SECTION IV

TROUBLESHOOTING

After the Chaparral snow vehicle has been in the customer's hands for a period of time, it may be returned to the dealer with a report of a malfunction. While the customer's complaint must be received courteously, it in itself is not cause for replacement of the malfunctioning part without further consideration of the possible cause and effect of the problem. Frequently, a minor adjustment is all that is required to solve the problem.

ENGINE TROUBLESHOOTING

TROUBLE	CAUSES	CHECK FOR:
HARD STARTING	Fuel not reaching carburetor	Check gas supply Fuel line pinched Plugged vent hole in filler cap Fuel filter plugged Impulse tube loose or pinched
	Poor ignition spark	Ignition not turned on Spark plug wet or fouled Spark electrodes broken or improperly gapped High tension lead loose or broken Breaker points damp, pitted, or improperly gapped Ignition switch faulty Ignition coil faulty Condenser faulty
	Bad fuel-air mixture	Engine flooded, over-choking Fuel stale, doesn't vaporize Water in fuel Dirt or gum forming Carburetor loose, allowing too much air intake

TROUBLE	CAUSES	CHECK FOR:
	Poor compression	Spark plug loose Cylinder head loose Head gasket leaking Piston rings broken Pistons scored Piston and cylinder worn
	(Electric Start Models)	
	Cranks too slowly	Loose or corroded battery cables Weak battery Starting solenoid faulty Moisture in starter
RUNNING PROBLEMS	Lacks power	Poor quality fuel Improperly mixed fuel Water in fuel Air inlet restricted Exhaust port or muffler plugged Loose or improperly adjusted carburetor Ignition timing incorrect Poor compression
	Runs unevenly	Spark plug in poor condition Wrong spark plug or plug gap High tension lead loose Breaker points pitted Fuel bubbles in carburetor from overheating
	Poor acceleration	Choke closed Carburetor malfunction Exhaust port coated with carbon
	Backfiring	Insufficient fuel Spark plug too hot (pre-ignition) Water in carburetor Air leakage from faulty gaskets or oil seals.

TROUBLE	CAUSES	CHECK FOR:
	Knocks under load, full throttle	Timing too early Spark plug heat range wrong Carburetor main fuel set too lean Combustion chamber coated with carbon
	Engine stops	Vapor lock Ignition interrupted Exhaust pipe plugged Overloaded Insufficient oil in fuel Fuel line plugged Carburetor inlet screen or passages plugged
	NOTE Vapor lock may occur at temperatures of 30°F and above, due to insufficient cooling of the engine. In this case, a colder plug, such as Bosch M280-T1, may be used. In addition, vapor lock conditions may be relieved by use of higher octane fuel. If the engine is equipped with a Tillotsen carburetor, a high altitude return kit (see Section Six) may also be used.	

CARBURETOR TROUBLESHOOTING

TROUBLE	CAUSES	CORRECTION
OVERFLOW	Dirty inlet valve	Remove valve, clean and replace
	Inlet valve does not close tight enough	Replace valve (check to see if valve seat surface is smooth)
	Inlet control level not operating smoothly	Replace or adjust as shown in Figure 4-1

TROUBLE	CAUSES	CORRECTION
	Main diaphragm out of correct position.	Place diaphragm in correct position
	Incorrect inner pressure in regulator.	Readjust according to instructions, Section Six
POOR STARTING	Blocked fuel passage	Clean fuel passage with gasoline and air pressure
	Fuel pump not working	Check the impulse tube and orifice fuel pump components and check valve
	Choke not closing properly	Re-assemble in correct order
	No more fuel	Check fuel tank
POOR IDLING	Regulator or idle adjustment incorrect	Adjust idle mixture screw, idle speed screw and regulator if necessary
	Inlet control lever incorrectly adjusted	Adjust as shown in Figure 4-1
	Fuel pump not operating	Check fuel pump section Check crankcase impulse tube and orifice.
UNSATISFACTORY HIGH SPEED PERFORMANCE	Incorrect high speed adjustment	Readjust high speed screw
	Blocked fuel passage	Clean fuel passage
	Defective high speed adjustment screw	Replace high speed adjustment screw
	Fuel pump not operating properly due to air inside pump section	Release air by loosening the screw plug as shown in Figure 4-1 This should be performed at idle speed.

