over rapidly. If all conditions are right engine will start promptly, after one or two applications of the rope.

With the engine operating on gasoline, to switch to gas, shut off the gasoline supply and open the gas regulator valve (Ref. 9) about one turn. When the gasoline is used up in the carburetor, the gas regulator valve should be adjusted to give the smoothest operation. (The proper adjustment will depend upon the B.T.U. content of the gas.)

When operating on BUTANE or PROPANE GAS, a Pressure Reducing Valve is necessary in the line between the storage gas tank and the gas regulator on the engine, as the pressure in gas tank may be 100 lbs. or over, and this must be reduced to 4 to 6 ounces.

LZ51E5 Or LZ52C4 Combination Gas-Gasoline

USE WITH MODELS ACND, BKND

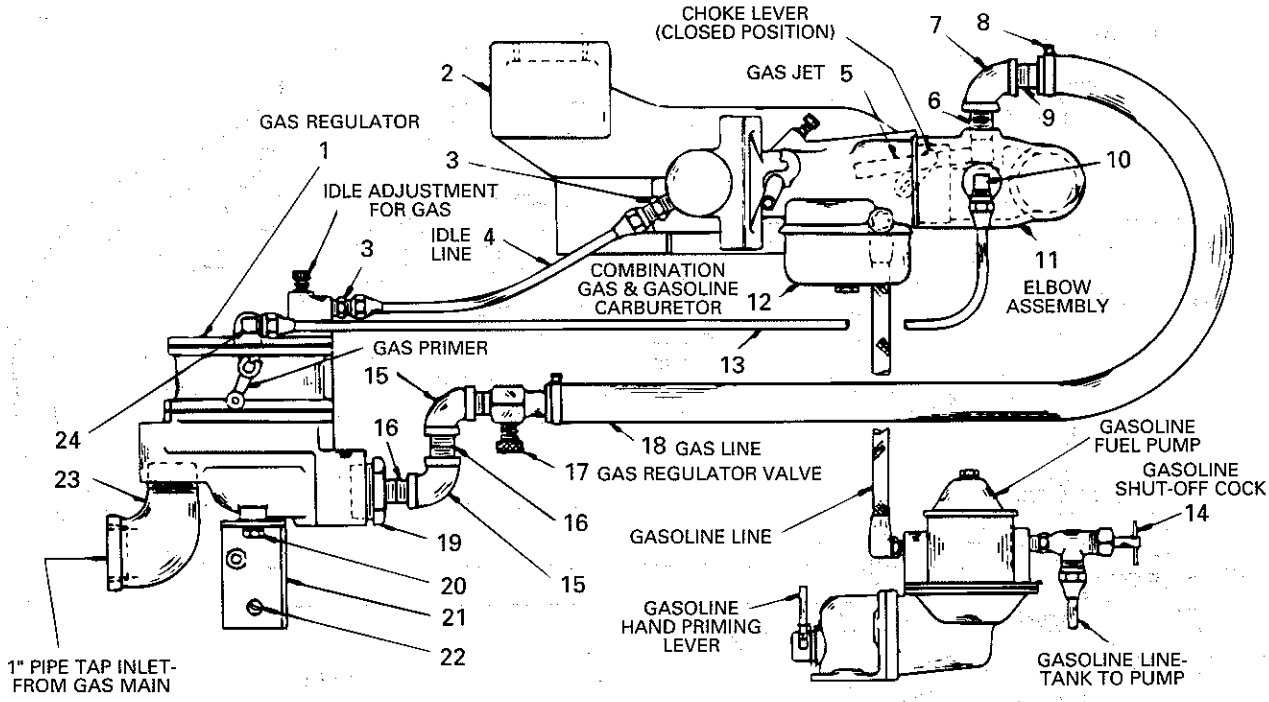


ITEM	PART NO.	DESCRIPTION	QTY
—	AE74C	Inlet valve	1
—	AE74D	Stellite exhaust valve	1
—	AF49A	Exhaust valve spring	1
—	HG273D	Stellite exhaust insert	1
1	L101	Gas regulator, Garretson no. 039E	1
2	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
3	RF997	Hose connector	1
4	LK20	Hose clamp, 7/8" I.D.	2
5	LL54	Rubber hose, 1/2" I.D. - 3 ply x 18" long (NLA)	1

ITEM	PART NO.	DESCRIPTION	QTY
6	LZ51E5	Zenith carburetor assembly (replaces standard carburetor) (includes 7-9; includes carburetor) (replaces LZ26A8) (NLA)	1
—	LZ52C4	Marvel-Schebler carburetor assembly; optional (replaces LZ26A8) (NLA)	
7	RF934	Pipe nipple, 1/8" x 1" long	1
8	XK116	Pipe elbow, 1/8" x 45°	1
9	L28-4	Gas regulator valve	1

