INSTRUCTOR GUIDE 1 - 1980 SNOWMOBILES

DIRECTIONS TO THE INSTRUCTOR

This Instructor Guide is a part of the Service Training Course STC-7010, a course designed for the new 1980 John Deere Snowmobiles. It is a complete instruction package and will provide training material necessary to cover predelivery, operations, adjustments and trouble shooting for the 1980 Snowmobiles.

This IG is designed with the Technical Manuals as the prime source of information for both the instructor and the student. Specific teaching points and notes to the instructor are highlighted in the IG. Since the Technical Manuals are the student's textbook, be sure that each student receives copies.

When instructing this course, we recommend that you follow the suggested guide lines listed below:

1. In preparation for the class, we suggest that you become familiar with the objectives of the course stated on page 4. This Instructor Guide is written so that the class will achieve these objectives and your instruction should be directed so that these objectives are achieved. After you are familiar with these objectives, read the entire Instructor Guide and appropriate section(s) of the Technical Manuals and project slides. Make sure that you know exactly what points are to be emphasized on each slide. Then reread the Instructor Guide and add any specific notes that you will need to modify the lesson to fit your needs.

2. Give the student a brief introduction to the course. Include the objectives and state what he should know at the end of the class. Then outline the class so that the student will know where he is going and what is expected of him.

3. We recommend that approximately 40% of the time be spent in the classroom and 60% spent in the shop or field.

4. After you have completed the lesson, you should conduct a brief summary to review the main points to the lesson.

5. After all student questions have been answered, pass out the test and allow students a few minutes to complete it. If time allows, grade test in class and discuss it with the students.

6. Please have the student fill out the course evaluation. Send the training report to us so that we can make any necessary improvements in the course.

NOTES TO THE INSTRUCTOR

1. Stress the use of Operator's Manuals to students. Use the Operator's Manuals to emphasize proper fuels, lubricants, operation, predelivery, adjustments and delivery procedures.

2. This course is designed for the advanced student having substantial snowmobile experience. Modify the course as required to match the experience level of your students.

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COURSE OBJECTIVES

Upon completion of this course the student should be able to:

1. Explain the features of the Liquifire and Sportfire.
2. Explain the new features on Trailfire and Spitfire.
3. Perform the new service procedures and adjustments on 1980 Snowmobiles.

MATERIALS REQUIRED

1. Slide set for STC-7010.
2. Slide projector and screen.
3. Technical Manuals

   TM-1197 - Trailfires
   TM-1191 - Spitfire
   TM-1217 - Liquifire
   TM-1222 - Sportfire

4. Operator's Manuals

   OM-M68421 - Spitfire
   OM-M67978 - Liquifire
   OM-M68674 - Sportfire
   OM-M68491 - 340 and 440 Trailfires

5. Tools (a set for each work station)

   Handtools
   Essential Tools (See page 19)
   Convenience Tools (See page 19)

MACHINE SPECIFICATIONS

	Liquifire	Sportfire	340 Trailfire	440 Trailfire	Spitfire
Engine					
Manufacturer	KHI	KHI	KHI	KHI	KHI
Model	TC440A-C202	TA440B-C202	TA340A-D202	TA440A-D202	TB340A-A202
Bore	68 mm	68 mm	60 mm	68 mm	60 mm
Stroke	60 mm	60 mm	60 mm	60 mm	60 mm
Displacement	436 cc	436 cc	339 cc	436 cc	339 cc
Compression Ratio	6.9:1	7.3:1	6.9:1	6.5:1	6.9:1
Compression (PSI)	120 to 140	130 to 155	125 to 140	130 to 155	110 to 130
Fuel System					
Capacity (U.S. Gallons)	7.75 (29.3L)	7.75 (29.3L)	7.75 (29.3L)	7.75 (29.3L)	5.50 (20.8L)
Fuel Pump	Diaphragm with Shut-Off	Diaphragm	Diaphragm	Diaphragm	Diaphragm
Fuel Filter	In-line	In-line	In-line	In-line	In-line
Carburetor Type	Mikuni Power Jet	Mikuni Power Jet	Mikuni Slide Valve	Mikuni Slide Valve	Mikuni Butterfly
Carburetor Qauntity and Size	Two 36 mm	One 34 mm	One 34 mm	One 34 mm	One 32 mm
Oil Injection System					
Capacity	3.5 Pints	N/A	N/A	N/A	N/A
Pump	Mikuni Plunger	N/A	N/A	N/A	N/A
Cooling System					
Type	Liquid	Fan	Fan	Fan	Free Air
Capacity	4 qts. (2.8L)	N/A	N/A	N/A	N/A
Pump Output	19.56 gpm (74L) @ (7000 rpm)	N/A	N/A	N/A	N/A
Thermostat	108°F	N/A	N/A	N/A	N/A
Pressure Cap	12 to 13 PSI (0.8 to 0.9 Bar)	N/A	N/A	N/A	N/A
Belt Tension	N/A	3/8 inch (9.52 mm)	3/8 inch (9.52 mm)	3/8 inch (9.52 mm)	N/A

MACHINE SPECIFICATIONS - Continued

	Liquifire	Sportfire	340 Trailfire	440 Trailfire	Spitfire
Electrical System					
Type	Capacitor Discharge	Capacitor Discharge	Capacitor Discharge	Capacitor Discharge	Capacitor Discharge
Lighting Coil Capacity	120 Watts	120 Watts	120 Watts	120 Watts	120 Watts
Ignition Timing	16° BTDC @ 6500 RPM (0.058")	18° BTDC @ 6000 RPM (0.073")	22° BTDC @ 6000 RPM (0.108")	22° BTDC @ 6000 RPM (0.108")	22° BTDC @ 6500 RPM (0.108")
Spark Plug	Champion QN-2	Champion QN-2	Champion QN-3	Champion QN-3	Champion ON-3
Plug Gap	0.025" (0.635 mm)	0.025" (0.635 mm)	0.025" (0.635 mm)	0.025" (0.635 mm)	0.025" (0.635 mm)
RPM Limiter	Yes	No	No	No	No
Power Train					
Primary (Comet)	JD 102C	JD 102C	JD 102C	JD 102C	JD 94C
Secondary	John Deere 44° Cam	John Deere Compound Cam	John Deere 38° Cam	John Deere 44° Cam	John Deere 44° Cam
Final Drive Ratio	1.59:1	1.86:1	2.06:1	1.86:1	Direct Drive
Sprockets (upper/ lower)	22/35	21/39	17/35	21/39	N/A
Chain Type	66 Pitch	66 Pitch	62 Pitch	66 Pitch	N/A
Drive Belt	M68715	M66345	M66345	M66345	M68416
Brake	Mechanical Disk	Mechanical Disk	Mechanical Disk	Mechanical Disk	Mechanical Disk
Brake Pad Material	Sintered Metal	Sintered Metal	Sintered Metal	Sintered Metal	Sintered Metal
Suspension					
Type	Aluminum Slide	Aluminum Slide	Aluminum Slide	Aluminum Slide	Aluminum Slide
Track Type	Rubber, Molded	Rubber, Riveted	Rubber, Riveted	Rubber, Riveted	Rubber, Riveted
Track Width	15.38 in. (39.1 cm)	15 in. (38.2 cm)	15 in. (38.1 cm)	15 in. (38.1 cm)	15 in. (38.1 cm)

MACHINE SPECIFICATIONS - Continued

	Liquifire	Sportfire	340 Trailfire	440 Trailfire	Spitfire
Chassis and Body Tunnel	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum
Pan	Steel & TPR	Steel & TPR	Steel & TPR	Steel & TPR	Aluminum
Hood	SMC	SMC	SMC	SMC	SMC
Windshield	Sport	Sport	Trail	Trail	Standard
Seat	Sport	Sport	Standard with Seat Strap	Standard with Seat Strap	Standard
Ski Stance	32.0 in. (81 cm)	30.0 in. (76 cm)	30.0 in. (76 cm)	30.0 in. (76 cm)	30.0 in. (76 cm)
Overall Width	39 in. (99.1 cm)	37 in. (94 cm)	37 in. (94 cm)	37 in. (94 cm)	33.25 in. (84 cm)
Overall Length	102 in. (259 cm)	102 in. (259 cm)	102 in. (259 cm)	102 in. (259 cm)	98.6 in. (250.4 cm)
Overall Height	37 in. (94 cm)	37 in. (94 cm)	40 in. (102 cm)	40 in. (102 cm)	41 in. (104 cm)
Dry Weight	404 lbs. (183.3 kg)	385 lbs. (175 kg)	375 lbs. (170 kg)	370 lbs. (168 kg)	285 lbs. (129.27 kg)

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TORQUE SPECIFICATIONS

	Liquifire	Sportfire	340 Trailfire	440 Trailfire	Spitfire
Engine					
Crankcase	16 ft.lbs. (22 Nm)	16 ft.lbs. (22 Nm)	16 ft.lbs. (22 Nm)	16 ft.lbs. (22 Nm)	16 ft.lbs. (22 Nm)
Cylinder Head	16 ft.lbs. (22 Nm)	16 ft.lbs. (22 Nm)	16 ft.lbs. (22 Nm)	16 ft.lbs. (22 Nm)	16 ft.lbs. (22 Nm)
Intake Manifold	N/A	4.3 ft.lbs. (5.8 Nm)	4.3 ft.lbs. (5.8 Nm)	4.3 ft.lbs. (5.8 Nm)	4.3 ft.lbs. (5.8 Nm)
Exhaust Manifold	11 ft.lbs. (16 Nm)	13 ft.lbs. (16 Nm)	13 ft.lbs. (16 Nm)	13 ft.lbs. (16 Nm)	13 ft.lbs. (16 Nm)
Fan Pulley Nut	N/A	47 ft.lbs. (64 Nm)	47 ft.lbs. (64 Nm)	47 ft.lbs. (64 Nm)	N/A
Carburetor Flange (Rubber)	3.5 ft.lbs. (4.7 Nm)	N/A	3.5 ft.lbs. (4.7 Nm)	3.5 ft.lbs. (4.7 Nm)	N/A
Oil Pump Gear Nut	11.6 ft.lbs. (17 Nm)	N/A	N/A	N/A	N/A
Flywheel	60 ft.lbs. (81 Nm)	60 ft.lbs. (81 Nm)	60 ft.lbs. (81 Nm)	60 ft.lbs. (81 Nm)	60 ft.lbs. (81 Nm)
Engine Bracket L.H. (Cap Screw)	8 ft.lbs. (11 Nm)	N/A	N/A	N/A	N/A
Engine Bracket L.H. (Socket Screw)	12 ft.lbs. (17 Nm)	N/A	N/A	N/A	N/A
Engine Bracket R.H. Nut	12 ft.lbs. (17 Nm)	N/A	N/A	N/A	N/A
Rubber Mount R.H.	31 ft.lbs. (44 Nm)	N/A	N/A	N/A	N/A
Engine to Base Plate	N/A	50 ft.lbs. (68 Nm)	50 ft.lbs. (68 Nm)	50 ft.lbs. (68 Nm)	50 ft.lbs. (68 Nm)

TORQUE SPECIFICATIONS - Continued

	Liquifire	Sportfire	340 Trailfire	440 Trailfire	Spitfire
Power Train					
Primary Bolt	50 ft.lbs. (68 Nm)	50 ft.lbs. (68 Nm)	50 ft.lbs. (68 Nm)	50 ft.lbs. (68 Nm)	50 ft.lbs. (68 Nm)
Secondary Bolt	20 ft.lbs. (27 Nm)	20 ft.lbs. (27 Nm)	20 ft.lbs. (27 Nm)	20 ft.lbs. (27 Nm)	20 ft.lbs. (27 Nm)
Chassis and Body					
Ski Bolts	39 ft.lbs. (52 Nm)	39 ft.lbs. (52 Nm)	39 ft.lbs. (52 Nm)	39 ft.lbs. (52 Nm)	39 ft.lbs. (52 Nm)
Drag Link Hardware	32 to 38 ft.lbs. (43 to 51 Nm)	32 to 38 ft.lbs. (43 to 51 Nm)	32 to 38 ft.lbs. (43 to 51 Nm)	32 to 38 ft.lbs. (43 to (51 Nm)	32 to 38 ft.lbs. (43 to 51 Nm)
Tie Rod Jam Nuts	8 to 12 ft.lbs. (11 to 16 Nm)	8 to 12 ft.lbs. (11 to 16 Nm)	8 to 12 ft.lbs. (11 to 16 Nm)	8 to 12 ft.lbs. (11 to (16 Nm)	8 to 12 ft.lbs. (11 to (16 Nm)
Spindle Arm to Spindle Bolt	22 to 28 ft.lbs.	22 to 28 ft.lbs.	22 to 28 ft.lbs.	22 to 28 ft.lbs.	22 to 28 ft.lbs.

FUEL AND LUBRICANTS

Liquifire*

	Capacity	Type
Fuel Tank	7.75 U.S. Gal. (29.3 L) 6.50 Imperial Gal.	Regular Leaded*
Oil Tank	55 ounces	BIA-TCW 2-Cycle
Engine Gear Case	1.35 oz. 40 cc	SAE 10W40

Fuel/Oil Ratio Idle - 120:1 W.O.T. - 25:1

IMPORTANT: Mix fuel and oil at 50:1 ratio for the first tank of fuel. Check that some oil has been used from oil tank after first tank of fuel is used.

Sportfire, Trailfires and Spitfire *

	U.S.		Canada	
Ratio	Oil	Fuel	Oil	Fuel
40:1	1 Pt. (0.473 L)	5 Gal. (18.9 L)	1 U.S. Pint (0.473 L)	4 Imperial Gal. (18.2 L)
			1 Imperial Pt. (0.568 L)	5 Imperial Gal. (22.7 L)
50:1	1 Pt. (0.473 L)	6 Gal. (22.7 L)	1 U.S. Pint (0.473 L)	5 Imperial Gal. (22.7 L)
			1 Imperial Pt. (0.568 L)	6 Imperial Gal. (27.2 L)

IMPORTANT: Use 40:1 mixture in the first tank and 50:1 thereafter.