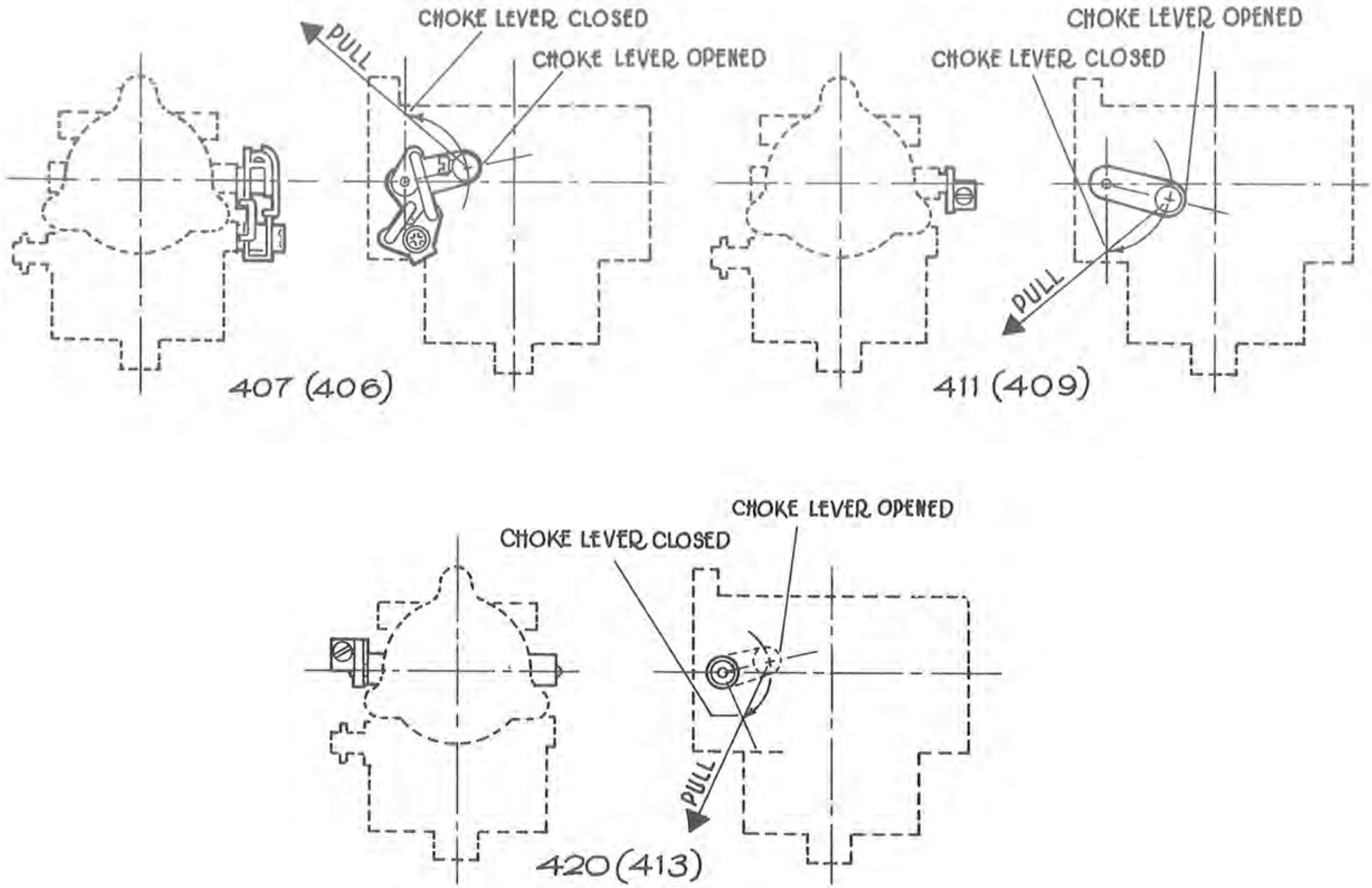


Figure 4-1 Choke Adjustment

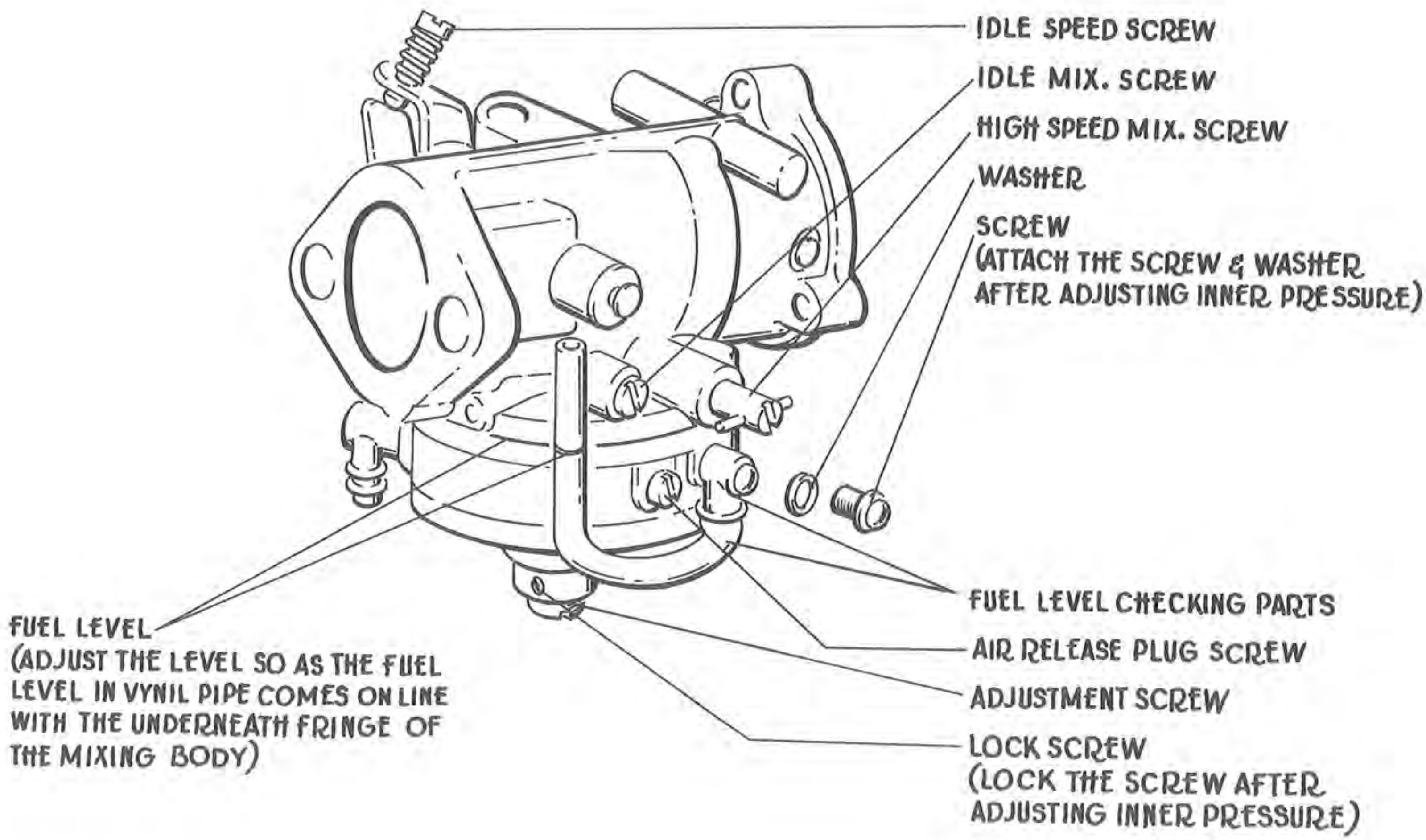


Figure 4-2 Carburetor Fuel Level

To obtain dependable constant performance, the carburetor should be cleaned and checked at reasonable intervals.

Dusty or dirty parts are the usual causes of carburetor trouble. Accordingly, carburetors should always be serviced under clean conditions. Never use such solvents as alcohol, acetone, lacquer thinner, benzol or any other liquids which can damage the synthetic rubber parts of the carburetor. It is recommended to use only gasoline for cleaning.

CARBURETOR ADJUSTMENT PROCEDURE

Snowmobile carburetor has been designed to supply an accurate fuel mixture to the engine under severe vibrating or inclined conditions.

As shown in figure 4-1, the carburetor is formed of three functional sections. These sections are the mixing body, the fuel pump and the regulator. The function of the regulator is identical to that of the float chamber in a float type carburetor. The inner pressure of the regulator maintains or controls the fuel level in the carburetor. Accordingly, a correct inner pressure is required to maintain the necessary fuel level according to the varying characteristics or requirements of different engines.

In order to maintain proper inner pressure, the regulator is located apart from the mixing body and the fuel pump is positioned between these two parts.

The regulator is so designed as to maintain positive pressure under any conditions or requirements and accordingly its pressure setting can be determined easily. In addition, the primary venturi being located above the secondary venturi means that the main discharge port is kept well apart from the idle discharge port.

Construction and Principle of Operation

The following is a brief outline of the operation of the diaphragm carburetor:

Upon cranking the engine, the inner pulse of the crankcase is led to the fuel pump via the impulse induction orifice and causes the pump diaphragm to vibrate. The resulting suction thus carries the fuel from the tank via the fuel inlet tube to the fuel pump inlet check valve. The fuel then flows into the regulator chamber via the outlet valve and the inlet control valve. The main diaphragm is subjected to two opposing tensions; the one being downwards is activated by the inlet tension spring and control lever and the other being upwards is caused by the diaphragm spring. The tension of both springs is so designed to maintain a proper upwards fuel pressure resulting that the inlet control valve is kept in an open position. As the fuel flows in and inner pressure of the regulator is built up, the main diaphragm moves downwards thus limiting the resultant force of the inlet tension spring and the diaphragm spring. This causes the inlet control valve to close because of the inlet control lever thus restricting the flow of excess fuel. Due to the above operation of the mechanism, the inner pressure of the regulator is always maintained at a proper level. The fuel pressure being properly regulated and then controlled by the idle mixing screw is fed to the idle discharge port and also to the main discharge port which is regulated by the high speed mixture screw.