LZ54J2 Combination Gas-Gasoline And Natural Gas

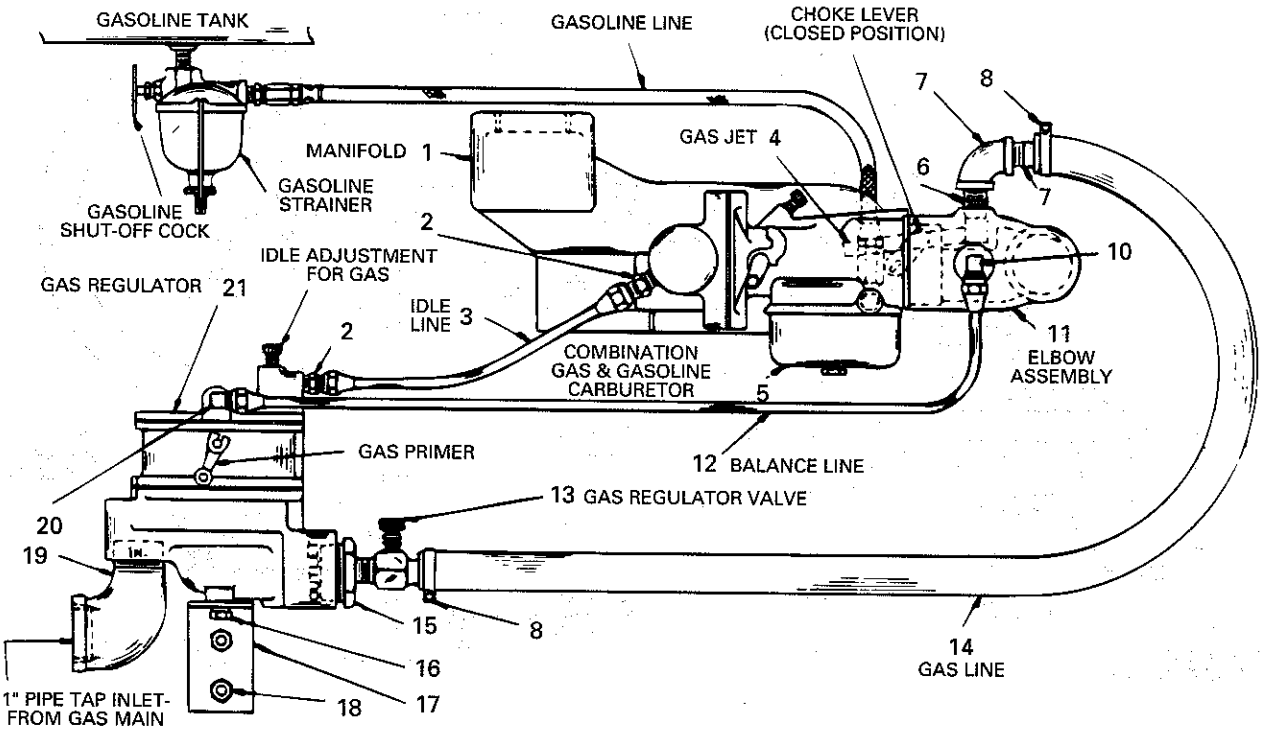
USE WITH MODELS VP4D, VG4D OPEN ENGINES



ITEM	PART NO.	DESCRIPTION	QTY
—	AB88	Cylinder head (VP4D) (NLA)	2
—	AB97B	Cylinder head (VG4D)	2
—	PH79	Flat washer	4
1	L20	Gas regulator, Ensign model "B", no. 4782	1
2	LD240B	Manifold	1
3	RF269	Straight fitting	2
4	RM717	Idle line, 14-3/4" long	1
5	RF1204	Gas jet	1
6	RF503	Pipe nipple, 1/4" x 7/8" long	1
7	XK22	Elbow, 1/4" x 90°	1
—	XB20	Clamp screw and PE3 lock washer	1
8	LK20	Hose clamp, 7/8" I.D.	2
9	RF997	Hose connector	1
10	RF270-5	Elbow	1
11	BI288A	Gas tube and air cleaner elbow assembly (includes 5-7, 9, 10)	1
12	LZ54J2	Schebler carburetor (NLA)	1
13	RM1161	Balance line, 23" long	1
14	RG22	Shut-off cock	1
15	XK22	Elbow, 1/2" pipe x 90°	2
16	RF503	Pipe nipple, 1/4" x 7/8" long	2
17	L28A2	Gas regulator valve	1
18	LL97	Gas line, 1/2" I.D. - 3 ply x 23" long (NLA)	1
19	XK87	Reducer bushing, 1" to 1/4" (NLA)	1
20	XD13	Screw, 5/16"-18 thread x 1/2" long	2
21	BI207-1	Bracket (NLA)	1
22	XA35	Screw, 1/4"-20 thread x 5/8" long	2
23	XK20	Street ell, 1" x 90°	1
24	RF1225	Elbow	1