* Regular (leaded) gasoline with an anti-knock index of 88 or higher is perferred but non-leaded gasoline can be used on occasion if necessary.

ACCESSORIES

	Liquifire	Sportfire	340 Trailfire	440 Trailfire	Spitfire
Speedometer	Standard	Standard	AM54916	Standard	AM54656
Tachometer	Standard	AM52346	AM52346	AM52346	AM52346
Electric Start *	N/A	BM21167	BM21166	BM21167	N/A
Battery Charger	N/A	AM36786	AM36786	AM36786	N/A
Cross Country Windshield	AM55084	AM55084	AM55084	AM55084	N/A
Sport Windshield	Standard	Standard	AM55051	AM55051	N/A
Trail Windshield	AM55050	AM55050	Standard	Standard	Standard
Tow Hitch	AM54858	AM54858	AM54858	Standard	AM54858
Backrest Kit	BM21023**	BM21023**	BM21023	BM21023	N/A
Sport Seat	Standard	Standard	AM54987	AM54987	N/A
Handlebar Heater	AM54918	AM54918	AM54918	AM54918	AM55142
Partial Carbide Wear Rods	AM54964+	AM54964+	AM54964+	AM54964+	AM54964+
Full Carbide Wear Rods	AM54701+	AM54701+	AM54701+	AM54701+	AM54701+
Tunnel Wear Bars	AM55182+	AM55180+	AM55180+	AM55180+	AM55181#
Five Star Studs	AM54921	AM54921	AM54921	AM54921	AM54921
Steel Penetrater	AM55177	N/A	N/A	N/A	N/A
Steel Penetrater Carbide Tip	AM55178	N/A	N/A	N/A	N/A
Spring Helper Kit	AM54971	AM54971	AM54971	AM54971	N/A
Primer Kit	N/A	N/A	N/A	N/A	AM54923
Chrome Ski Shock Absorber	AM55130	Standard	AM55130	AM55130	AM55130
Light Duty Rear Spring (R.H.)	N/A	M67950	M67950	M67950	N/A

ACCESSORIES - Continued

	Liquifire	Sportfire	340 Trailfire	440 Trailfire	Spitfire
Light Duty Rear Spring L.H.	N/A	M67951	M67951	M67951	N/A
Chrome Rear Grab Handle	M68651	Standard	M68651	M68651	N/A
Deep Snow Suspension Kit	BM21169	N/A	N/A	N/A	N/A

* Requires AM52050 Battery
** Requires AM54717 Seat
\+ Package of 2
\# Package of 3

CLUTCHING CHARTS

Liquifire

Altitude	Engagement RPM	Governed RPM	Primary Clutch			Secondary Clutch		Chain Case	
			Spacers	Spring	Arm Kit	Spring Position	Cam	Gearings	Chain
Sea Level to 4000 Ft.	4400-4600	8000-8200	2	Silver	AM55172	2	44°	22/35	66
4000 Ft. to 6000 Ft.	4400-4600	8000-8200	2	Silver	AM55172	2	44°	22/39	68
6000 Ft. to Above	5200-5400	8200-8400	2	Red	AM55174	2	44°	22/39	68

Sportfire

Altitude	Engagement RPM	Governed RPM	Primary Clutch			Secondary Clutch		Chain Case	
			Spacers	Spring	Arm Kit	Spring Position	Cam	Gearings	Chain
Sea Level to 3000 Ft.	3800-4000	6700-7200	2	Silver	AM55158	2	Compound	21/39	66
3000 Ft. to 6000 Ft.	4300-4500	6700-7200	2	Silver	AM54287	1	Compound	21/39	66
6000 Ft. to Above	4300-4500	6700-7200	2	Silver	AM54287	1	Compound	21/39	66

340 Trailfire

Altitude	Engagement RPM	Governed RPM	Primary Clutch			Secondary Clutch		Chain Case	
			Spacers	Spring	Arm Kit	Spring Position	Cam	Gearings	Chain
Sea Level to 3000 Ft.	3600-3800	6200-6700	2	Silver	AM55159	2	38°	17/35	62
3000 Ft. to 6000 Ft.	4300-4500	6200-6700	2	Silver	AM54287	2	Compound	17/35	62
6000 Ft. to Above	4300-4500	6200-6700	2	Silver	AM54287	2	Compound	17/35	62

CLUTCHING CHARTS - Continued

440 Trailfire

Altitude	Engagement RPM	Governed RPM	Primary Clutch			Secondary Clutch		Chain Case	
			Spacers	Spring	Arm Kit	Spring Position	Cam	Gearing	Chain
Sea Level to 3000 Ft.	3600-3800	6200-6700	2	Silver	AM54281	2	44°	21/39	66
3000 Ft. to 6000 Ft.	3700-3900	6200-6700	2	Silver	AM54920	2	44°	21/39	66
6000 Ft. to Above	3700-3900	6200-6700	2	Silver	AM54920	2	44°	21/39	66

Spitfire

Altitude	Engagement RPM	Governed RPM	Primary Clutch			Secondary Clutch	
			Number of Weights	Hole Size	Spring	Cam	Spring Location
Sea Level to 3000 Ft.	3200 to 3600	5600 to 6100	9	3/4"	White	44°	2
3000 Ft. to 6000 Ft.	3200 to 3600	5600 to 6100	6	3/4"	White	44°	2
			3	7/8"			
6000 Ft. to 9000 Ft.	3200 to 3600	5600 to 6100	9	7/8"	White	44°	2
9000 Ft. And Above	3200 to 3600	5600 to 6100	9	1"	White	44°	2

CARBURETOR RECOMMENDATIONS
(Further Fine Tuning May Be Required)

Liquifire

Temperature	Component	Sea Level To 4000 Ft.	4000 Ft. To 6000 Ft.	6000 Ft. And Above
-40°F to 0°F	Main Jet	160	150	140
	Power Jet	95	90	85
0°F to +40°F	Main Jet	150 *	140	130
	Power Jet	90 *	85	80
-40°F to +40°F	Jet Needle	6DH8-3 *	6DH8-2	6DH8-1
	Needle Jet	159 Q0 *	159 Q0	159 Q0
	Throttle Valve	3.5 *	3.5	3.5
	Pilot Jet	30 *	25	20
	Air Screw	1-1/2 *	1-1/2	1-1/2
	Idle Speed	2000-2500	2000-2500	2000-2500

Sportfire

Temperature	Component	Sea Level To 4000 Ft.	4000 Ft. To 6000 Ft.	6000 Ft. And Above
-40°F to 0°F	Main Jet	210	200	180
0°F to +40°F	Main Jet	200 *	190	170
-40°F to +40°F	Power Jet	170 *	170	170
	Jet Needle	6F27-3 *	6F27-3	6F27-3
	Needle Jet	159 Q0 *	159 Q0	159 Q0
	Throttle Valve	3.0 *	3.0	3.0
	Pilot Jet	25 *	25	25
	Air Screw	1-1/2 *	1-1/2	1-1/2
	Idle Speed	2400-2700	2600-3000	2600-3000

440 Trailfire

Temperature	Component	Sea Level To 4000 Ft.	4000 Ft. To 6000 Ft.	6000 Ft. And Above
-40°F to 0°F	Main Jet	240	230	210
0°F to +40°F	Main Jet	230 *	220	200
-40°F to +40°F	Jet Needle	6F27-3 *	6F27-3	6F27-3
	Needle Jet	166 Q0 *	166 Q0	166 Q0
	Throttle Valve	3.5 *	3.5	3.5
	Pilot Jet	25 *	25	25
	Air Screw	1 *	1	1
	Idle Speed	1800-2300	2700-3200	2700-3200

* Standard Equipment

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CARBURETOR RECOMMENDATIONS - Continued
(Further Fine Tuning May Be Required)

340 Trailfire

Temperature	Component	Sea Level To 3000 Ft.	3000 Ft. To 6000 Ft.	6000 Ft. And Above
-40°F to 0°F	Main Jet	200	190	170
0°F to +40°F	Main Jet	190*	180	160
-40°F to +40°F	Jet Needle	6F27-3*	6F27-3	6F27-3
	Needle Jet	166-06*	166-06	166-06
	Throttle Valve	3.0*	3.0	3.0
	Pilot Jet	30*	30	30
	Air Screw	1-1/2*	1-1/2	1-1/2
	Idle Speed	1800-2300	2000-2500	2000-2500

Spitfire

Temperature	Component	Sea Level To 3000 Ft.	3000 Ft. To 6000 Ft.	6000 Ft. To 9000 Ft.	9000 Ft. And Above
-30°F and Below	Main Jet	195	180	165	150
-30°F to +30°F	Main Jet	180*	165	150	140
+30°F to +60°F	Main Jet	170	155	140	130
+60°F and Above	Main Jet	155	140	130	120
-40F°to +70°F	Main Air Jet	1.0*	1.0	1.0	1.0
	Air Bleed	.8x2x4*	.8x2x4	.8x2x4	.8x2x4
	Pilot Jet	80*	80	80	80
	Throttle Valve	210*	210	210	210
	Bypass	1.0-1.1-1.2*	1.0-1.1-1.2	1.0-1.1-1.2	1.0-1.1-1.2
	Pilot Screw	3/4*	3/4	3/4	3/4
	Main Nozzle	4.0*	4.0	4.0	4.0
	Idle Speed	2200-2400	2200-2400	2400-2700	2400-2700

* Standard Equipment

SERVICE TOOL CHART

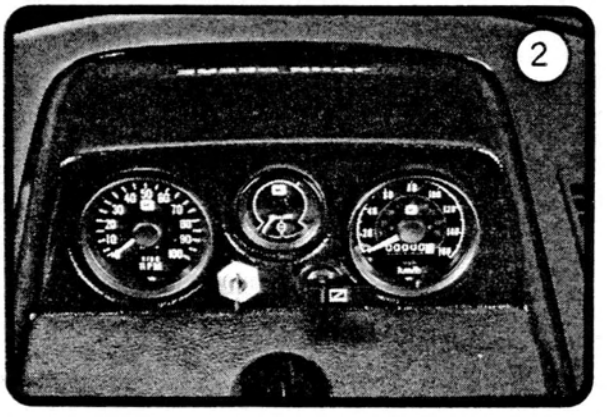
	Liquifire	Sportfire	340 Trailfire	440 Trailfire	Spitfire
Essential Tools					
Piston Pin Service Set	JDM-7	JDM-7	JDM-7	JDM-7	JDM-7
Crankshaft Bearing Service Set	JDM-8	JDM-8	JDM-8	JDM-8	JDM-8
Bearing Tool Adapter Kit	JDM-33	JDM-33	JDM-33	JDM-33	JDM-33
Flywheel Puller	JDM-9	JDM-9	JDM-9	JDM-9	JDM-9
Dial Indicator Bracket	JDM-10	JDM-10	JDM-10	JDM-10	JDM-10
Flywheel Holding Tool	JDM-64-1	JDM-64-1	JDM-64-1	JDM-64-1	JDM-64-1
Fan Holding Tool	JDM-112*	JDM-112	JDM-112	JDM-112	N/A
Starter Spring Winding Tool	JDM-113	JDM-113	JDM-113	JDM-113	JDM-113
Clutch Puller	JDM-41-1	JDM-41-1	JDM-41-1	JDM-41-1	JDM-103
Clutch Alignment Tool	N/A	JDM-81	JDM-81	JDM-81	JDG-47
Timing Indicator	JDM-15	JDM-15	JDM-15	JDM-15	JDM-15
CD Ignition Tester	JDM-74	JDM-74	JDM-74	JDM-74	JDM-74
Wiring Harness Adapter	JDM-74A-6	JDM-74A-6	JDM-74A-6	JDM-74A-6	JDM-74A-6
Track Clip Press	JDG-46	N/A	N/A	N/A	N/A
Convenience Tools					
Snowmobile Dolly	D-0524ST	D-0524ST	D-0524ST	D-0524ST	D-0524ST
Bench Mounted Fixture	JDM-16	JDM-16	JDM-16	JDM-16	JDM-16
Ring Compressor	JDM-35	JDM-35	JDM-35	JDM-35	JDM-35
Piston Lock Ring Plier	JDM-36	JDM-36	JDM-36	JDM-36	JDM-36
Pressure Testing Tool	JDM-44	JDM-44	JDM-44	JDM-44	JDM-44
Radiator Adapter Kit	JDG-56	N/A	N/A	N/A	N/A
Mikuni Carburetor Tool Kit	JDM-109-A	JDM-109-A	JDM-109-A	JDM-109-A	JDM-109-A
Carburetor Synchronizer	JDG-57	N/A	N/A	N/A	N/A
H-Puller	D-01200AA	D-01200AA	N/A	N/A	N/A
Bearing Puller	D-01218AA	D-01218AA	N/A	N/A	N/A

* Use JDM-112 to hold oil pump gear during removal or installation.

Liquifire

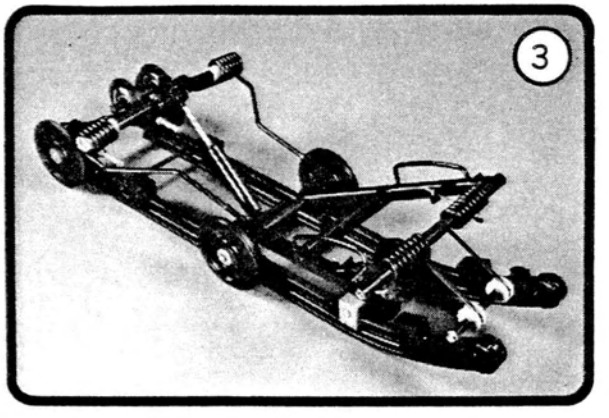
General Features

- 440 Liquid Cooled Oil Injected Engine.
- Aluminum Tunnel, Steel Center Pan Section and TPR Sidepanels.
- 32" Ski Stance.
- Sport Windshield and Seat.
- Heavy Duty Suspension and Molded Rubber Track.