Thus, matched fuel can be supplied from both discharge ports according to the varying operational conditions of the engine. The primary venturi being located on the upper part of the mixing body and the secondary venturi being located on the lower part of the mixing body, results in the best possible automization of the fuel.

In addition, as the inner pressure of the regulator can be freely adjusted, the carburetor can thus be adjusted or calibrated according to the particular characteristics of various types of engines.

Adjustment Procedure

It is not recommended to adjust these carburetors haphazardly; haphazard adjustment can cause very poor performance of the engine but, after cleaning, checking and replacing any worn out parts re-adjustment is naturally necessary and the following steps should be followed carefully and in this sequence:

1. Inner pressure of the regulator
2. Idle mixture screw
3. Idle speed screw
4. High speed adjustment screw

Regulator Adjustment (Keihin Carburetor only)

Since good performance of the carburetor depends mainly on correct regulator adjustment, great care should be exercised doing so. The inner pressure of the regulator is affected by turning the adjustment screw; clockwise turning will result in higher pressure and counter-clockwise turning will result in lower pressure. To ascertain the correct fuel pressure it is recommended to use a transparent vinyl tube as shown in figure 4-2.

Adjust the regulator so that the fuel level (as seen through the vinyl tube) is in line with the bottom of the mixing body. Once the fuel level has been properly adjusted, secure the adjustment screw by tightening the lock screw. As the regulator operates only when the engine is running, this adjustment must be performed while the engine is operating at idle speed. To begin regulator adjustment turn the adjusting screw to a fully opened position (counter-clockwise) and then make two clockwise turns before starting the engine then adjust as above.

Once the fuel level has been properly set at idle speed, (and idle adjustment has been performed) remove the vinyl checking tube and secure the sealing screw in place before operating the engine at higher speed; it is of course necessary to confirm the regulator's efficiency at high RPM operation.

Idle Adjustment

This adjustment is common to all carburetors. Clockwise turning of the idle mixture screw for leaner and counter-clockwise for richer mixture. Adjust to the lowest idle RPM as recommended by the engine manufacturer by turning the idle speed screw.

High Speed Adjustment

As with all carburetors this adjustment should be performed at full throttle and with a normal pay load for the engine. Set the high speed adjustment screw so as to reach maximum RPM. Care should be exercised so as not to adjust too lean which could have a damaging effect on the engine. Too lean a mixture will result in a loss of RPM.

TRACK AND STEERING PROBLEMS

Problems involving the track and the steering tiller are generally the result of improper tension and alignment. Refer to Section Two, Set-Up and Inspection, to check tension and alignment as originally set up.

1. Skis. Skis must be parallel to each other, and aligned with the body of the snowmobile. Check alignment, and realign according to Section Two.

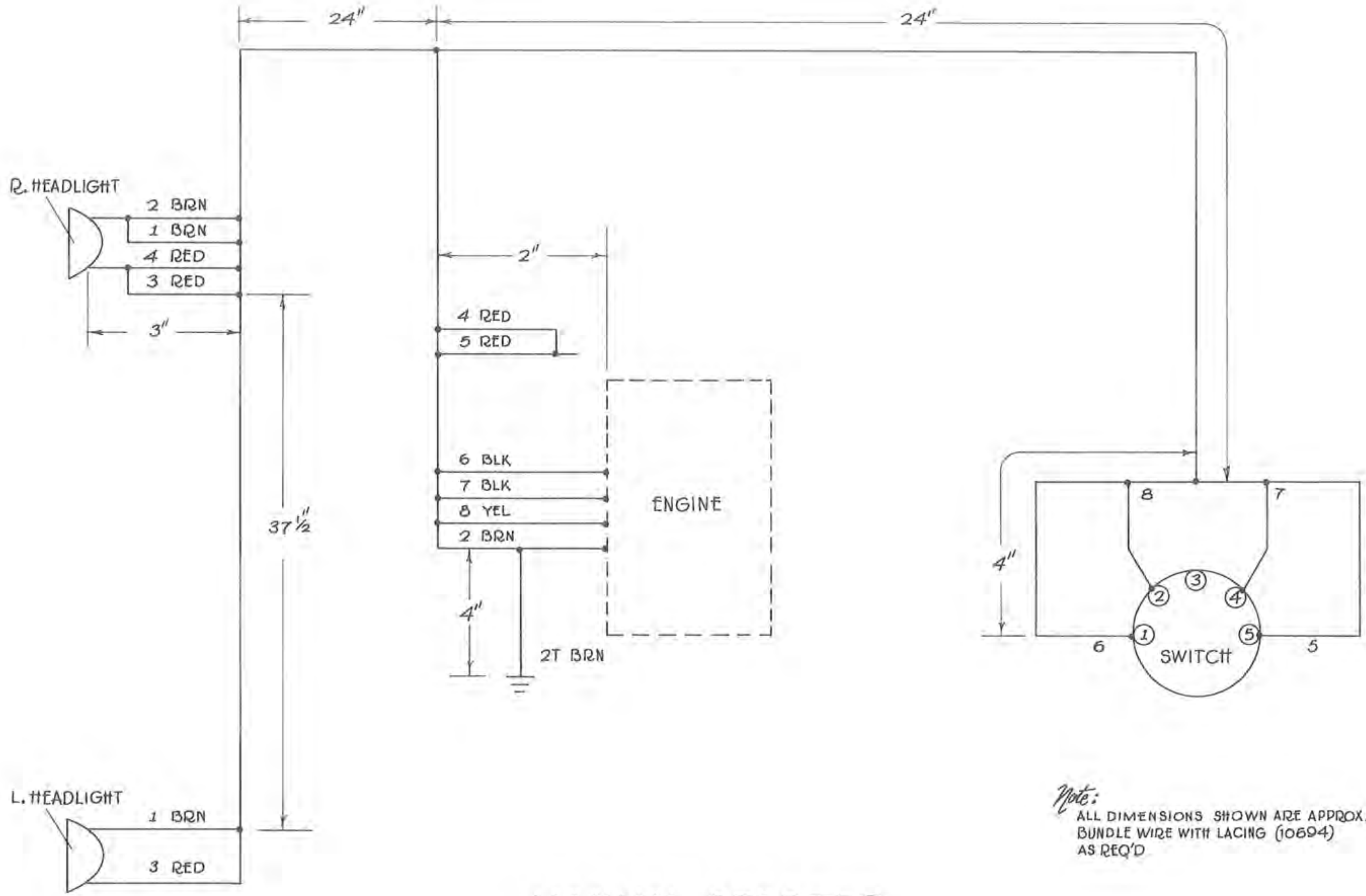
2. Steering Tiller. Steering must move freely, and the tiller bar must be aligned at right angles to the body of the snowmobile. If the tiller bar is mis aligned, correct according to the procedures given in Section Two.

3. Track Tension and Alignment. Track alignment is checked by measuring the distance between the rear hangers and the track. If the distance is not equal, it must be readjusted as shown in Section Two. If the track is too loose, it will slip teeth under load, and must be readjusted according to Section Two.

WIRING PROBLEMS

Problems in the wiring harness may be checked out with a continuity checker. For this purpose, the wiring diagram and wiring list for the models with electric starters and manual starters are supplied in this section.