LZ54J2 Combination Gas-Gasoline And Natural Gas

USE WITH MODELS VP4D, VG4D POWER UNITS

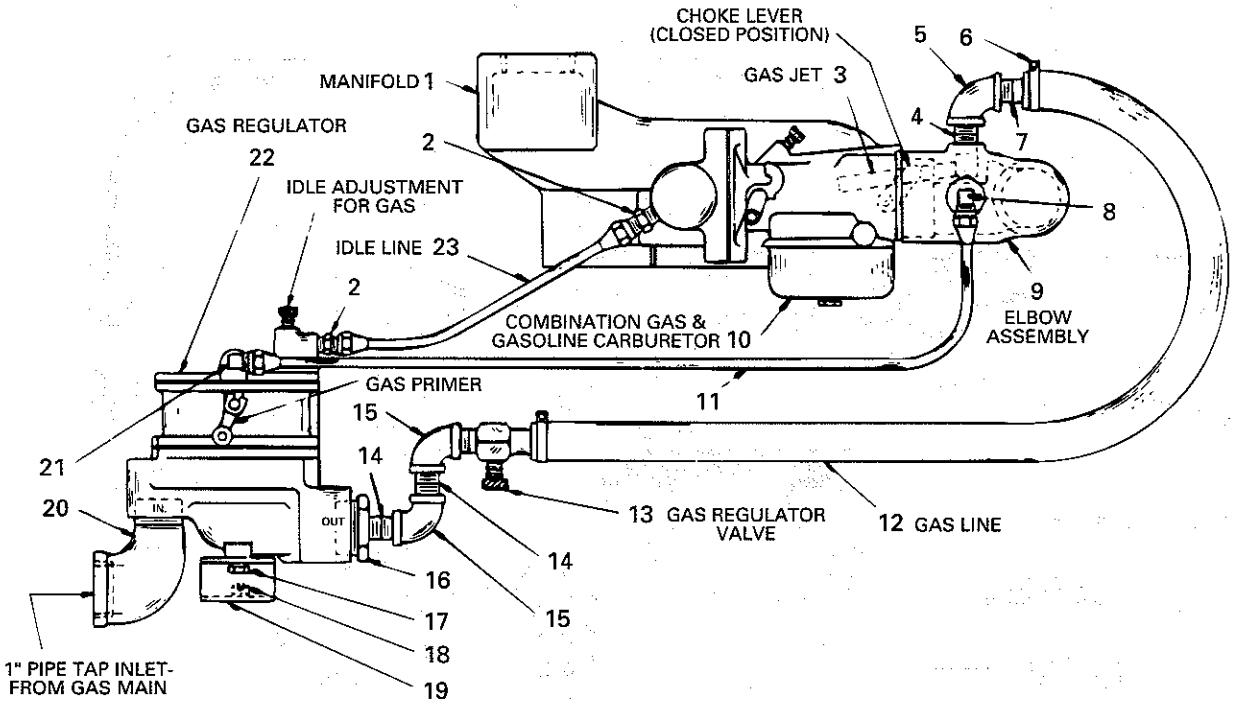


ITEM	PART NO.	DESCRIPTION	QTY
—	AB88	Cylinder head (VP4D) (NLA)	2
—	AB97B	Cylinder head (VG4D)	2
—	PH79	Flat washer	4
1	LD240B	Manifold	1
2	RF269	Straight fitting	2
3	RM717	Idle line, 14-3/4" long	1
4	RF1204	Gas jet	1
5	LZ54J2	Schebler carburetor (NLA)	1
6	RF503	Pipe nipple, 1/4" x 7/8" long	1
7	XK22	Elbow, 1/4" x 90°	1
—	XB20	Clamp screw and PE-3 lock washer	1
8	LK20	Hose clamp, 7/8" I.D.	2
9	RF997	Hose connector	1
10	RF270-5	Elbow	1
11	BI288A	Gas tube and air cleaner elbow assembly (includes 4, 6, 7, 9, 10)	1

ITEM	PART NO.	DESCRIPTION	QTY
12	RM1161	Balance line, 23" long	1
13	L28A2	Gas regulator valve	1
14	LL97	Gas line, 1/2" I.D. - 3 ply x 23" long (NLA)	1
15	XK87	Reducer bushing, 1" to 1/4" (NLA)	1
16	XD13	Screw, 5/16"-18 thread x 1/2" long	2
17	BI207	Bracket (NLA)	1
18	XD172	Screw, 5/16"-18 thread x 1/2" long with 1/8" thick hexagon head	2
19	XK20	Street ell, 1" x 90°	1
20	RF1225	Elbow	1
21	L20	Gas regulator, Ensign model "B", no. 4782 (NLA)	1

LZ54J2 Natural Gas Fuel System

USE WITH MODELS VP4D, VG4D OPEN ENGINES



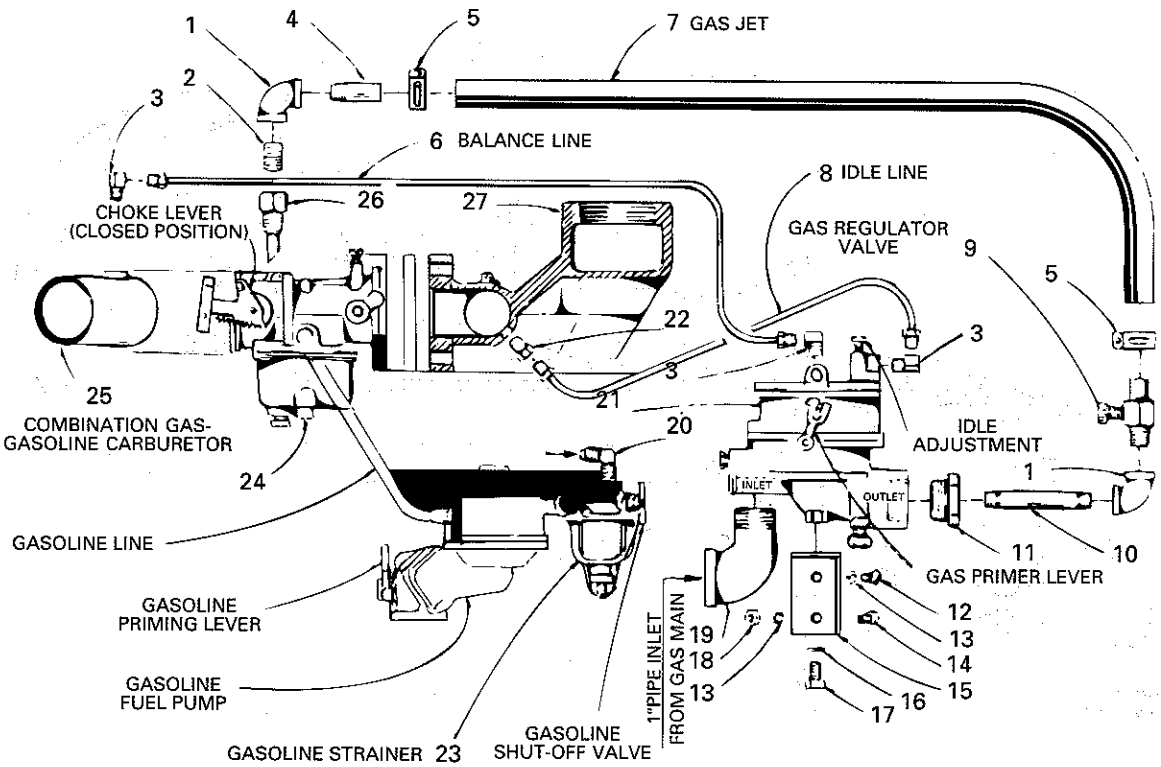
ITEM	PART NO.	DESCRIPTION	QTY
—	AB88	Cylinder head (VP4D) (NLA)	2
—	AB97B	Cylinder head (VG4D)	2
—	PH79	Flat washer	4
1	LD240B	Manifold	1
2	RF269	Straight fitting	2
3	RF1204	Gas jet	1
4	RF503	Pipe nipple, 1/4" x 7/8" long	1
5	XK22	Elbow, 1/4" x 90°	1
—	XB20	Clamp screw and PE3 lock washer	1
6	LK20	Hose clamp, 7/8" I.D.	2
7	RF997	Hose connector	1
8	F270-5	Elbow	1
9	BI288A	Gas tube and air cleaner elbow assembly (includes 3-5, 7, 8; includes BI288)	1
—	* BI288	Elbow	1
10	LZ54J2	Schebler carburetor (NLA)	1
11	RM1161	Balance line, 23" long	1