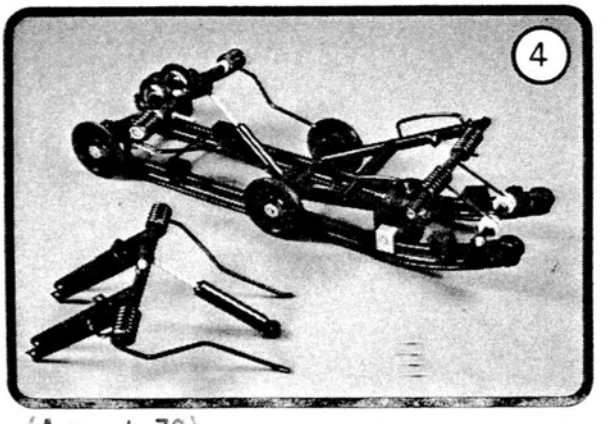
Instrumentation

High console holds temperature gauges, tachometer and speedometer which are standard equipment.



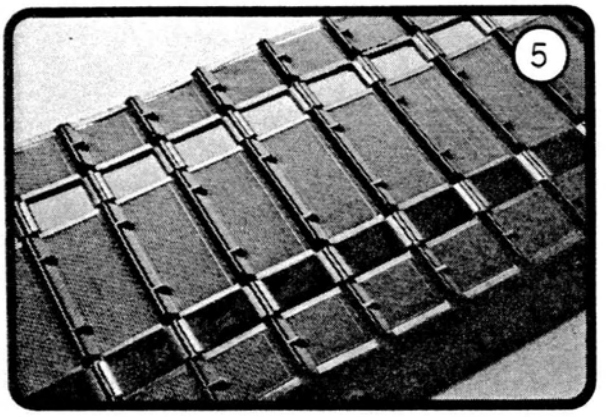
Suspension

Designed to support the molded rubber track and provide the strength required on a high performance snowmobile.



Deep Snow Suspension Kit (BM21169)

Has a longer rear swing arm, softer springs and shock. It brings the rear swing arm pivot forward to allow more driver weight force on the rear. Weight on the rear reduces ski pressure and transfers more weight to the track for traction.



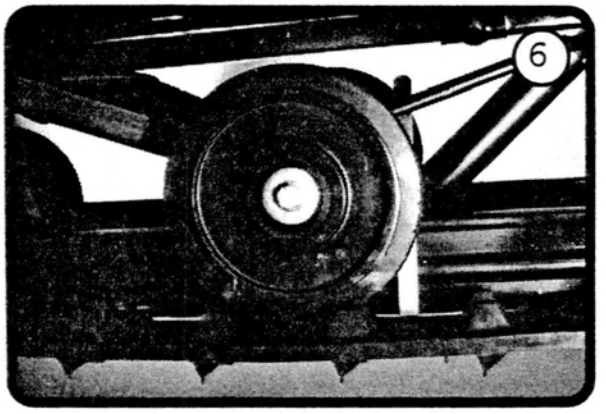
Molded Rubber Track

Reinforced with fiberglass rods.

Replaceable wear clips.

45° side of rib is the leading edge.

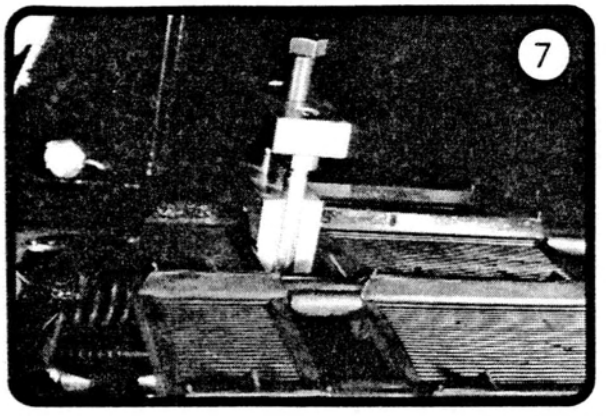
Reference	Section 60
TM1217	Group 15



Track Adjustment

Adjust to 1/2" slack.

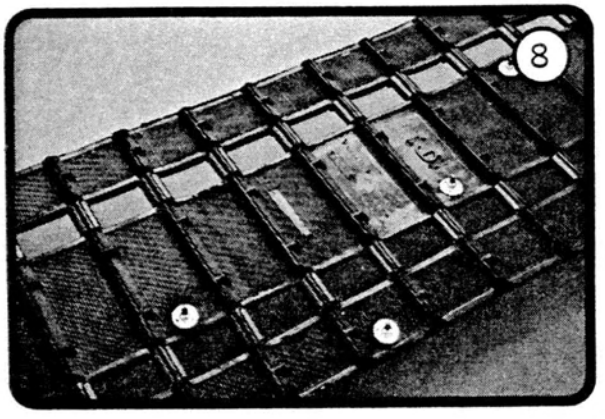
Reference	Section 60
TM1217	Group 15



Track Wear Clip Replacement

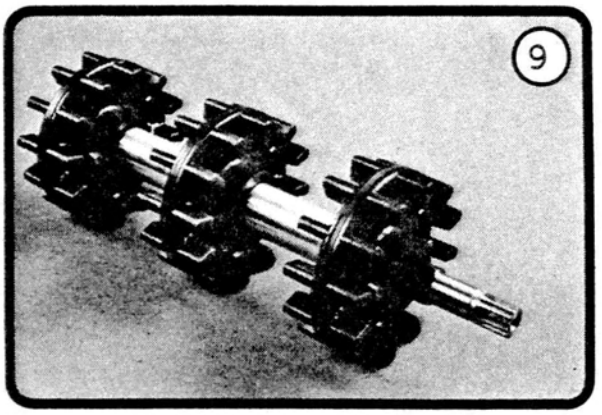
Install new wear clips with JDG-46.

Reference	Section 60
TM1217	Group 15



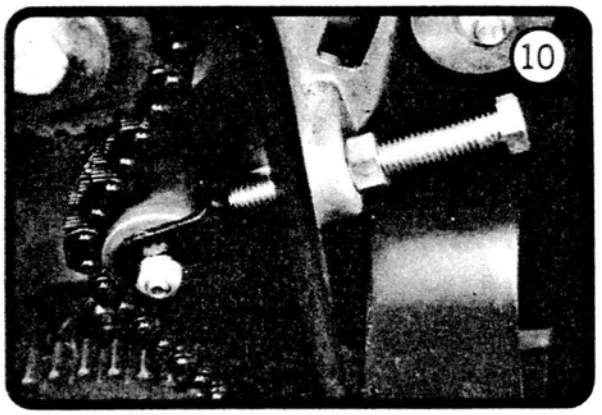
Stud Kit Installation

Install 18 or 36 studs per track using the pattern called out in the installation instructions. Stud locations are critical because of wheel locations.



Drive Shaft

Hexagon drive shaft has three drive sprockets.



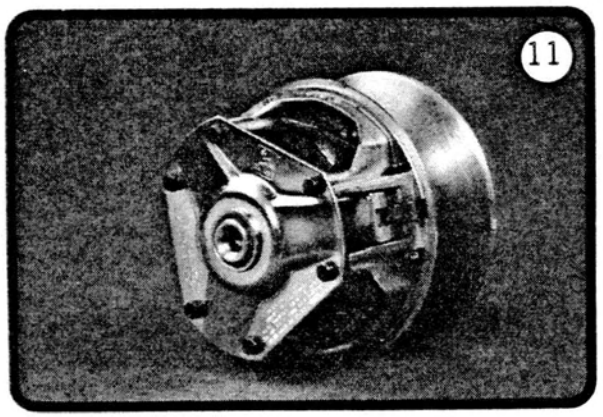
Adjustable Chain Case Tensioner

Heavy duty roller bearing design.

The chain tensioner requires more chain travel than previous years for the same gear ratios.

Turn adjusting screw in until finger-tight then back off 1/4-turn.

Reference	Section 50
TM-1217	Group 25



102C Primary Clutch

Disassembly:

Mark cover and moveable sheave for reassembly.

Assembly:

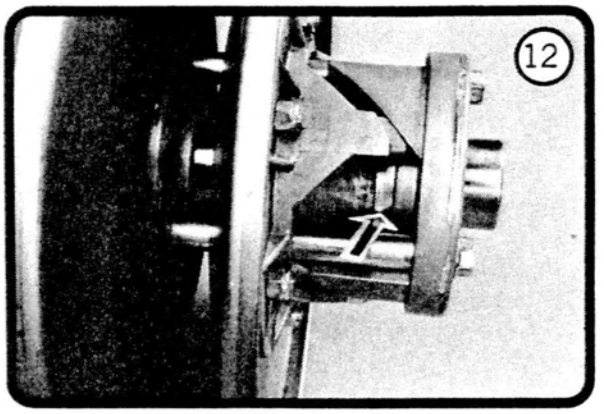
Apply Loctite 601 to pivot bolt threads and install nuts snug but not tight.

Install cover without spring and tighten cover bolts to 20 ft.lbs.

Tighten pivot bolt nuts and check that moveable moves freely. Loosen pivot bolt nuts if necessary until moveable is free.

Remove cover, install spring, reinstall cover and torque cover bolts to 20 ft. lbs.

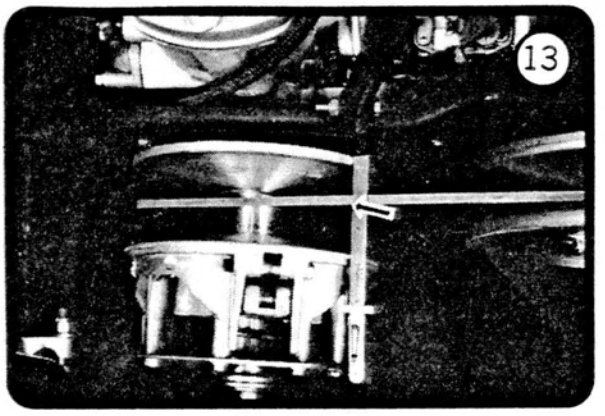
Reference	Section 50
TM-1217	Group 15



Secondary Clutch

Limiting washer prevents sheaves from opening far enough to allow belt to drop into hub area if overspeeding occurs.

The secondary will have 2 anti-creep washers standard.

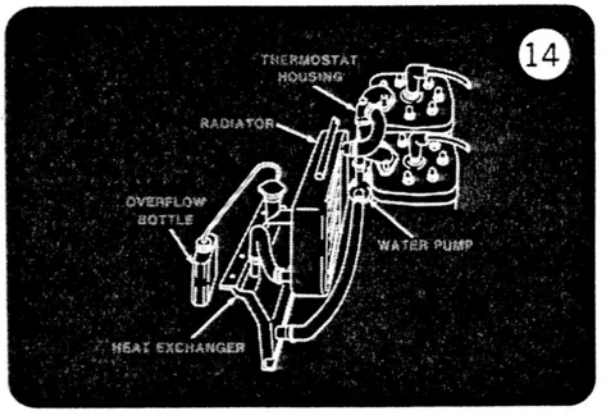


Clutch Alignment

Check alignment with 3/8" key stock.

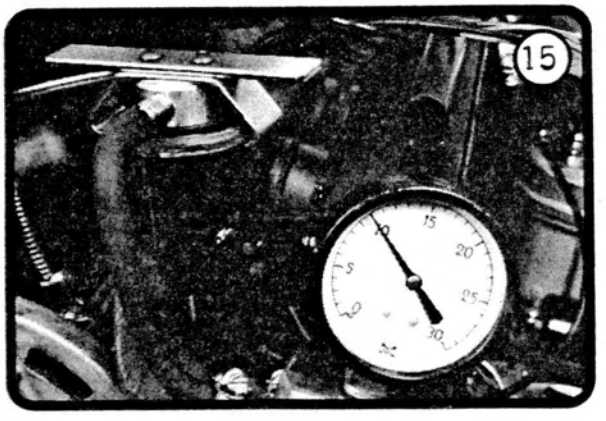
Add or remove washers behind secondary until dimension is 1.28-inches.

Reference	Section 50
TM-1217	Group 15



Cooling System

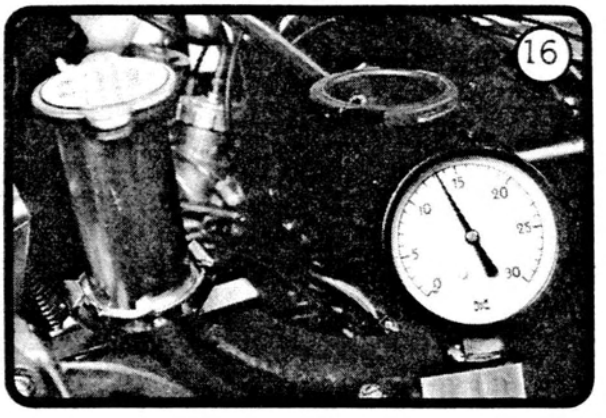
A radiator, heat exchanger and gear driven water pump cool the Liquifire engine.



Cooling System Pressure Test

Use JDM-44 Pressure Tester and JDG-56 Adapter to check cooling system pressure. System should hold 10 psi for 2 minutes.

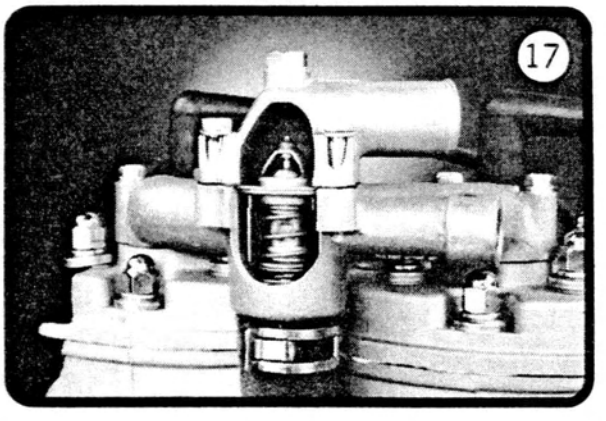
Reference	Section 20
TM-1217	Group 15



Cooling System Cap Pressure Test

Use JDM-44 Pressure Tester and JDG-56 Adapter to check cap pressure. Cap should release at 13 psi.