Figure 4-3 Wiring Diagram - Manual Starters

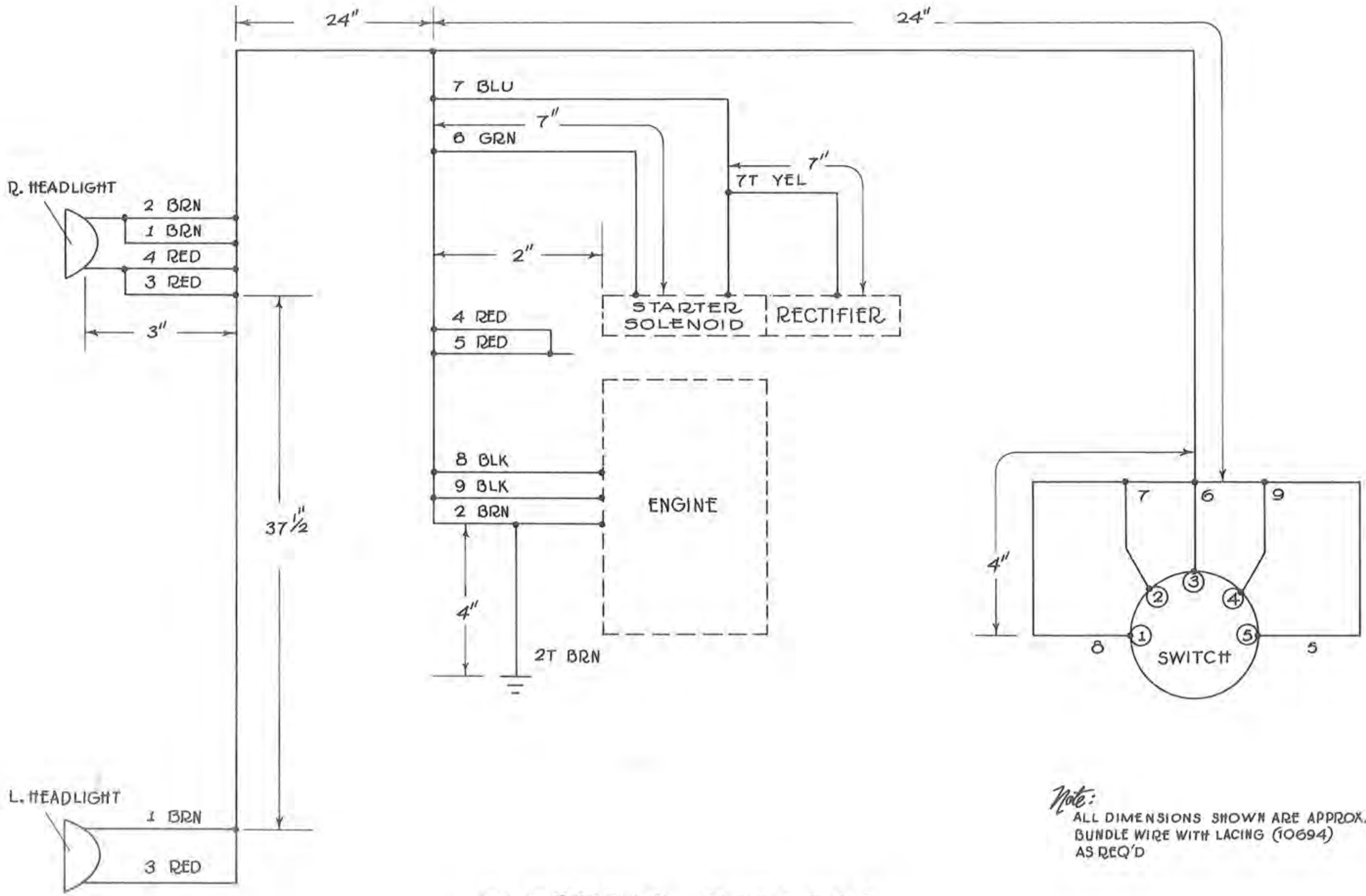


MANUAL STARTER

WIRING LIST FOR MODELS WITH MANUAL STARTERS

10692 WIRE NO.	COLOR	GAGE	FROM	10693 TERM.	TO	10693 TERM.
1	Brown	#16	Left Headlight	C134216	Right Headlight	C134216*
2	Brown		Right Headlight	C134216*	Engine	C134215 C134218
2T	Brown		Engine	C134215 C134218	Chas. Grd.	C134217
3	Red		Left Headlight	C134216	Right Headlight	C134216*
4	Red		Right Headlight	C134126*	Wire #5	C134215* C134218
5	Red		Wire #4	C134215* C134218	Switch	C134215
6	Black		Engine	C134215 C134218	Switch Plug #1	C134215
7	Black		Engine	C134215 C134218	Switch Plug #4	C134215
8	Yellow	#16	Engine	C134215 C134218	Switch	C134215

*More than one lead in terminal.