ITEM	PART NO.	DESCRIPTION	QTY
12	LL97	Gas line, 1/2" I.D. - 3 ply x 23" long	1
13	L28A2	Gas regulator valve	1
14	RF503	Pipe nipple, 1/4" x 7/8" long	2
15	XK22	Elbow, 1/2" pipe x 90°	2
16	XK87	Reducer bushing, 1" to 1/4" (NLA)	1
17	XD13	Screw, 5/16"-18 thread x 1/2" long	2
18	XB75	Screw, 1/4"-20 thread x 3/4" long	2
19	BI265B	Bracket (NLA)	1
20	XK20	Street ell, 1" x 90°	1
21	RF1225	Elbow	1
22	L20	Gas regulator, Ensign model "B", no. 4782 (NLA)	1
23	RM717	Idle line, 14-3/4" long	1

* Not serviced separately.

LZ56B4 Combination Gas-Gasoline And Natural Gas

USE WITH MODEL VR4D OPEN ENGINE

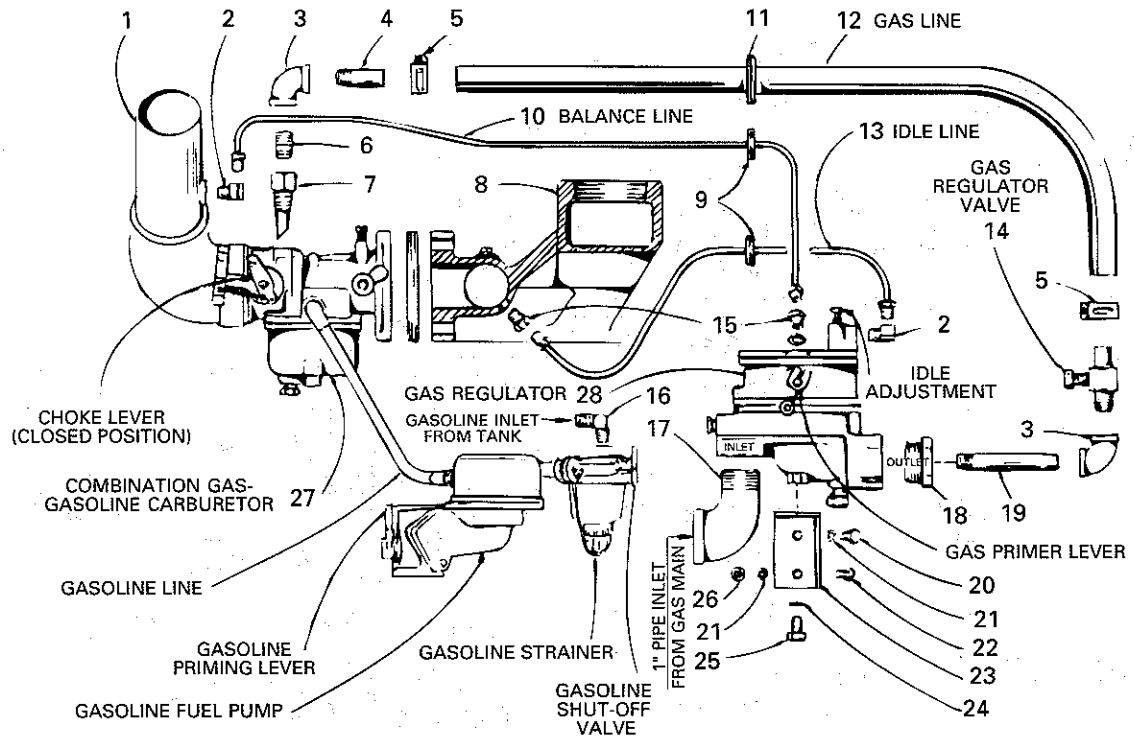


ITEM	PART NO.	DESCRIPTION	QTY
—	AB95A2	Cylinder head (NLA)	2
—	XD29	Screw, 3/8"-16 thread x 1-1/4" long	42
1	XK22	Elbow, 1/2" pipe x 90°	2
2	RF503	Pipe nipple, 1/4" W.I. pipe, 7/8" long	1
3	RF1123	Elbow (NLA)	3
4	RF997	Hose connector	1
5	LK20	Hose clamp, 7/8" I.D.	2
6	RM749A	Balance line, 3/16" tubing, 22-1/2" long (NLA)	1
7	LL97	Gas line, 1/2" I.D. - 3 ply x 23" long (NLA)	1
8	RM1227A	Idle line, 3/16" tubing, 18" long (NLA)	1
9	L28A2	Gas regulator valve	1
10	RF1278	Pipe nipple, 1/4" W.I. pipe, 3-1/4" long (NLA)	1
11	XK87	Reducer bushing, 1" to 1/4" (NLA)	1
12	XA35	Screw, 1/4"-20 thread x 5/8" long	1

ITEM	PART NO.	DESCRIPTION	QTY
13	PE3	Lock washer, 1/4"	2
14	XA34	Screw, 1/4"-20 thread x 1/2" long	1
15	BI207	Bracket (NLA)	1
16	PE4	Lock washer, 5/16"	2
17	XD13	Screw, 5/16"-18 thread x 1/2" long	2
18	PD77	Nut, 1/4"-20 thread	1
19	XK20	Street ell, 1" x 90°	1
20	RF1225	Elbow	1
21	L20	Gas regulator, Ensign model "B", no. 4782 (NLA)	1
22	RF1314	Straight fitting (NLA)	1
23	LP19	Gasoline strainer	1
24	LZ56B4	Zenith carburetor (includes item 26) (NLA)	1
25	LJ335A	Air cleaner tube (NLA)	1
26	RF1345A	Gas inlet tube (NLA)	1
27	LD248A	Manifold (NLA)	1