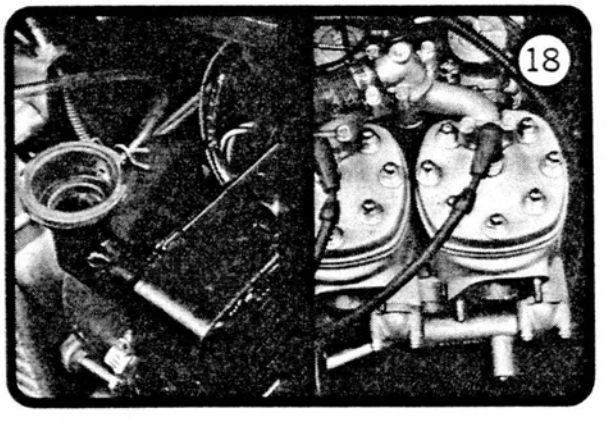
Reference	Section 20
TM-1217	Group 15



Replacing and Testing Thermostat

Place thermostat in a container of water with a thermometer. Thermostat should be fully open at 108°F.

Reference	Section 20
TM-1217	Group 15



Draining and Filling Cooling System

Remove drain plug.

Lift rear of snowmobile to drain system.

Reinstall plug.

Remove bleed plug.

Fill radiator with a 50/50 mixture of ethylene glycol antifreeze and water until mixture starts to come out bleed hole.

Reinstall bleed plug.

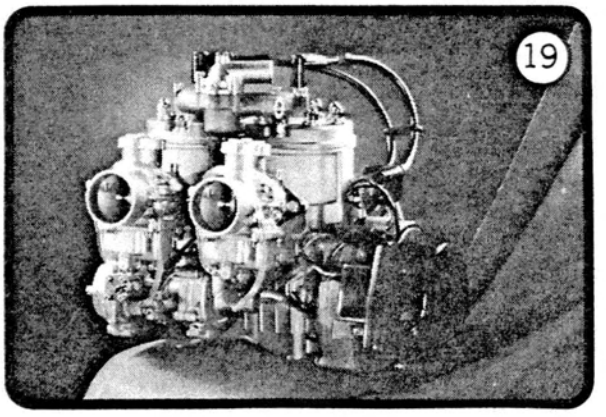
Continue filling until radiator is full.

Run for five minutes and recheck coolant level.

Coolant recovery tank should be approximately 1/2 full.

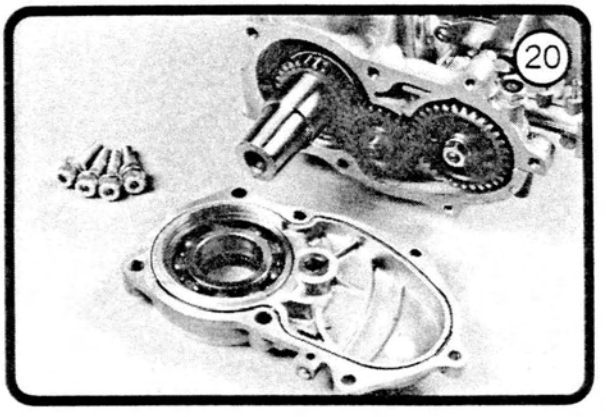
Reference	Section 20
TM-1217	Group 15

Litho in USA



Fireburst Engine

The 440 oil injected, liquid cooled engine is built by Kawasaki Heavy Industries to John Deere specifications.

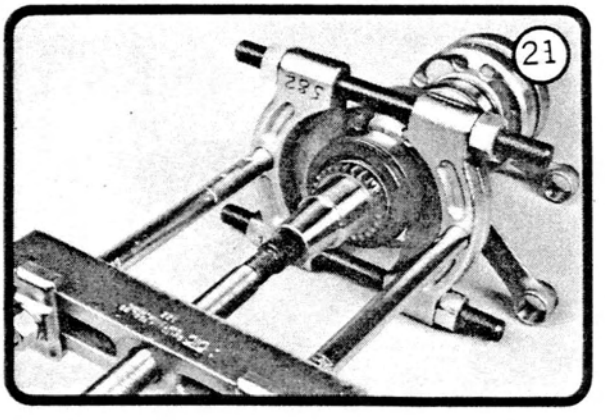


Servicing Pump Gearcase

Removing the gearcase cover exposes the crankshaft gear, idler gear and oil pump gear.

If oil pump gear is being removed, use JDM-112 to hold gear while nut is removed.

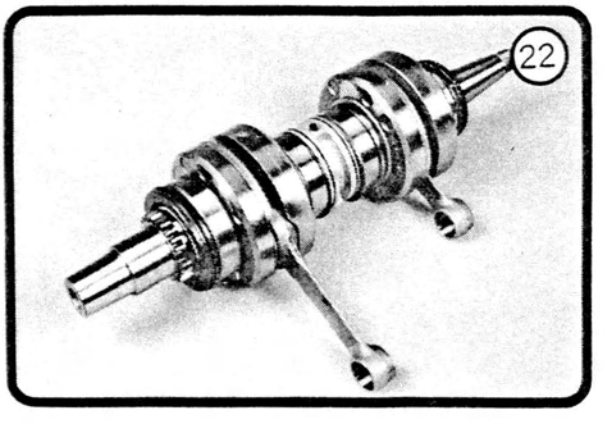
Reference	Section 20
TM-1217	Group 10



Removing Crankshaft Gear and Bearing

To replace the crankshaft gear, bearing or seal, disassemble the engine and remove all three at once with D-01218AA Bearing Puller, D-01200AA H-Puller and 27501 Pilot.

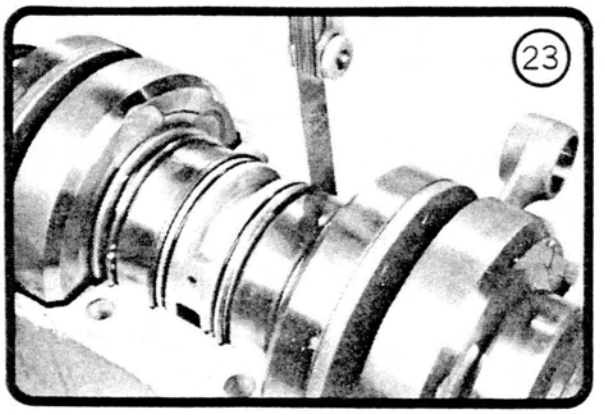
Reference	Section 20
TM-1217	Group 10



Installing Crankshaft Gear and Bearing

Use heat to expand crankshaft gear and bearing for installation.

Reference	Section 20
TM-1217	Group 10



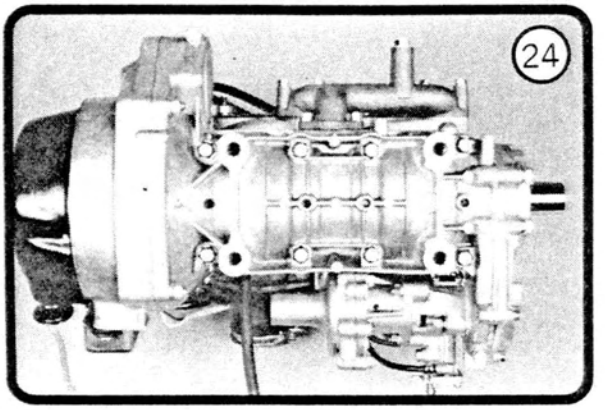
Shimming Crankshaft End Play

Set the crankshaft in lower crankcase half and tap the flywheel end of crankshaft.

Check clearance between inner thrust washer and bearing on flywheel end.

Add shims as necessary.

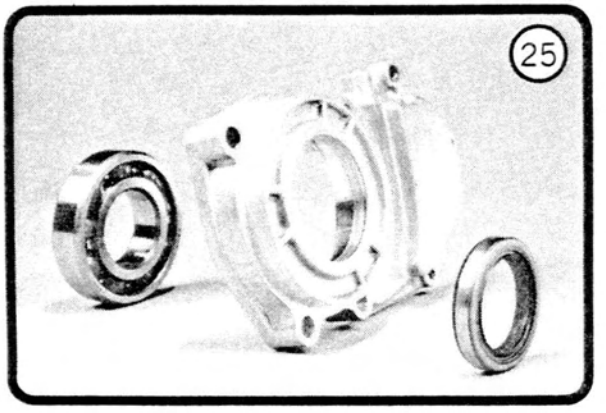
Reference	Section 20
TM-1217	Group 10



Crankcase Torque Sequence

Torque crankcase hardware in the sequence shown.

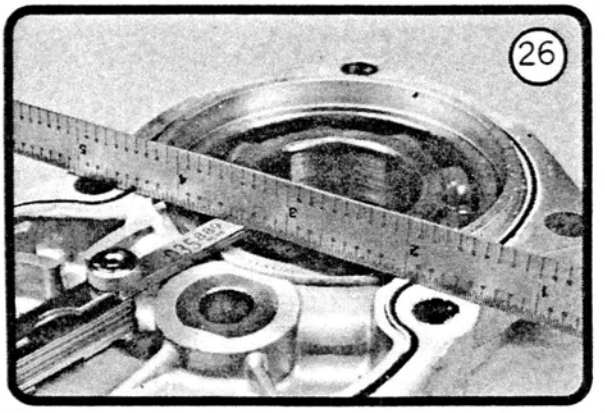
Reference	Section 20
TM-1217	Group 10



Replacing Gearcase Cover Bearing

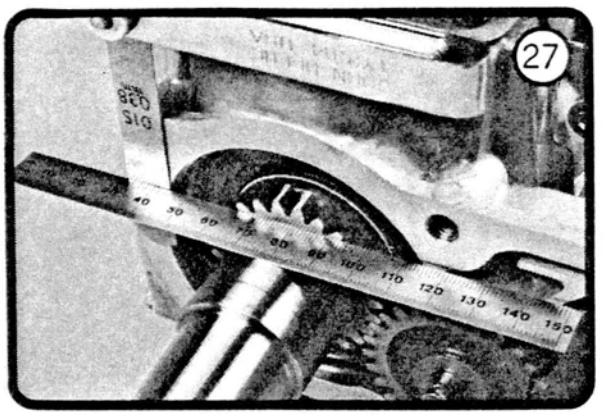
This bearing can be easily pressed in and out of gearcase cover after seal has been removed. Use the proper size drive plates.

Reference	Section 20
TM-1217	Group 10



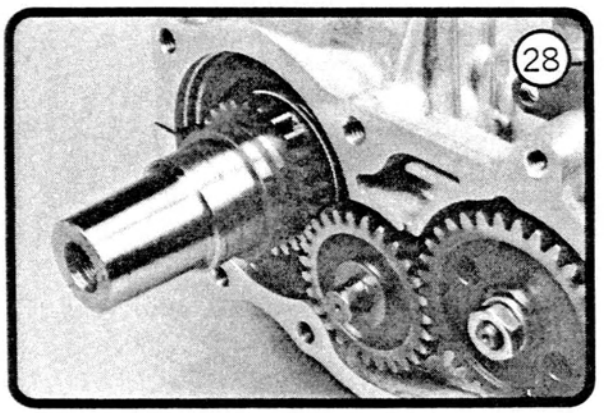
Shimming Oil Pump Drive Gear

Measure the dimension between the gear case cover gasket flange and the bearing.



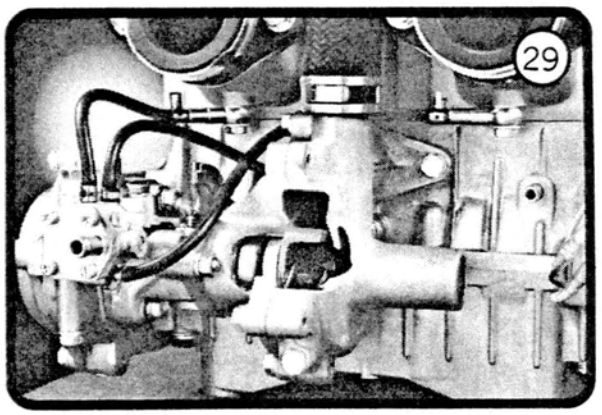
Shimming Oil Pump Drive Gear - Continued

Measure the dimension between the crank case flange and the outer edge of crank shaft gear.



Subtract the crankshaft gear dimension from the gearcase cover dimension. The difference determines the amount and size of shims.

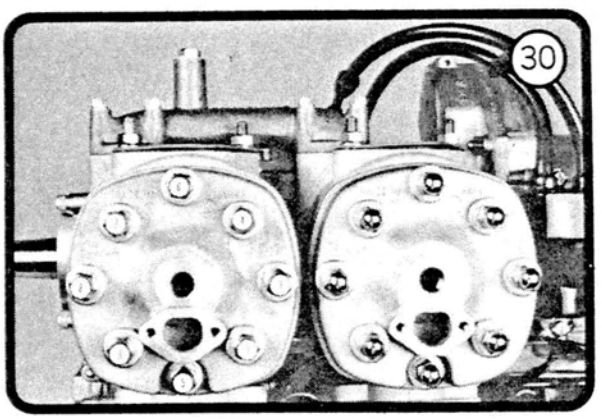
Reference	Section 20
TM-1217	Group 10



Installing Oil Pump

When installing the oil pump the oil injection lines must be installed as shown or the main bearing will not receive enough oil.

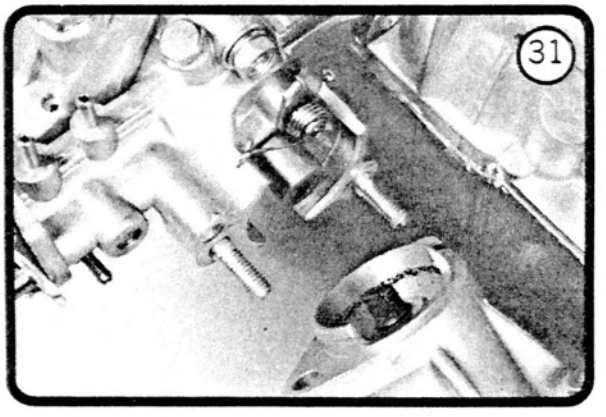
Reference	Section 20
TM-1217	Group 10



Cylinder Head Torque Sequence

Torque the cylinder head bolts in a cross hatch pattern.