ELECTRIC STARTER

Figure 4-4 Wiring Diagram - Electric Starters

WIRING LIST FOR MODELS WITH ELECTRIC STARTERS

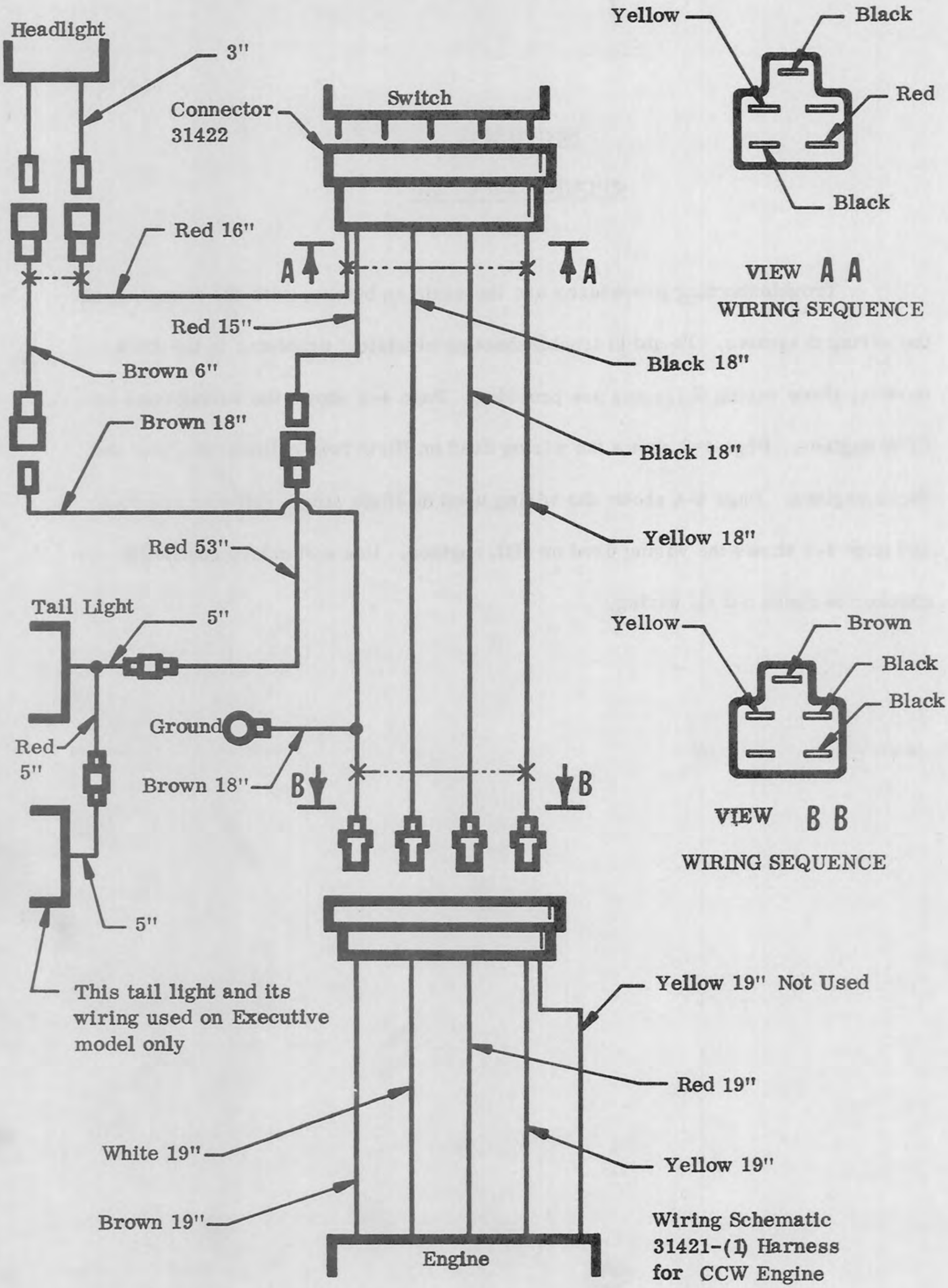
10692 WIRE NO.	COLOR	GAGE	FROM	10693 TERM.	TO	10693 TERM.
1	Brown	#16	Left Headlight	C134216	Right Headlight	C134216*
2	Brown		Right Headlight	C134216*	Engine	C134215 C134218
2T	Brown		Engine	C134215 C134218	Chas. Grd.	C134217
3	Red		Left Headlight	C134216	Right Headlight	C134216*
4	Red		Right Headlight	C134216*	Wire #5	C134215* C134218
5	Red		Wire #4	C134215* C134218	Switch Plug #5	C134215 C134219
6	Green		Starter Solenoid	C134216 C134217	Switch Plug #3	C134215 C134219
7	Blue		Starter Solenoid	C134216 C134217	Switch Plug #2	C134215 C134219
7T	Yellow		Starter Solenoid	C134216 C134217	Rectifier	C134215 C134218
8	Black		Engine	C134215 C134218	Switch Plug #1	C134215 C134219
9	Black	#16	Engine	C134215 C134218	Switch Plug #4	C134215 C134219

*More than one lead in terminal.