LZ56B4 Combination Gas-Gasoline And Natural Gas

USE WITH MODEL VR4D POWER UNIT

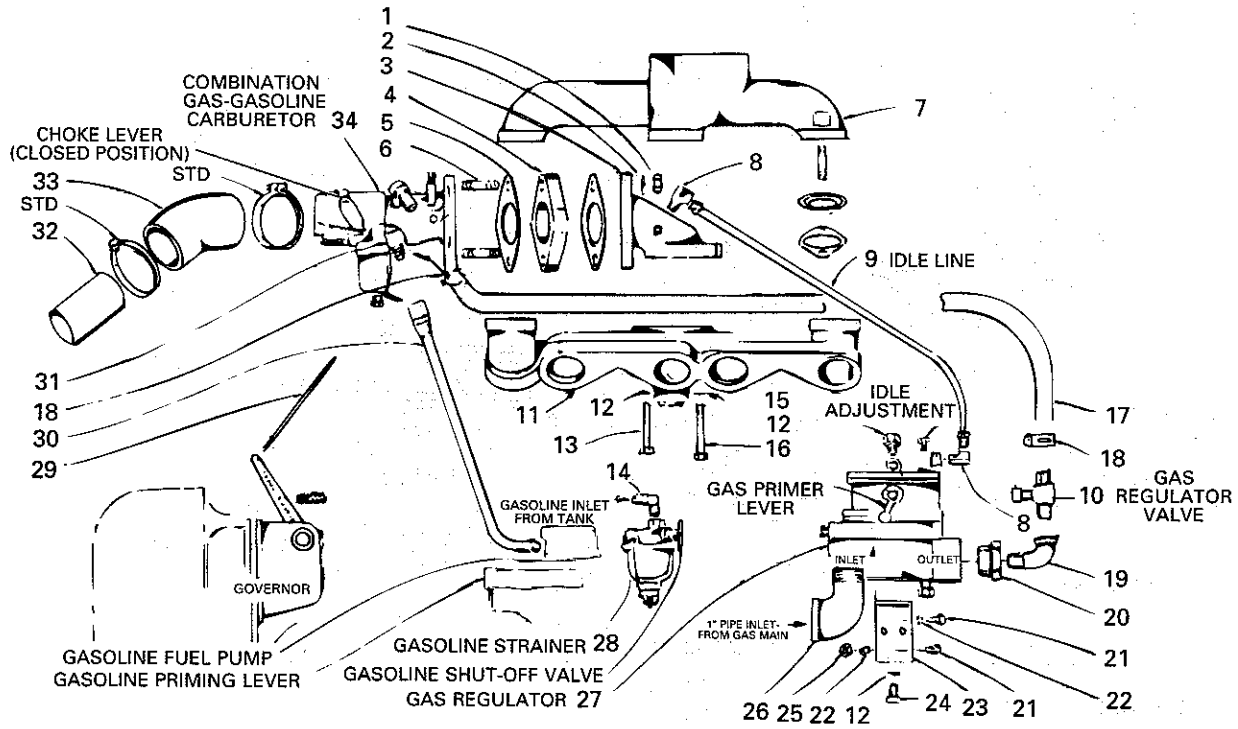


ITEM	PART NO.	DESCRIPTION	QTY
—	AB95A2	Cylinder head (not illustrated) (NLA)	2
—	XD29	Screw, 3/8"-16 thread x 1-1/4" long	42
1	LJ357B	Air cleaner tube (NLA)	1
2	RF1123	Elbow (NLA)	2
3	XK22	Elbow, 1/2" pipe x 90°	2
4	RF997	Hose connector	1
5	LK20	Hose clamp, 7/8" I.D.	2
6	RF503	Pipe nipple, 1/4" W.I. pipe, 7/8" long	1
7	RF1345A	Gas inlet tube (NLA)	1
8	LD248A4	Manifold (NLA)	1
9	PH198	Rubber grommet	2
10	RM749A	Balance line, 3/16" tubing, 22-1/2" long (NLA)	1
11	PH460	Rubber grommet (NLA)	1
12	LL97	Gas line, 1/2" I.D. - 3 ply x 23" long (NLA)	1
13	RM1227A	Idle line, 3/16" tubing, 18" long (NLA)	1
14	L28A2	Gas regulator valve	1

ITEM	PART NO.	DESCRIPTION	QTY
15	RF1314	Straight fitting (NLA)	2
16	RF1225	Elbow	1
17	XK20	Street ell, 1" x 90°	1
18	XK87	Reducer bushing, 1" to 1/4" (NLA)	1
19	RF1278	Pipe nipple, 1/4" W.I. pipe, 3-1/4" long (NLA)	1
20	XD6	Screw, 1/4"-20 thread x 3/4" long	1
21	PE3	Lock washer, 1/4"	2
22	XA35	Screw, 1/4"-20 thread x 5/8" long	1
23	BI207	Bracket (NLA)	1
24	PE4	Lock washer, 5/16"	2
25	XD13	Screw, 5/16"-18 thread x 1/2" long	2
26	PD77	Nut, 1/4"-20 thread	1
27	LZ56B4	Zenith carburetor (includes item 7) (NLA)	1
28	L20	Gas regulator, Ensign model "B", no. 4782 (NLA)	1