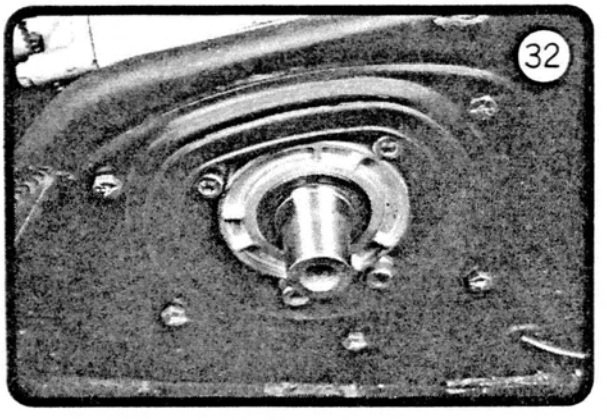
Reference	Section 20
TM-1217	Group 10



Lubricating Water Pump Drive and Replacing Water Pump

Annually or when replacing a water pump lubricate the inside of drive coupling with Molybdenum disulphide grease.

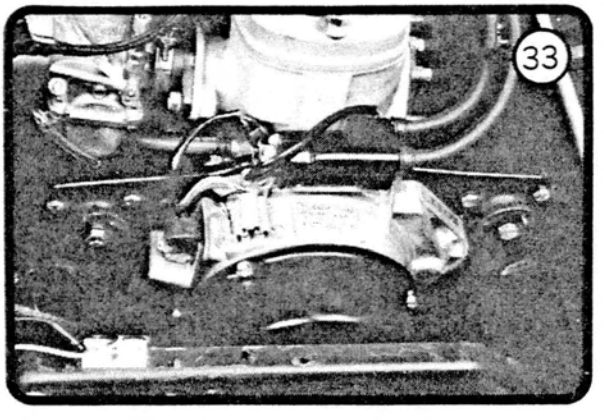
Reference	Section 20
TM-1217	Group 10



Left Hand Engine Hardware Torque

1. Cap screws - 8 ft.lbs.
2. Socket screws - 12 ft.lbs.

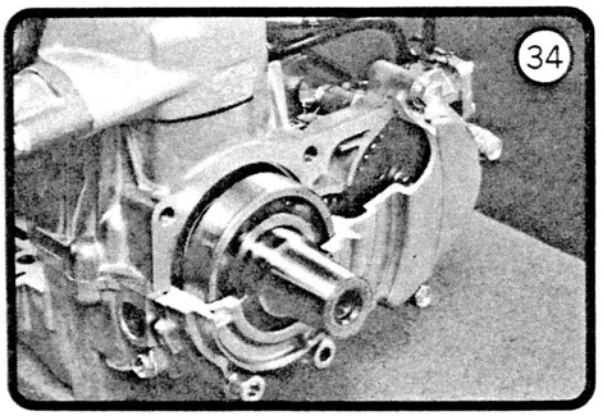
Reference	Section 20
TM-1217	Group 10



Right Hand Engine Hardware Torque

1. Nuts - 12 ft.lbs.
2. Cap screws - 31 ft.lbs.

Reference	Section 20
TM-1217	Group 10



Gearcase Oil

Draining and Filling Gear Case

Drain oil from drain plug.

Fill gearcase through fill plug with 40 cc of 10W40 engine oil.

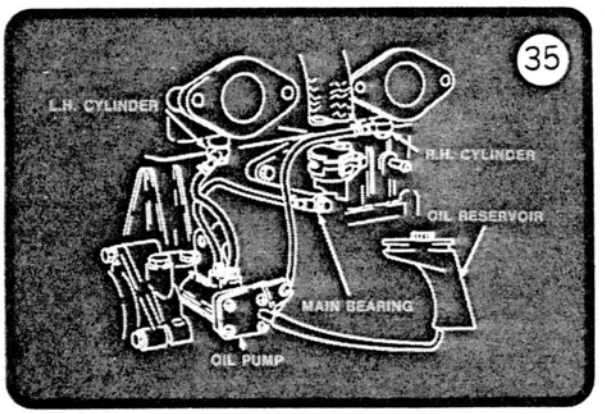
Checking Gearcase Oil Level

Oil level should be 1/2 to 3/4 full in sight gauge.

Gearcase Vent

Keep gearcase vent clean and open at all times or pressure can build up and leak into crankcase.

Reference	Section 10
TM-1217	Group 10

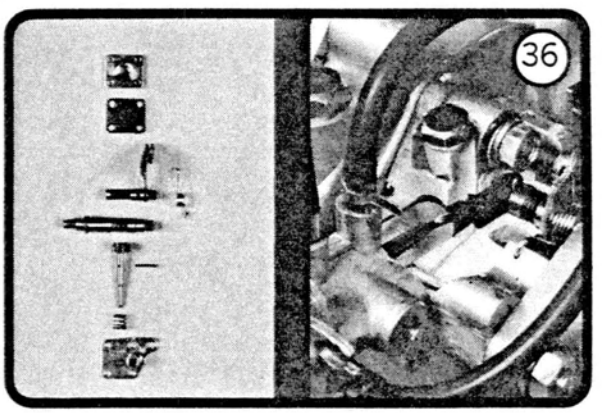


Oil Injection System

Oil is supplied to main bearings and both pistons by external lines from a gear driven oil pump.

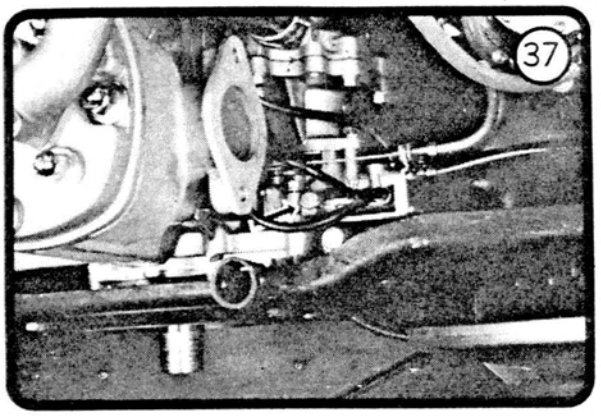
The amount of oil increases with engine speed (see page 10.)

IMPORTANT: Whenever the oil injection system has been disturbed, use 50:1 mixture fuel for the first tank and check that some oil has gone out of oil reservoir.



Oil Pump

The oil pump is gear driven off the crankshaft. A cam on the pump piston provides the pumping action and another cam on the pump lever shaft varies the stroke of the piston.



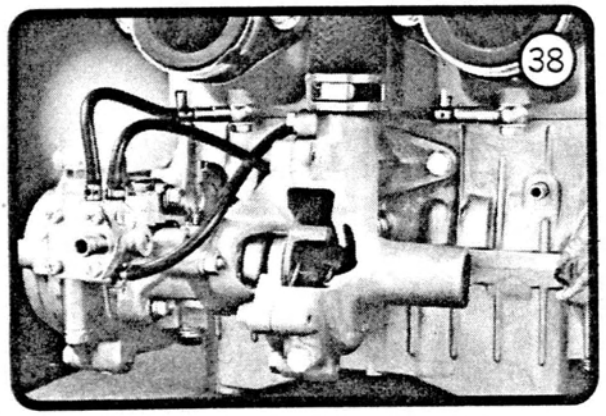
Filling and Bleeding Oil Injection System

Fill oil reservoir with 2-cycle oil.

Remove bleed plug and allow oil to run out until no air bubbles appear.

The alternative is to run with 50:1 mix until oil level in reservoir goes down.

Reference	Section 20
TM-1217	Group 10



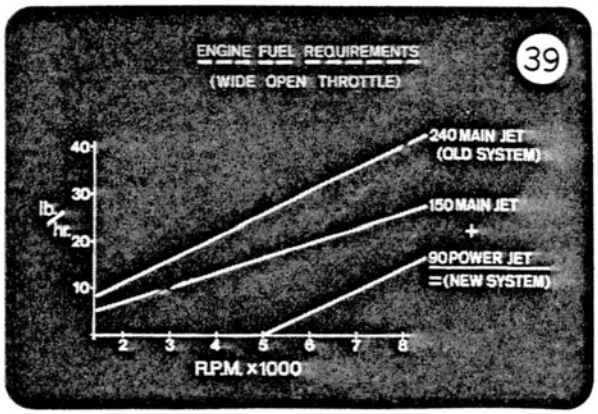
Checking Oil Pump Flow

Run engine with 50:1 fuel mixture and check flow from each outlet.

You should get the following flow in one minute at 3,000 rpm.

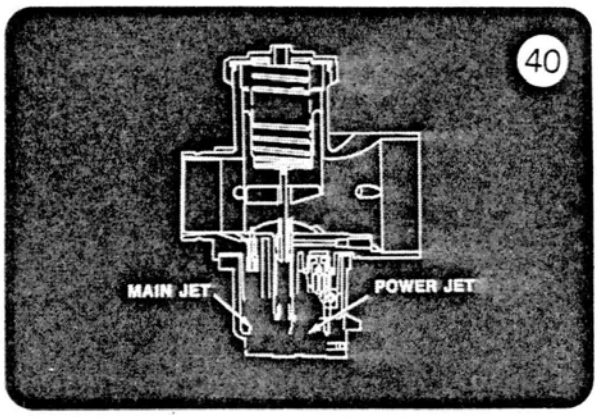
Cylinder Outlets - 1.68 to 2.03 cc
Crankcase Outlet - 3.35 to 4.06 cc

Reference	Section 20
TM-1217	Group 10



Power Jet Carburetor

The power jet allows the carburetor to be jetted closer to the engines fuel requirements in all ranges.

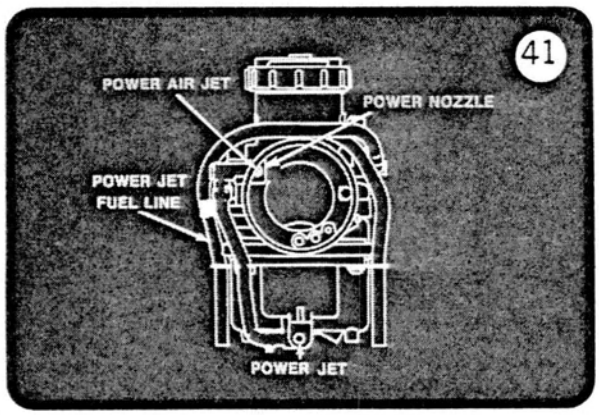


Power Jet Carburetor Jet Locations

The main jet and power jet are located in the float bowl.

Fuel is drawn from the main jet through a passage in the float bowl and up the pick up to the venturi.

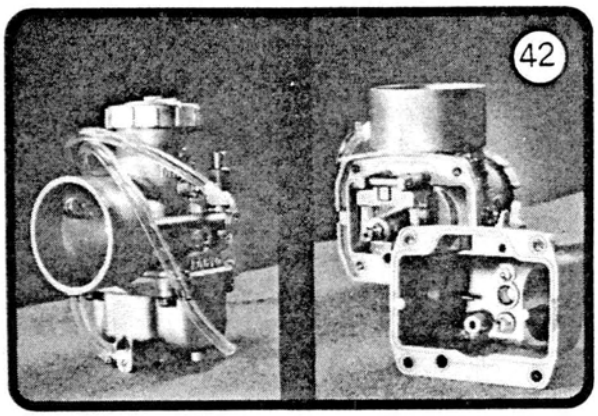
Reference	Section 30
TM-1217	Group 10



Power Jet Function

Incoming air going through the power air jet creates a low pressure which draws fuel through the power jet up the external line. When the air flow becomes strong enough the fuel is discharged through the power nozzle into the venturi.

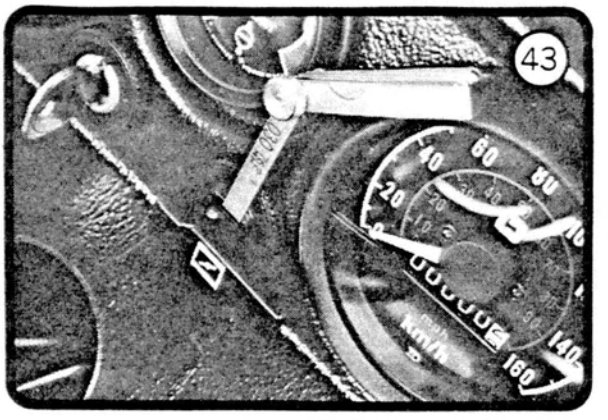
Reference	Section 30
TM-1217	Group 10



Replacing Power Jet and Main Jet

Remove the float bowl to replace a power jet or main jet. The slotted head jet is the power jet and the hex head is the main jet.

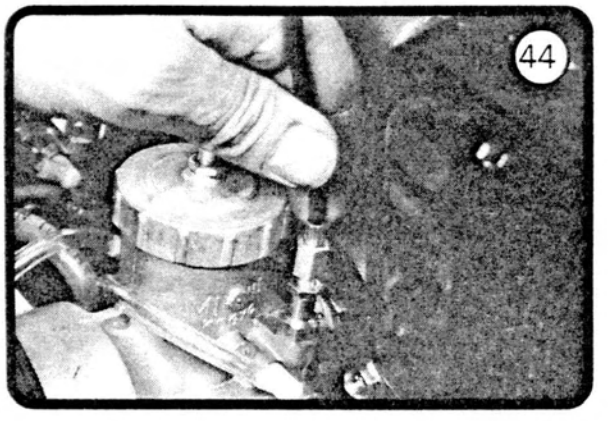
Reference	Section 30
TM-1217	Troup 10



Adjusting Choke

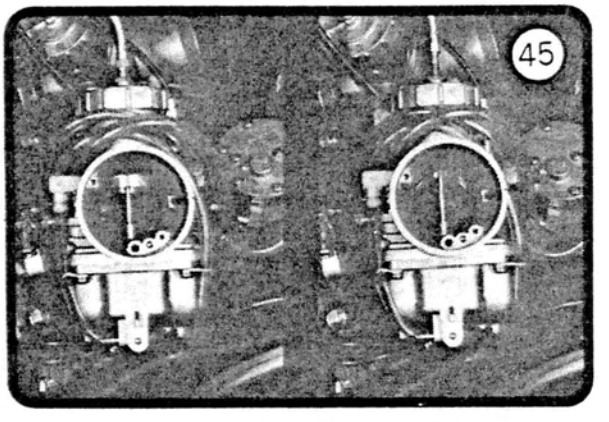
Adjust both choke cables evenly until 0.030 inch free play exists on choke lever with the console down.