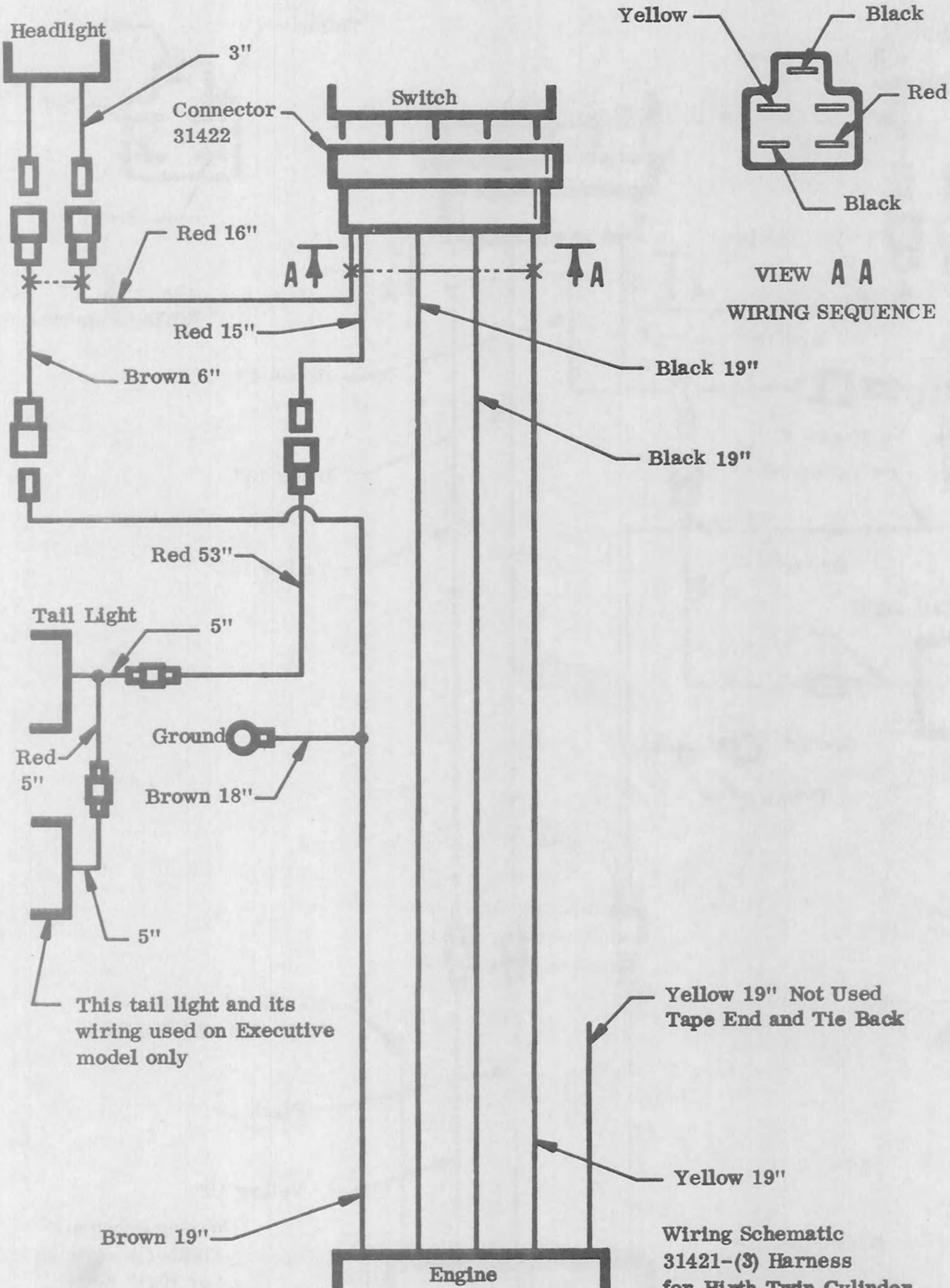
SECTION IV

TROUBLESHOOTING

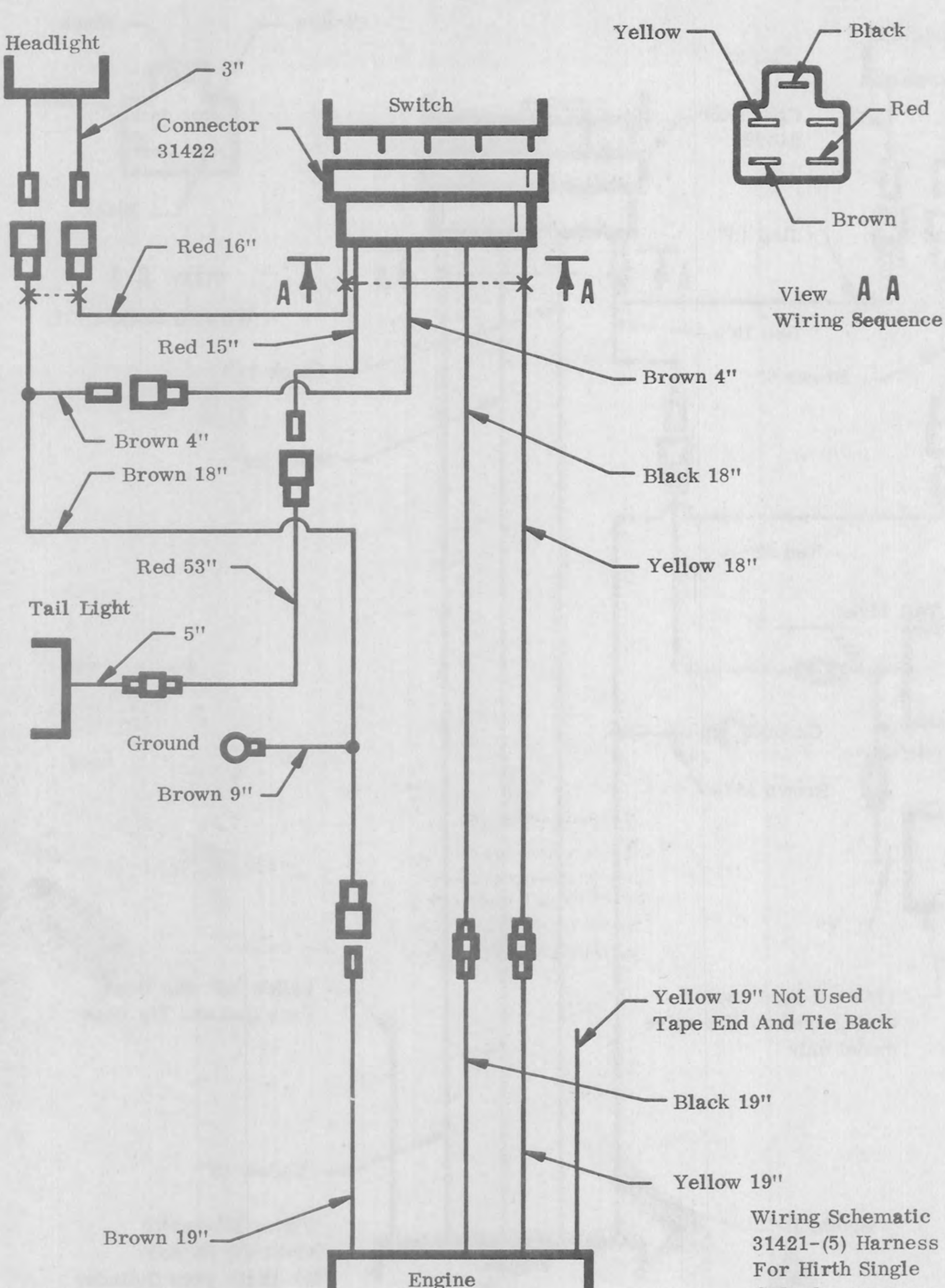
Troubleshooting procedures are the same as before, with the exception of the wiring diagrams. To aid in troubleshooting electrical problems in the 1971 models, three wiring diagrams are provided. Page 4-2 shows the wiring used on CCW engines. Page 4-3 shows the wiring used on Hirth twin cylinder engines and Sachs engines. Page 4-4 shows the wiring used on Hirth single cylinder engines, and page 4-5 shows the wiring used on JOL engines. Use a standard continuity checker to check out all wiring.



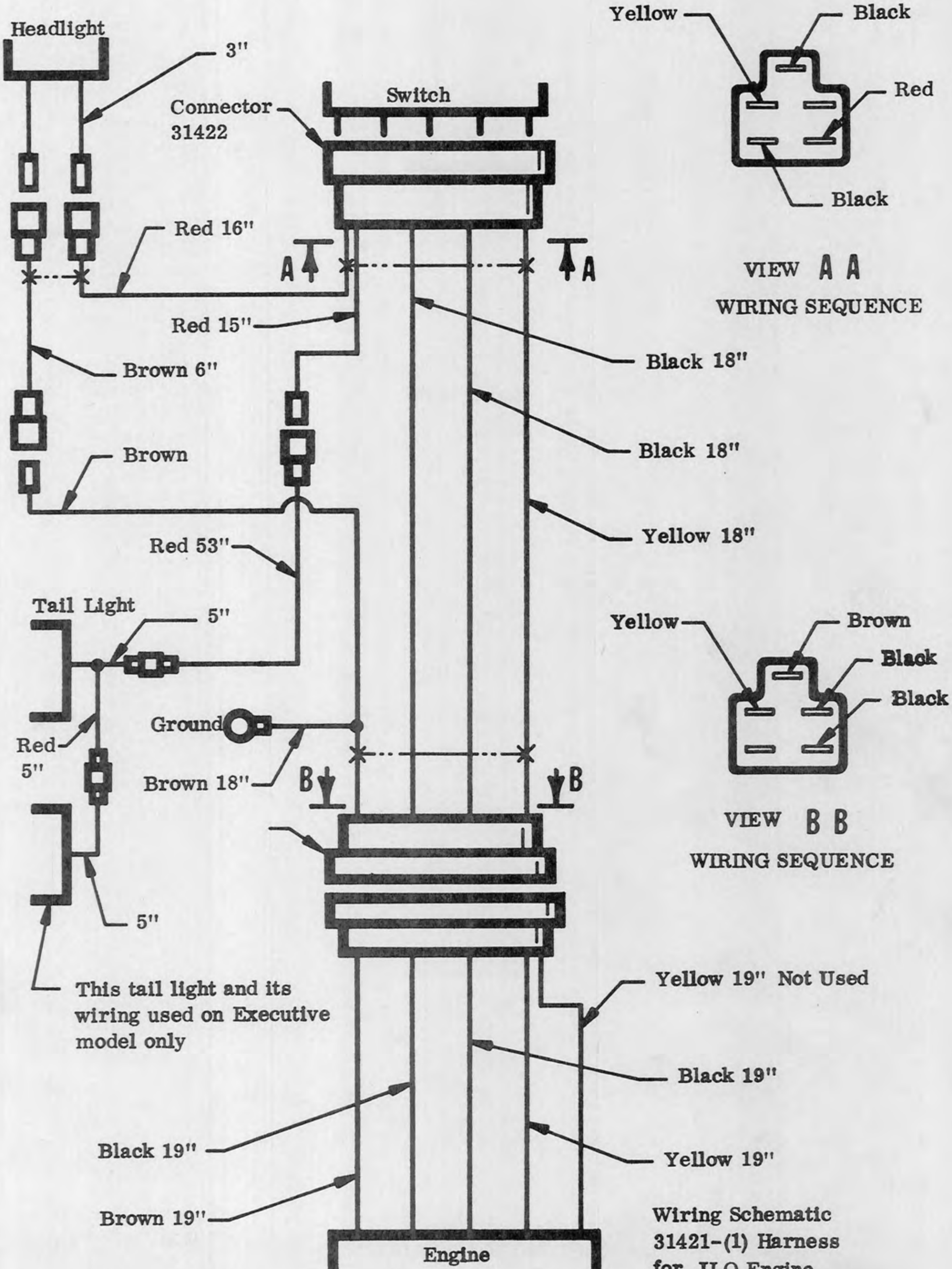
Wiring Schematic
31421-(1) Harness
for CCW Engine



Wiring Schematic
31421-(3) Harness
for Hirth Twin Cylinder Engine and Sachs Engine



Wiring Schematic
31421-(5) Harness
For Hirth Single
Cylinder Engine



Wiring Schematic
31421-(1) Harness
for JLO Engine

SECTION IV

TROUBLESHOOTING

Section IV, Troubleshooting is essentially the same as in previous years. We have added, at the back of the dealer's manual, a new section, Technical Specifications, which includes clutch, engine, and carburetor specifications and parts lists from their respective manufacturers.