LZ56B13 Combination Gas-Gasoline And Natural Gas

USE WITH MODEL V461D



ITEM	PART NO.	DESCRIPTION	QTY
1	PD83	Nut, 3/8"-24 thread	2
2	PE5	Lock washer, 3/8"	2
3	LC280-1	Elbow (NLA)	1
4	HF604	Spacer	1
5	QC64	Gasket	2
6	PC409	Stud (NLA)	2
7	LD258C	Exhaust manifold	1
8	RF1123	Elbow (NLA)	2
9	RM1001	Idle line (NLA)	1
10	L28A2	Gas regulator valve	1
11	LD257C2S1	Inlet manifold	1
12	PE4	Lock washer, 5/16"	4
13	XD22	Screw, 5/16"-18 x 1-3/4" long	1
14	RF1225	Elbow	1
15	LO14	Breather	2
16	XD23	Screw, 5/16"-18 thread x 2" long	1
17	LL165	Gas line, 1/2" I.D. - 3 ply x 26" long (NLA)	1
18	LK20	Hose clamp, 7/8" I.D.	2
19	XK37	Street ell, 1/4" x 90°	1
20	XK87	Reducer bushing, 1" to 1/4" (NLA)	1
21	XA34	Screw, 1/4"-20 thread x 1/2" long	2
22	PE3	Lock washer, 1/4"	2
23	BI207-3	Bracket (NLA)	1
24	XD13	Screw, 5/16"-18 thread x 1/2" long	2
25	PD77	Nut, 1/4"-20 thread	1
26	XK20	Street ell, 1" x 90°	1
27	L20	Gas regulator, Ensign model "B", no. 4782 (NLA)	1
28	LP19	Gasoline strainer	1
29	VE875S1	Control rod	1
30	RM1049B	Gasoline line	1
31	RF1421	Elbow	1
32	LJ341	Tube (NLA)	1
33	LL109	Elbow	1
34	LZ56B13	Carburetor assembly (includes L85) (NLA)	1

LZ64A1 Combination Gas-Gasoline

GENERAL INFORMATION

The Garretson no. 039E gas regulator is a single diaphragm type regulator which will accurately regulate the flow of gas to the carburetor and will automatically shut off the supply when the engine demand has ceased.

The gas regulator, as illustrated on page 38, should be installed as close to the carburetor as possible, and it is preferred that it be mounted in a vertical position.

The gas pressure to the regulator should be 7" to 10" water column, or 4 to 6 ounces per square inch, when using natural gas of 1100 B.T.U. content.

STARTING PROCEDURE

There are two methods by which the engine can be started; one directly with natural gas and the other, by a prime of gasoline. The gasoline method is the least troublesome.

To Start On Gasoline: Fill the float chamber of the carburetor with gasoline, either through a priming cup on the carburetor, or if a separate auxiliary gasoline tank is furnished, by opening the shut-off valve in the gasoline strainer below the tank.

With the magneto or ignition switch in the on position, close the carburetor choke lever by pushing the lever down. Apply the crank at the flywheel end of the engine and pull up briskly on the crank in a clockwise direction. Do not attempt to spin the engine with the starting crank. If the engine does not start on the first pull up of the crank, re-engage the crank and repeat the operation. After the engine is started, the choke lever should be opened gradually as the engine warms up. More choking is necessary when starting in cold weather than in warm. If the engine is warm, very little choking is necessary.

With the engine operating on gasoline, to switch to natural gas, shut off the gasoline supply, open valve at main gas supply and open the gas regulator valve about one turn. When the gasoline is used up in the carburetor, the gas regulator valve should be adjusted to give the smoothest operation. The proper adjustment will depend upon the B.T.U. content of the gas.

When Starting Directly On Natural Gas: Open the gas regulator valve approximately 3 turns and do not close choke on carburetor. With the magneto or ignition switch in the running position, the gas primer on the gas regulator should be depressed and quickly released, then crank engine. Repeat if necessary. Do not hold primer down for any length of time as this will result in flooding of the carburetor. After engine starts, the gas regulator valve should be adjusted for smoothest engine operation.

With the engine running at low idle speed, adjust the idle adjusting screw on the gas regulator for smooth operation.

STOPPING ENGINE

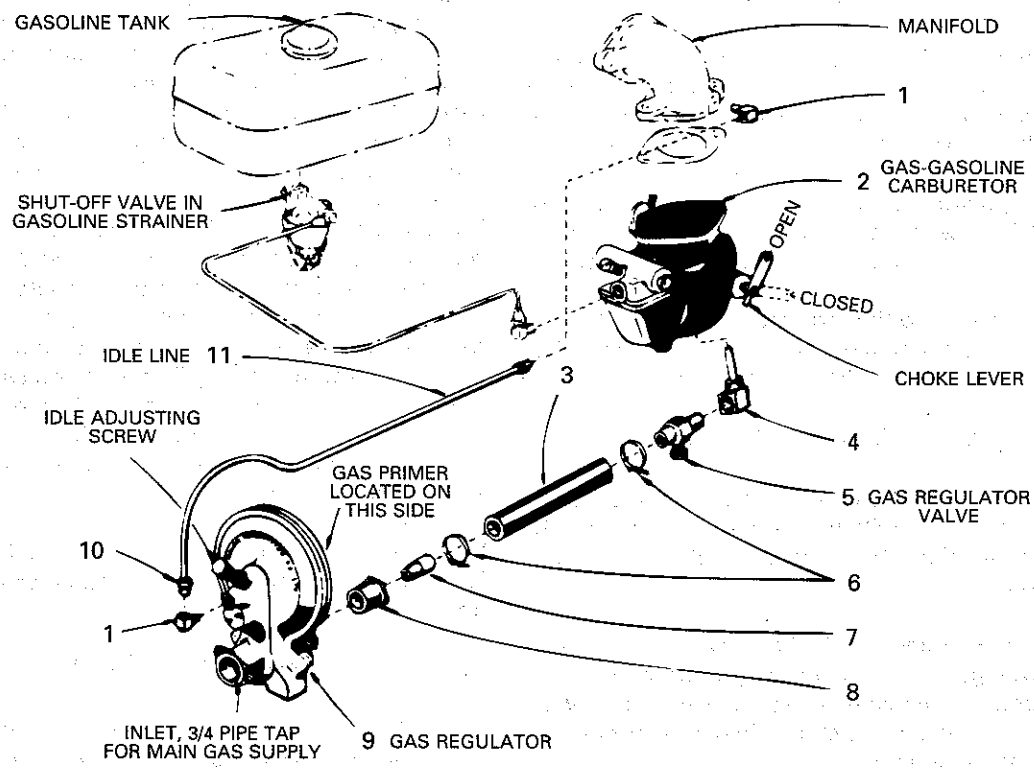
Let engine run at idle speed (1000 to 1200 R.P.M.) for a few minutes. This will cool the internal and external parts of the engine much faster than abruptly shutting off the engine from full load speed.