Reference	Section 30
TM-1217	Group 10



Choke Cable Sychronization

Pull up on each cable to make sure each is adjusted equally.

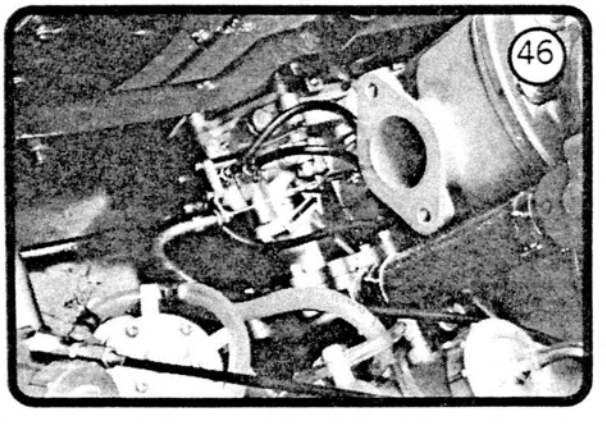


Synchronizing Carburetors

Adjust both slide valves to move at the same time when the throttle lever is depressed. Leave a small amount of cable free play on lever.

Make sure that both are flush or above the carburetor bore at wide open throttle.

Reference	Section 30
TM-1217	Group 10

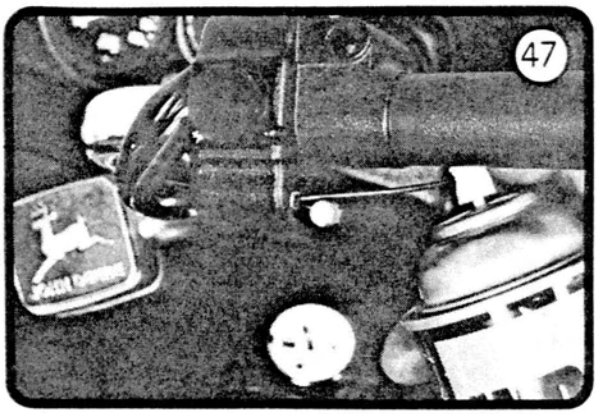


Adjusting Oil Pump Cable

Remove left hand carburetor.

Adjust oil pump cable to set against stop when throttle lever is released and start moving at exactly the same time as the slide valve when throttle lever is depressed.

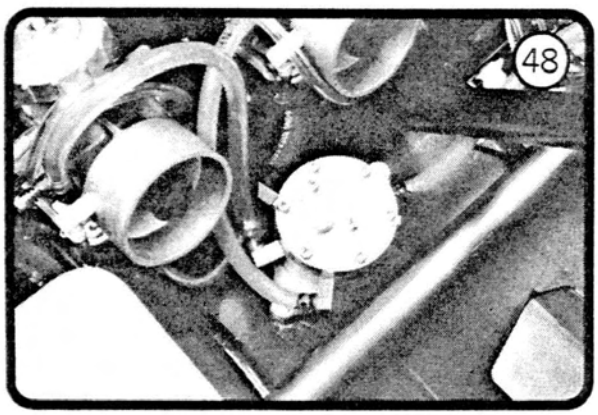
Reference	Section 30
TM-1217	Group 10



Lubricating Throttle Cable

Lubricate throttle cable annually with WD40 or LPS lubricant.

Reference	Section 30
TM-1217	Group 10

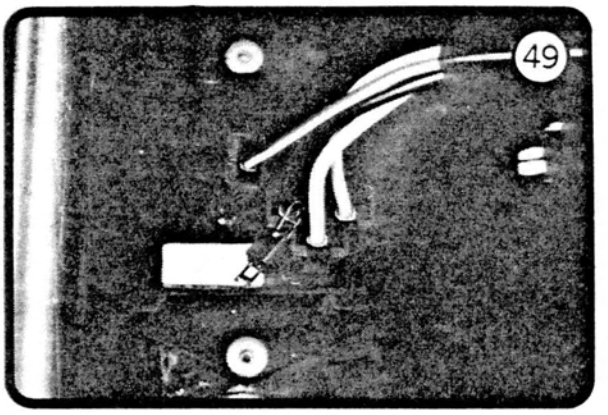


Fuel Pump

Vacuum operated with a fuel shut-off valve to prevent fuel flow when the engine is not running.

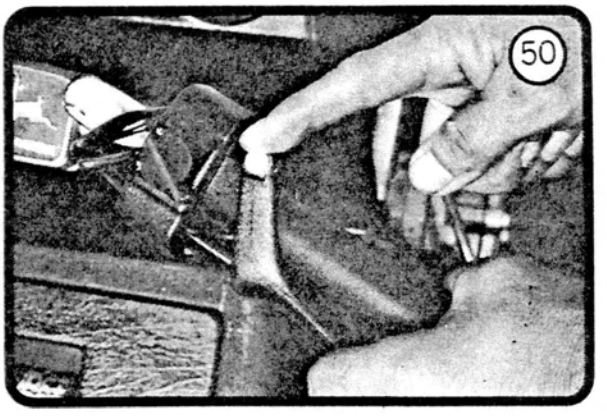
If fuel runs out of carburetor line when the engine is shut off, replace the fuel pump.

Reference	Section 30
TM-1217	Group 20



RPM Limiter

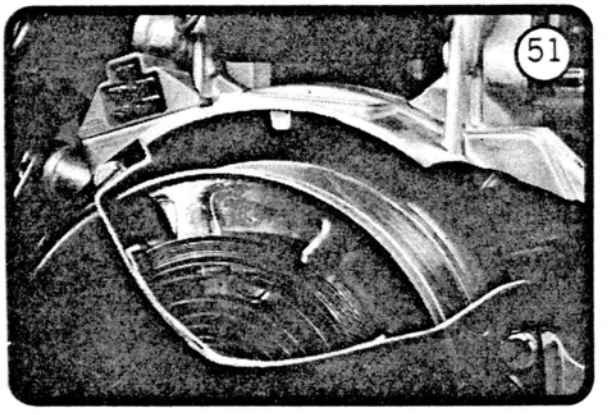
Limits the engine rpm to approximately 3750 when the throttle lever is released. Also limits the top rpm to approximately 9000.



Checking RPM Limiter

Hold the throttle lever pivot and depress the throttle lever. Engine speed should not go above approximately 3750 rpm.

Reference	Section 40
TM-1217	Group 10



Engine Timing

To check timing, the first line on the flywheel should align with the timing mark on the flywheel housing at 6500 rpm.

Reference	Section 40
TM-1217	Group 10

SPORTFIRE AND TRAILFIRE

Sportfire General Features

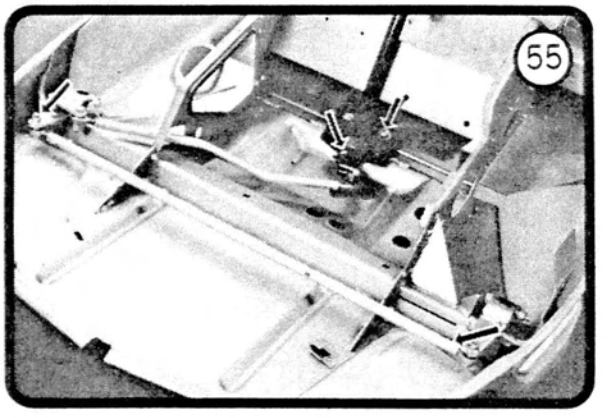
1. Chrome shocks and grab bar.
2. High console and speedometer.
3. Sport windshield.
4. Aluminum suspension.
5. Sport seat.
6. Hood louvers to release engine heat.

440 Trailfire New Features

1. New paint and graphics.
2. High console and speedometer.
3. Redesigned windshield.
4. Seat strap.
5. Hood louvers to release engine heat.

340 Trailfire New Features

1. New paint and graphics.
2. High console.
3. Redesigned windshield.
4. Seat strap.
5. Hood louvers to reduce engine heat.



Steering System

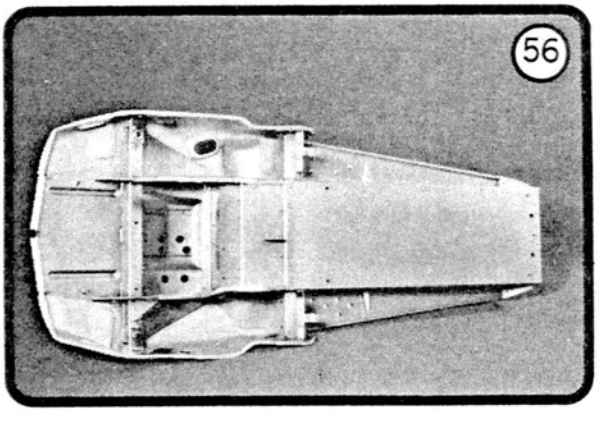
All locknuts are the plastic insert type and should be replaced when removed except for the pitman arm nut which is slotted with a cotter pin through the bolt.

Both the tie rod and drag link are crimped which means steering adjustments are made on the right side only.

The steering column can be adjusted to center the pitman arm between engine and pan.

Pitman arm bearing has been redesigned and is lubricated in production.

Reference	Section 60
TM-1217	Group 20



Center Pan Section

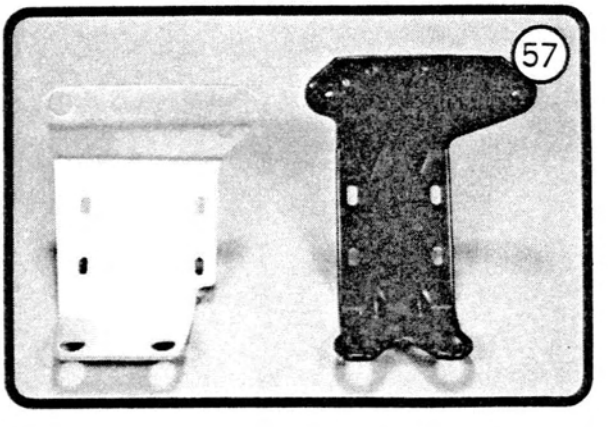
The pan is ribbed to provide additional strength.

Portions of pan covered by the TPR sections are primered to prevent rust.

TPR sections are slightly thicker.

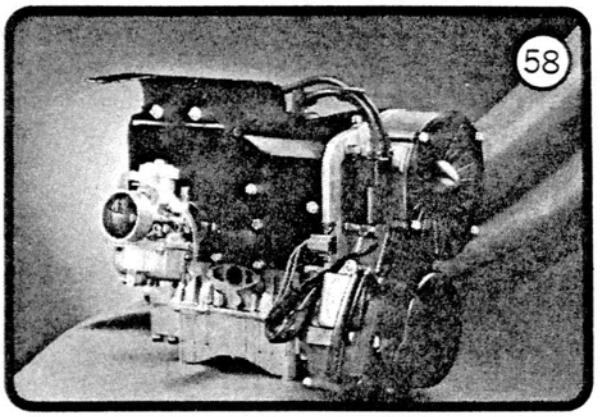
Center pan hole locations are relocated to provide easier access to engine mount bolts.

The tunnel is aluminum to reduce weight and prevent rust.



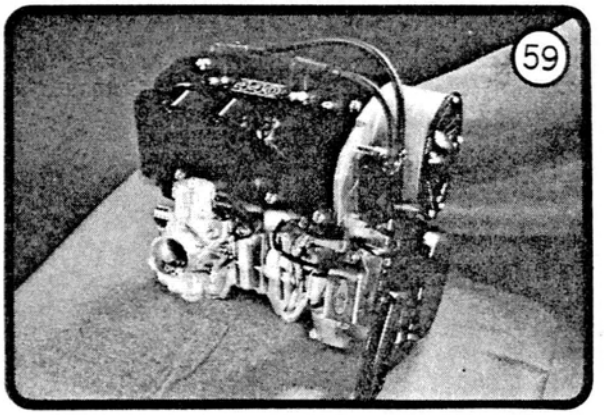
Engine Bases

The Sportfire engine base is aluminum and the Trailfires are redesigned but still made of steel. Both are designed to support the weight required without flexing or cracking. They are not interchangeable.



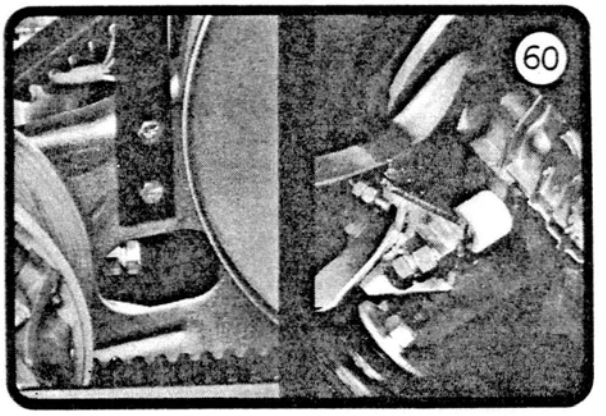
Sportfire Engine

440 fan cooled engine has approximately 15% more power than the 440 Trailfire. It has a ring gear, an air intake duct, a cooling air deflector and slightly larger cooling fan than the 440 Trailfire. Fuel is supplied by a power jet carburetor as was explained in the Liquifire section.



Trailfire Engine

Both the 340 and the 440 engines have air intake ducts and recalibrated Mikuni Slide Valve Carburetors. The 440 has a ring gear as standard equipment.