CLUTCH SPACING

When replacing the motor or the driven clutch, clutch spacing must be checked carefully.

The 770 Clutch must be offset 0.16 inch to the outside. The 910 Clutch must be offset 0.30 inch to the outside. The center-to-center distance between the engine shaft and the clutch shaft must be 10-1/2 inches.

SPINDLE SPACERS

The steering spindle (figure 5-6) contains two spacers on each ski. These are, as shown, usually placed at the top and bottom of the spindle. This arrangement is best for steering stability. We recommend that most customer's machines be used with this arrangement. However, if the customer wants better traction and greater speed with somewhat less steering stability, both spacers may be placed at the top of the spindle.

Page 4-4 contains a wiring schematic for all single and twin cylinder engines.

ABS REPAIR

The following procedure is used to repair those parts of the snowmobile made from ABS plastic. Currently, these parts are the hood and the dash assembly only.

SURFACE SCRATCHES, ABRASION, GROUND-IN-DIRT: Perhaps surface scratches, abrasion and dirt particles in the plastic surface are the most frequent types of damage encountered with ABS. Although these conditions normally do not cause physical damage, they can detract from product appearance and should be corrected.

Shallow scratches and abraded surfaces are generally remedied by following directions on the containers of conventional automotive buffing and rubbing compounds available locally in automotive supply stores.

Mild household cleaners will remove surface dirt from ABS. However, if large dirt particles are embedded in the plastic skin, they are removed ordinarily with a heating device (for example, a hot air gun) capable of supplying hot air in the temperature range of 300°-$400^{\circ}F$. Using particular care not to overheat the plastic, hold the nozzle of the heating unit about 1/4 in. away from the surface and apply heat with a circular motion until the soiled area is sufficiently soft to remove the dirt particles. The ABS will return to its original shape upon cooling.

DEEP SCRATCHES, SHALLOW NICKS, SMALL HOLES: When repairing deep scratches, shallow nicks, or small holes (less than 1 in. in diameter) the following materials are suggested.

1. ABS/solvent cements
2. Epoxy patching compounds
3. Hot melt adhesives
4. Heated ABS rods

ABS/solvent cements were developed to fit virtually any application. Where the area to be repaired is extremely small, it may be quicker to make a satisfactory cement by dissolving ABS pellets in a solvent such as methyl ethyl ketone or methylene chloride. The pellets are added to the solvent until the desired paste-like consistency is achieved. This mixture is then applied to the damaged area with a squeeze bottle, putty knife, spatula, trowel or other similar applicator. Upon solvent evaporation, the hard, durable solids remaining can easily be shaped to the product's contour by sanding or filing. Solvent adhesives are not recommended for highly stressed areas, on thin walled parts, or for patching holes greater than 1/4 in. in diameter.

Hot melt adhesives, polyamids, are supplied in stick form (1/2 in. diameter x 3 in. long) and can be applied directly to the damaged area with a hot melt gun. Although hot melts adhere well to ABS, and can be used for a variety of repairs, they should be used only in areas involving little or no shear stress because of their low cohesive strength. The gun and adhesive sticks are available through Sears Roebuck & Co., and most hardware stores.

Heating ABS rods with a hot air gun and welding them to the damaged material may seem slow when compared to the preceding repair methods, but in some applications hot air welding could prove the most effective technique to use. A repair utilizing this procedure is primarily intended for small holes, indentations, or cracks in the plastic surface where high stress is apparent or thin walled sections are used. To weld, the hot air gun should be held in such a manner as to direct the flow of hot air into the fusion zone heating the damaged area and the welding rod both uniformly and simultaneously. The gun should be moved continuously in a fanning motion as it is moved along the weld to prevent discoloration of the ABS, and enough pressure must be maintained on the rod to insure good adhesion. If the process is carefully performed, overheating of the ABS will be avoided and a firm bond will be achieved. After the repair is completed, sanding is permissible to obtain a surface finish of acceptable appearance.

CRACKS: To successfully repair a crack in ABS, its origin must first be determined, then alleviated to prevent its recurrence after the repair has been made. The preferred method is to drill a small hole at each end of the crack to stop crack extension. Next, a scab plate is bonded to the reverse side of the damaged area to provide extra strength to the product. The crack is then "V" grooved and filled with an ABS/solvent cement, hot melt adhesive, epoxy patching compound, or sealed using the hot air welding technique. After drying or cooling, the patched area is sanded to match the surrounding surface finish.

REPAIRING MAJOR DAMAGE: This section deals primarily with major repairs on composite ABS structures; however, if a scab plate is used, these same repairs may also be applied on single skin applications.

Where appearance is secondary, the simplest way of repairing large holes, (1 in. or larger in diameter), tears, etc. is to patch over the damaged area with a piece of ABS extruded sheet. The sheet is cut slightly larger in circumference than the section to be repaired. It is then coated with a solvent adhesive, firmly attached over the damaged area and let dry approximately one hour before any sanding or additional finishing operations are performed.

Where appearance is important, large holes, cracks, tears, etc. can be repaired by cutting out the damaged area and replacing it with an ABS piece of similar size and thickness. In cutting out the damaged area, a smooth edge must be maintained to eliminate the notch effect common to all thermoplastics. The remaining seam is filled with a repair material, sanded and finished.

Blisters and punctures in the ABS surface are most effectively repaired by first removing the damaged section with a hole saw, drill or similar tool, then undercutting the hole perimeter and filling it with an epoxy patching compound. It is suggested that the hole be slightly overfilled and the patching compound be feathered out in the surrounding area. The patch is sanded and finished after the compound has cured. Due to the generation of heat in the epoxy compound, care should be taken to build up layers less than 1/2 in. in thickness at a time. Successful repairs up to 12 square inches have been made using this procedure.

STRESS LINES: Stress lines produce a whitened appearance in a localized area and generally emanate from the severe bending or impacting of ABS. The material can be restored to its original condition and color by gradually heating the affected area with a hot air gun or similar heating device. Care should be exercised not to overheat the plastic.