For short intervals of operation, the engine can be stopped by depressing the switch on the magneto and holding down until engine stops. On engines with timer ignition, "push in" ignition switch to stop engine.

To properly shut off the engine after the days work, close the shut-off valve at the main gas supply and allow the engine to run until the gas in the carburetor and fuel lines is used up, at which time the engine will stop. On engines with timer ignition "push in" ignition switch button when engine stops.

LZ64A1 Combination Gas-Gasoline

USE WITH MODEL AGND

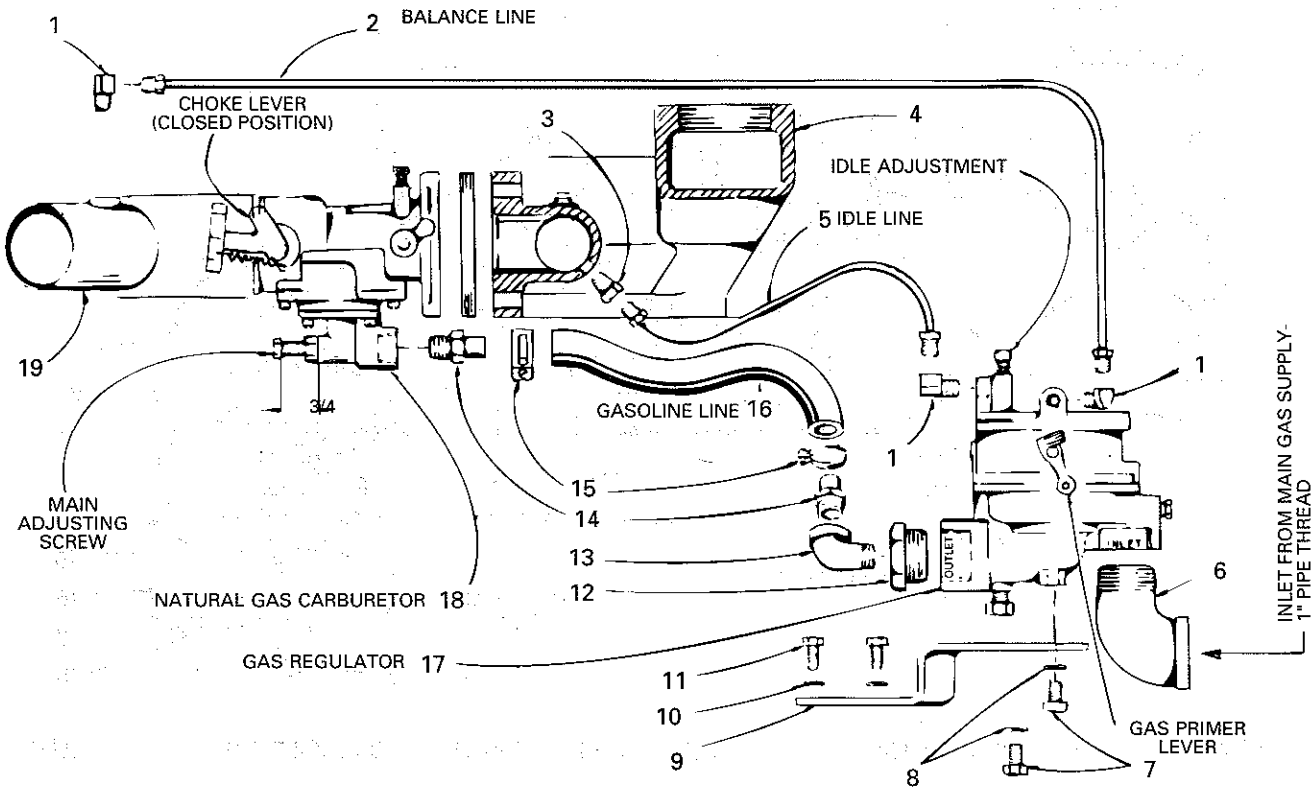


ITEM	PART NO.	DESCRIPTION	QTY
—	AB102A2	Cylinder head	1
—	AE87D	Stellite exhaust valve	1
—	AF55	Valve spring	1
—	AG31	Roto-cap	1
—	HG272D	Stellite exhaust valve seat insert	1
1	RF1123	Elbow (NLA)	2
2	LZ64A1	Marvel-Schebler carburetor assembly (includes item 4) (NLA)	1
3	LL54	Gas line, 1/2" I.D. x 18" long, 3 ply (NLA)	1

ITEM	PART NO.	DESCRIPTION	QTY
4	L28A4	Gas jet (NLA)	1
5	L28A2	Gas regulator valve	1
6	LK20	Hose clamp, 7/8" I.D.	2
7	RF997	Hose connector	1
8	XK19A	Reducer bushing, 3/4" to 1/4" (NLA)	1
9	L101	Gas regulator, Garretson no. 039E	1
10	RF1124	Nut (NLA)	2
11	RM744A	Idle line, 3/16" tubing, 36" long (NLA)	1