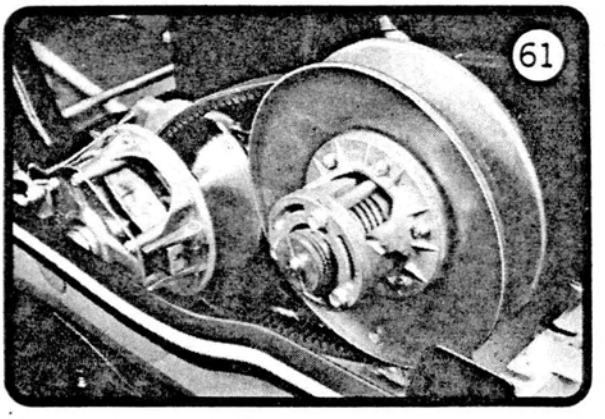


Engine Snubber

The engine snubber limits engine movement under peak load. When adjusting center distance or alignment, loosen the snubber. Thread snubber in until .030" to .040" clearance exists between snubber and engine crankcase and tighten lock nut.

IMPORTANT: Do not use snubber to align engine.

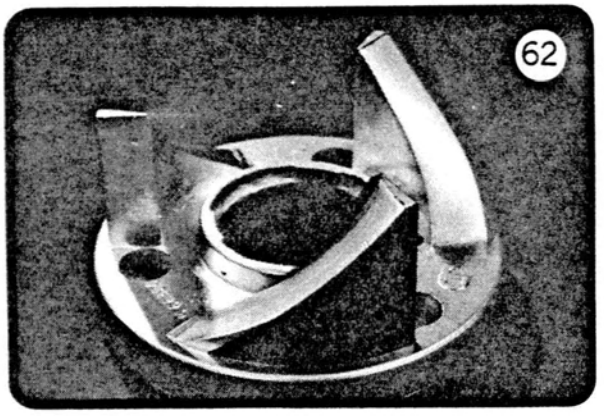
Reference	Section 50
TM-1197	Group 25



Clutches

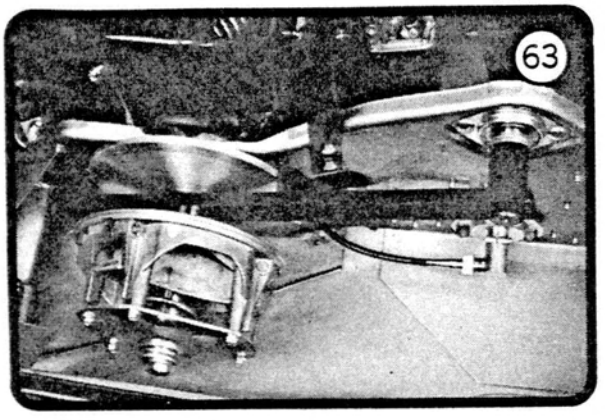
The 102C Primary is standard on all 3 models. The 440 has been recalibrated to match carburetion and increase low end performance.

The secondary will have only two anti-creep washers.



Secondary Clutch (Sportfire)

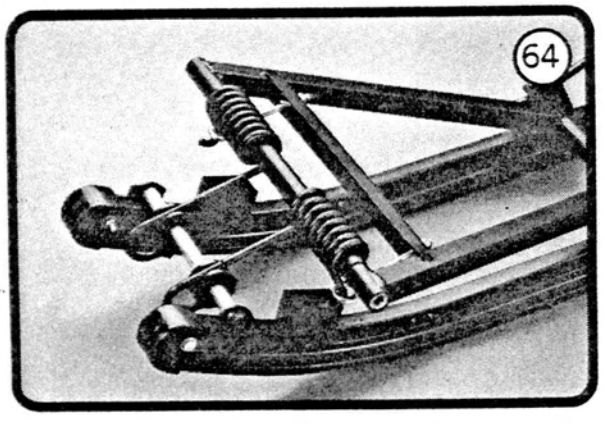
The Sportfire has a compound cam to more efficiently control rpm throughout the shift pattern. As the slide shows the compound cam starts out at 48° and reaches a 32° angle as compared to the red shaded area which represents a standard 44° cam.



Checking Center Distance and Offset

The engine has been moved forward to the furthest end of the specification. JDM-81 is still used to check alignment and center distance but the stationary shaft will fit tight against front of the notch in the tool.

Reference	Section 50
TM-1197	Group 25

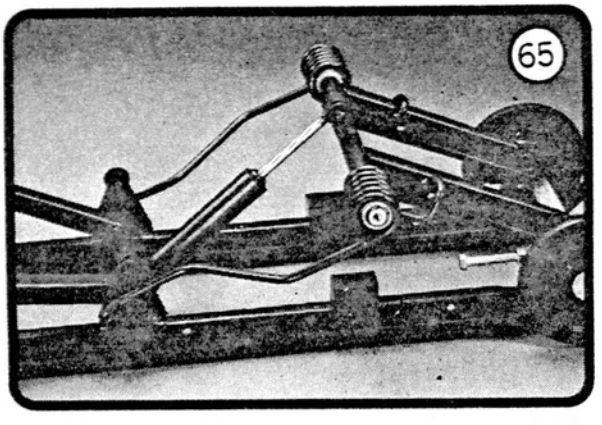


Front Suspension Springs

The front bearing shaft will be changed to steel and the bearings to a stronger black material during production as a running change.

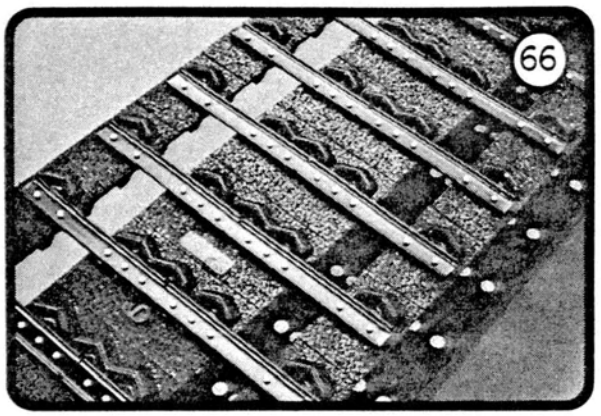
Adjust springs to a minimum of 1/2" of threads exposed through nut.

Reference	Section 60
TM-1197	Group 10



Rear Suspension Springs

Standard equipment springs are equivalent to 1979 top location when in the bottom position. '79 springs can be installed to provide a softer ride. The spring helper kit can be used with either spring.

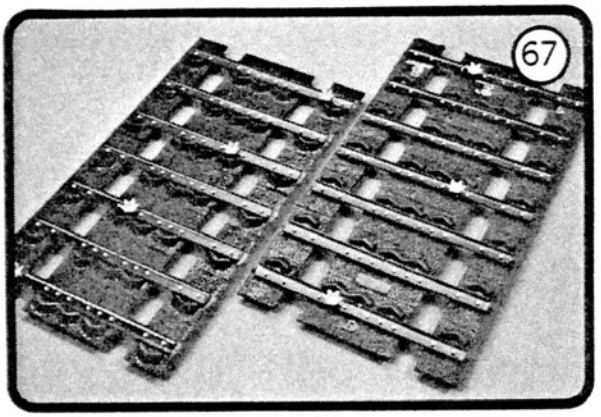


Rubber Track With Low Profile Cleats

Provides the traction and stability of a rubber track and the grabbing power of cleats.

Adjust to 3/8" slack maximum.

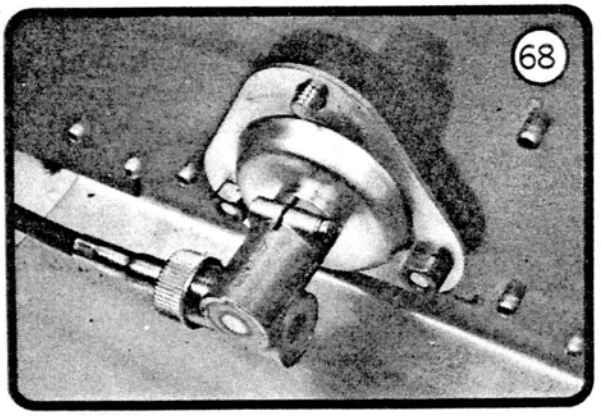
Reference	Section 60
TM-1197	Group 10



Stud Installation

Star studs are recommended for the Sportfire and Trailfires in a light (10) or heavy (15) pattern.

The heavy pattern requires carbide wear rods and both require tunnel wear strips.

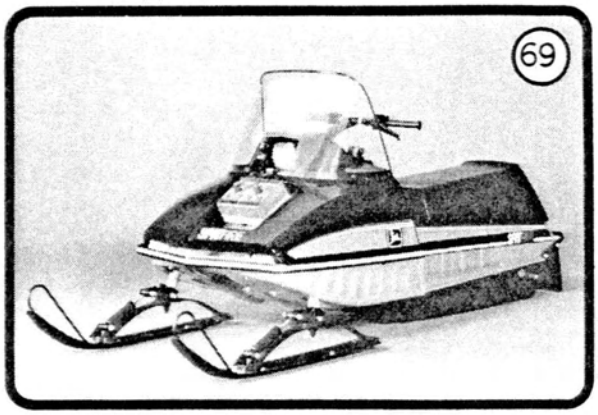


Speedometer Drive Installation

The speedometer drive can be easily installed without removing the left hand drive shaft bearing.

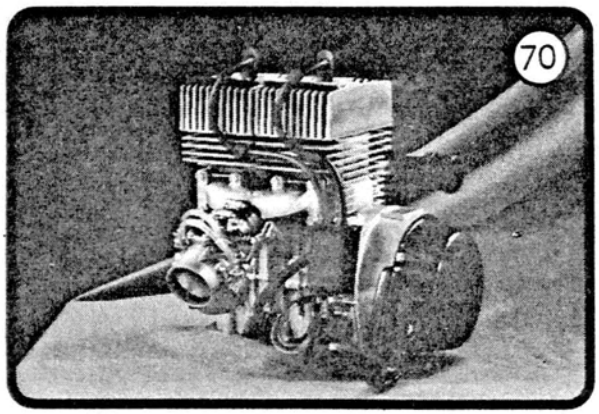
Do not install a nut on the top bolt or it will rub on the secondary moveable sheave.

SPITFIRE



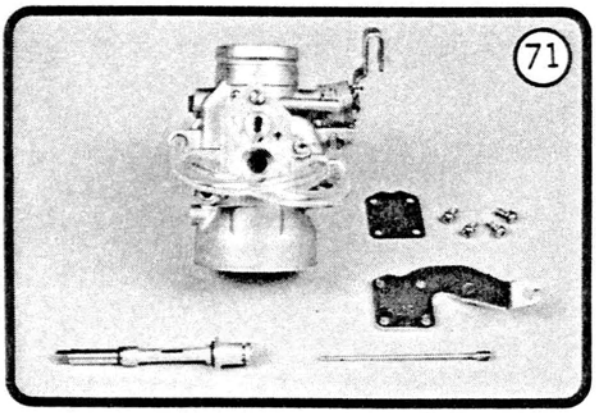
General Features

1. Color and graphics.
2. Handlebar is set back closer to the operator.
3. Canted spindle design for more stability on corners.
4. Dipstick fuel gauge.
4. Kill switch and dimmer switches, same design as Trailfire.



Fireburst Engine

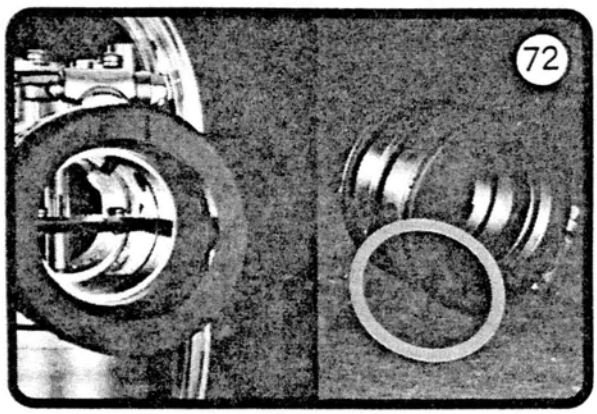
340 free air engine. All service procedures are similar to the fan cooled engine except the simplified ignition system.



Butterfly Carburetor

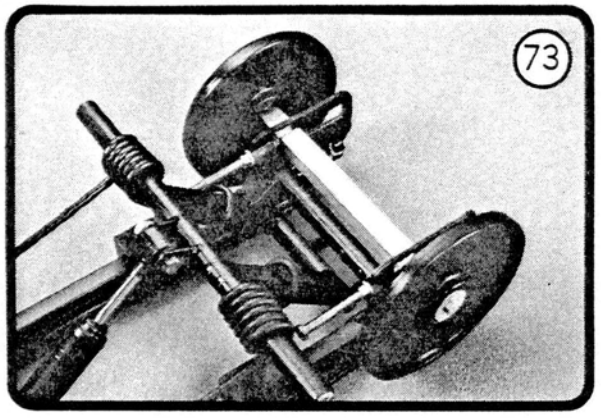
The carburetor has been recalibrated.

The main nozzle is die cast instead of machined aluminum and has a smaller inside diameter. The main air jet is larger.



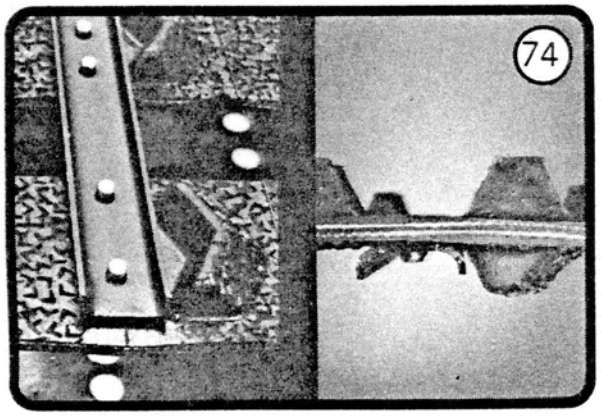
Intake Block Washer

A washer in the intake block accumulates fuel for hot starting and improves fuel distribution during idle.



Suspension

The rear idler shaft is square to increase durability.