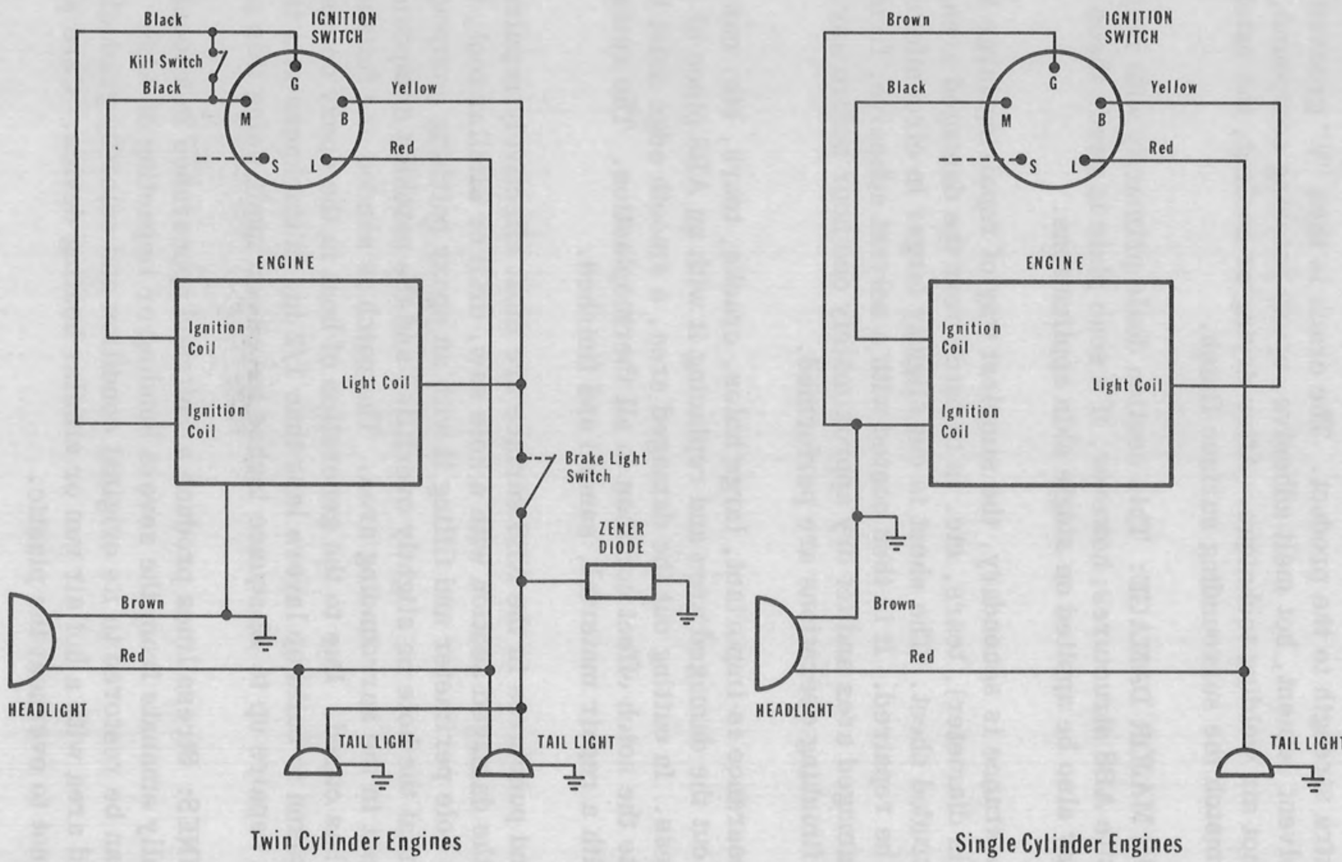


FIGURE 4-1. ELECTRICAL SCHEMATICS

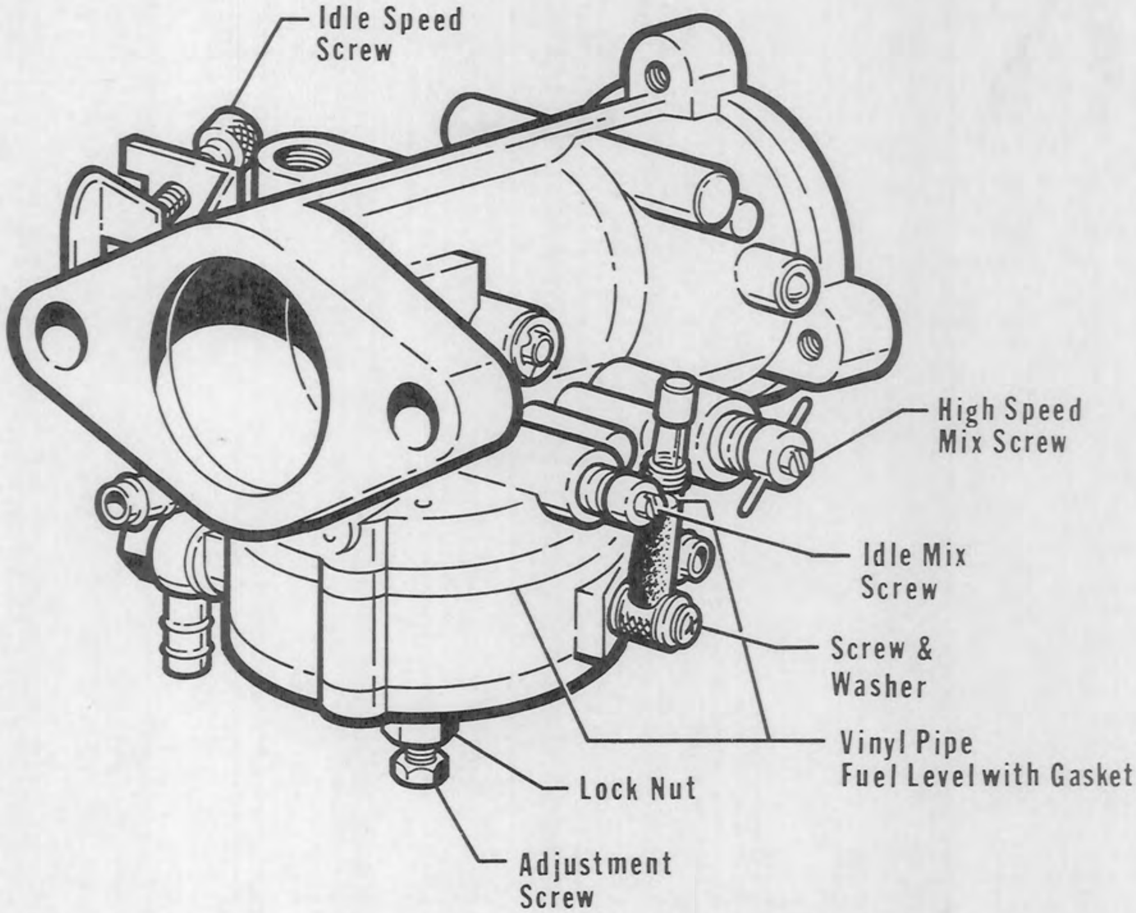


FIGURE 4-2. FUEL LEVEL OF CARBURETOR

Check the fuel level of the Carburetor to be sure that the fuel in the standpipe (figure 4-2) is level with the top gasket of the Carburetor. If it is not, loosen the lock nut and adjust the fuel level with the adjustment screw.