LZ72A Natural Gas Fuel System

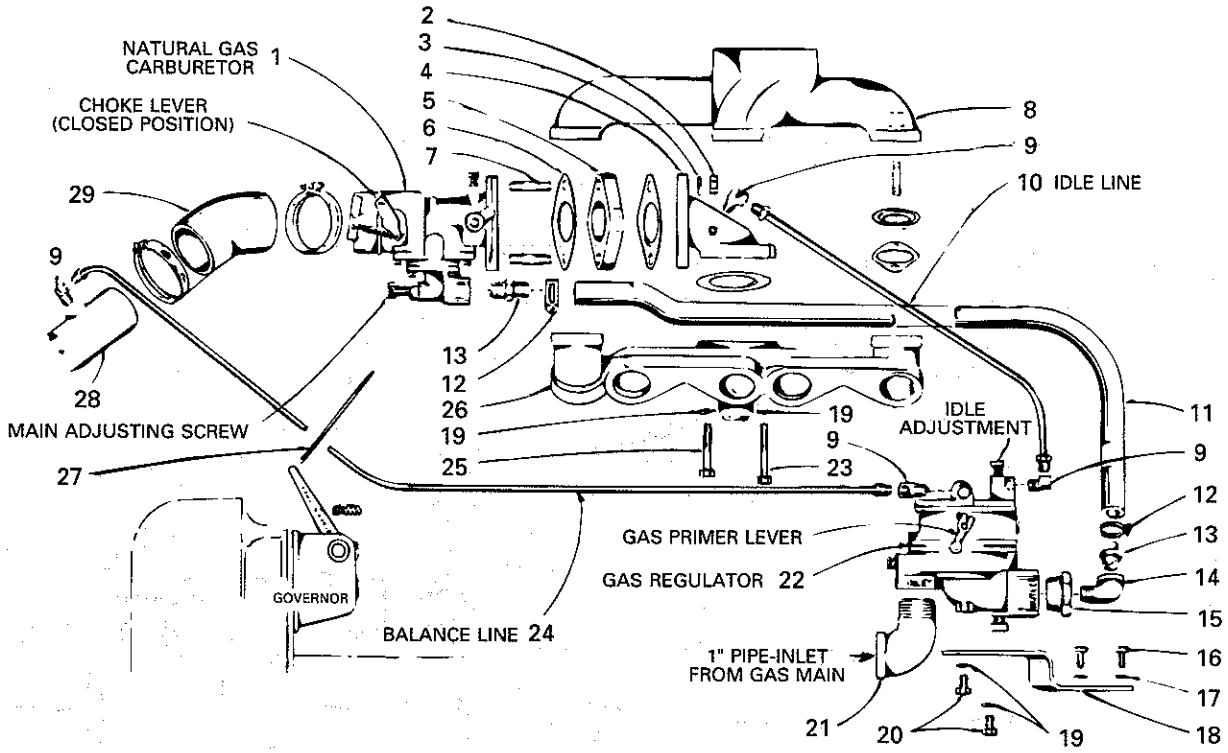
USE WITH MODEL VR4D



ITEM	PART NO.	DESCRIPTION	QTY
—	AB95A2	Cylinder head (not illustrated) (NLA)	2
—	XD29	Screw, 3/8"-16 thread x 1-1/4" long	42
1	RF1123	Elbow, 3/16" (NLA)	3
2	RF749A	Balance line, 3/16" tubing, 22-1/2" long (NLA)	1
3	RF1314	Straight fitting, 3/16" tubing nut (NLA)	1
4	LD248E4	Manifold (NLA)	1
5	RM886B	Idle line, 3/16" tubing, 10" long (NLA)	1
6	XK20	Street ell, 1" x 90°	1
7	XD13	Screw, 5/16"-18 x 1/2" long	2
8	PE4	Lock washer, 5/16"	2
9	BI265B	Bracket (NLA)	1
10	PE3	Lock washer, 1/4"	2
11	XD4	Screw, 1/4"-20 thread x 1/2" long	2
12	XK74	Reducer bushing, 1" to 3/8" (NLA)	1
13	XK45	Street ell, 3/8" x 90° (NLA)	1
14	RF1310	Connector (NLA)	2
15	LK20	Hose clamp, 7/8" I.D.	2
16	L63BL	Gas line, 1/2" I.D. x 16" long, 3 ply	1
17	L20	Gas regulator, Ensign model "B", no. 4782 (NLA)	1
18	LZ72A	Gas carburetor assembly (NLA)	1
19	LJ335A	Air cleaner tube (NLA)	1

LZ72A Natural Gas Fuel System (SK1396A)

USE WITH MODEL V461D



ITEM	PART NO.	DESCRIPTION	QTY
1	LZ72A	Gas carburetor assembly (NLA)	1
2	PD83	Nut, 3/8"-24 thread	2
3	PE5	Lock washer, 3/8"	2
4	LC280-1	Elbow (NLA)	1
5	HF604	Spacer	1
6	QC64	Gasket	2
7	PC409	Stud (NLA)	2
8	LD258C	Exhaust manifold	1
9	RF1123	Elbow, 3/16" (NLA)	4
10	RM886	Idle line, 3/16" tubing, 10" long (NLA)	1
11	L63BL	Gas line, 1/2" I.D. x 16" long, 3 ply	1
12	LK20	Hose clamp, 7/8" I.D.	2
13	RF1310	Connector (NLA)	2
14	XK45	Street ell, 3/8" x 90° (NLA)	1
15	XK74	Reducer bushing, 1" to 3/8" (NLA)	1
16	XA34	Screw, 1/4"-20 thread x 1/2" long	2

ITEM	PART NO.	DESCRIPTION	QTY
17	PE3	Lock washer, 1/4"	2
18	BI265C	Bracket (NLA)	1
19	PE4	Lock washer, 5/16"	4
20	XD13	Screw, 5/16"-18 thread x 1/2" long	2
21	XK20	Street ell, 1" x 90°	1
22	L20	Gas regulator, Ensign model "B", no. 4782 (NLA)	1
23	XD23	Screw, 5/16"-18 thread x 2" long	1
24	RF715	Balance line, 3/16" tubing, 21-1/4" long (NLA)	1
25	XD22	Screw, 5/16"-18 thread x 1-3/4" long	1
26	LD257C2S1	Inlet manifold	1
27	VE875S1	Control rod	1
28	LJ341A	Tube (NLA)	1
29	LL109	Elbow	1