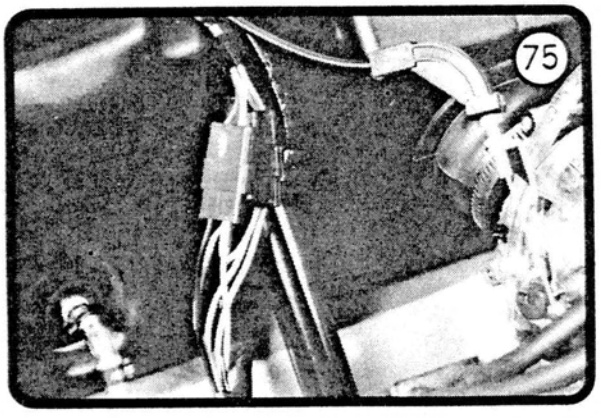


Rubber Track With Low Profile Cleats

Identical to the Sportfire and Trailfire.

Adjust to 3/8" slack maximum.

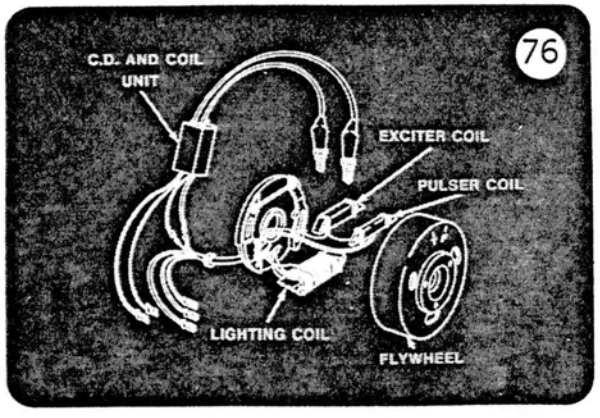
Reference	Section 60
TM-1191	Group 10



One Piece Wiring Harness

The terminal block has been eliminated which will change electrical test connection points.

Reference	Section 40
TM- 1191	Group 17

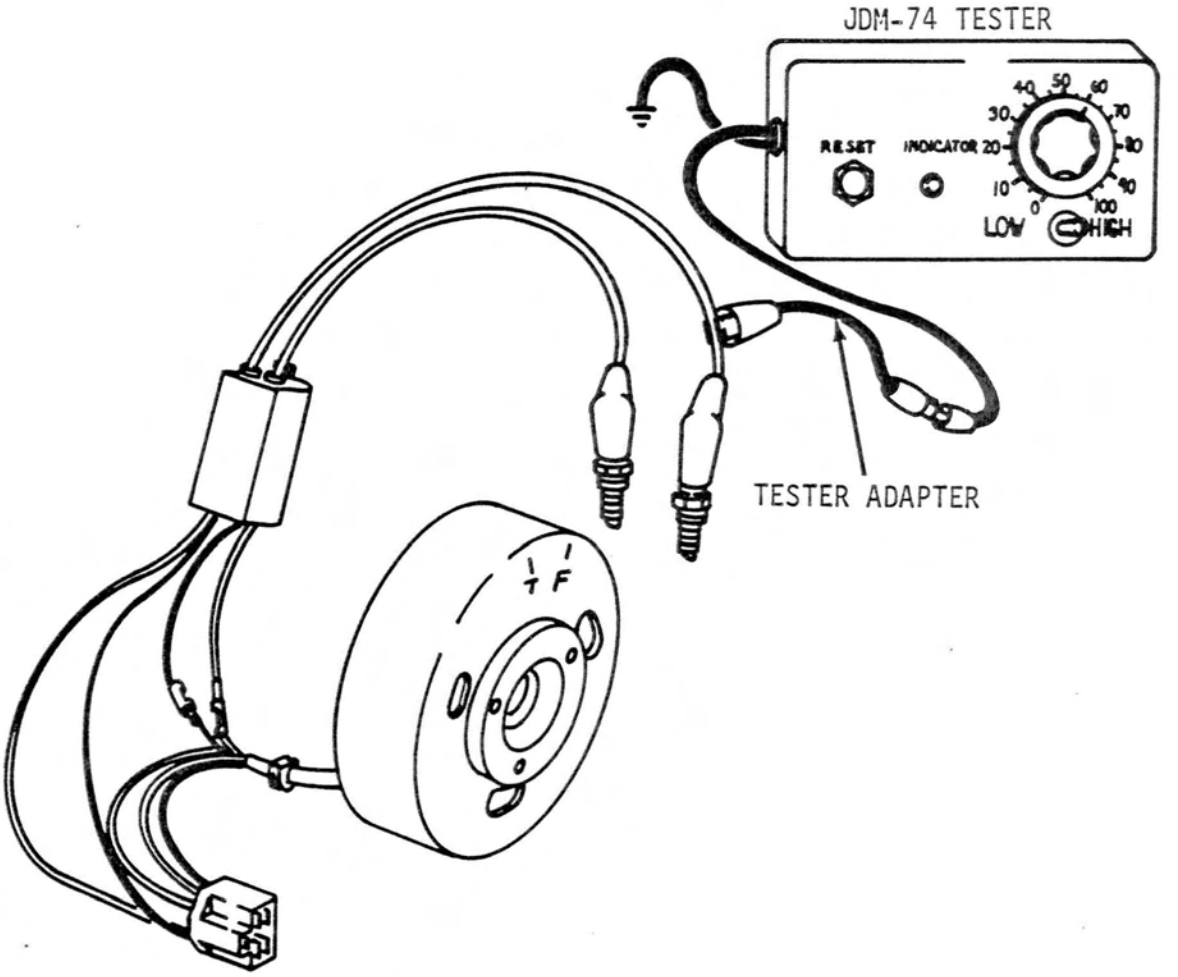


Simplified Ignition System

The Spitfire ignition system has the CD unit and the ignition coil combined in one assembly.

Reference	Section 40
TM-1191	Group 12

TESTING SPITFIRE IGNITION SYSTEM



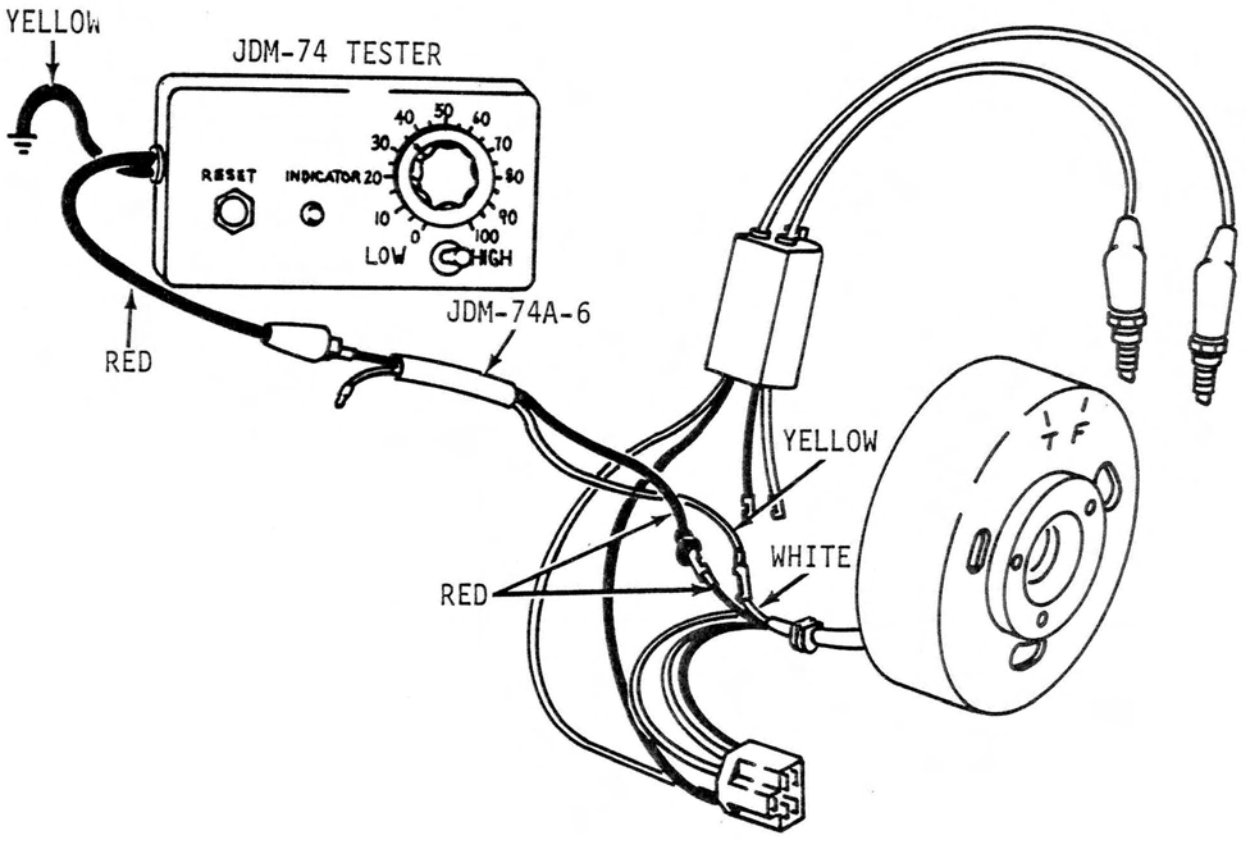
Test #1 (CD and Coil Output)

1. Make connections as shown above.
2. Set tester on (high) 60.
3. Crank engine.

Results: Indicator Lights - System OK

Indicator Does Not Light - Proceed to Test #2.

TESTING SPITFIRE IGNITION SYSTEM - Continued



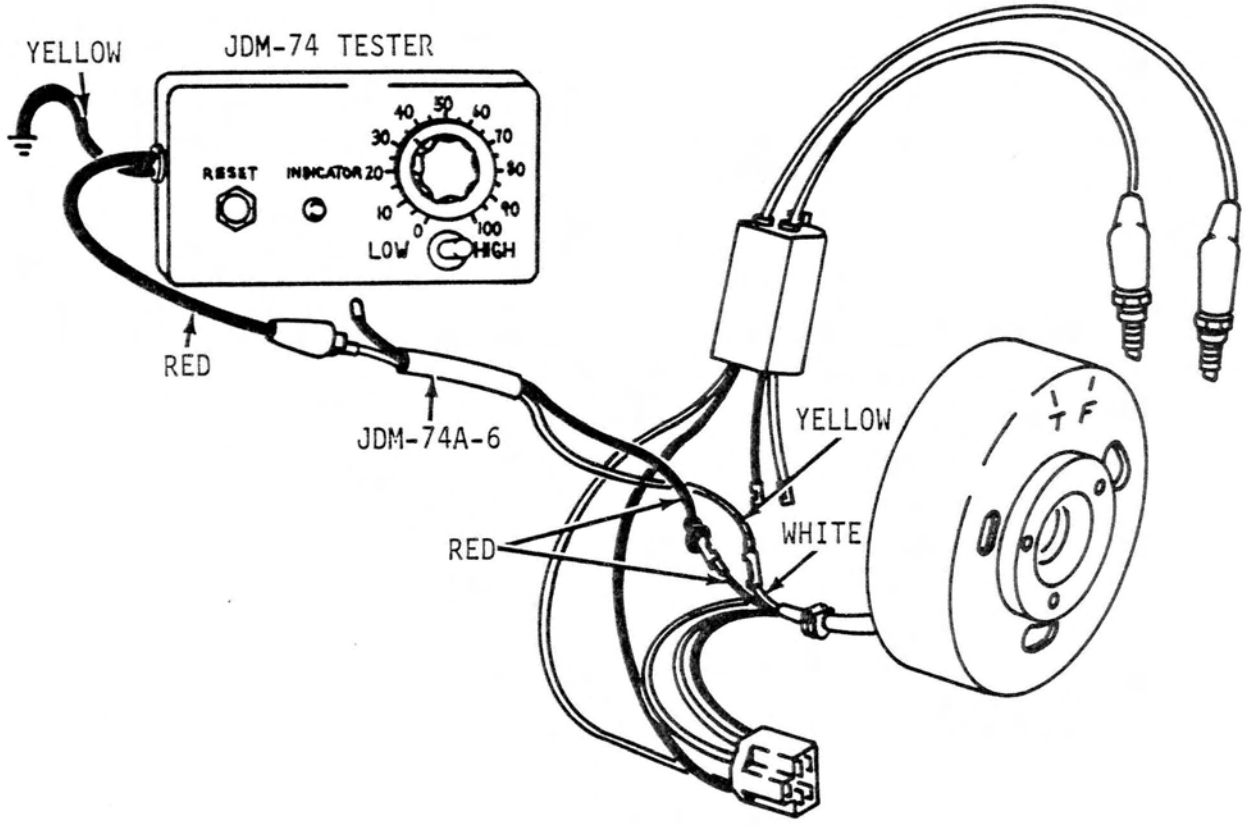
Test #2 (Exciter Coil Output)

1. Make connections as shown above.
2. Set tester on (high) 35.
3. Crank engine.

Results: Indicator Lights - Proceed to Test #3.

Indicator Does Not Light - Replace Exciter Coil.

TESTING SPITFIRE IGNITION SYSTEM - Continued



Test #3 (Pulser Coil Output)

1. Make connections as shown above.
2. Set tester on (high) 35.
3. Crank engine.

Results: Indicator Lights - Replace Coil/CD Unit.

Indicator Does Not Light - Replace Pulser Coil.

Litho in USA

QUIZ

1. The Liquifire secondary clutch has a limiting washer to:

   A. Prevent sheaves from opening too far.
   B. Open sheaves to reduce creep.

2. The Liquifire oil injection system provides a fuel/oil mixture of:

   A. 50:1 at all engine speeds.
   B. More at idle and less at wide open throttle.
   C. Less at idle and more at wide open throttle.

3. The Liquifire engine gearcase should be kept 1/2 to 3/4 full in the sight gauge with 10W40 engine oil.

   A. True.
   B. False.

4. The power jet affects:

   A. Idle to mid-range.
   B. Mid-range only.
   C. Mid-range to wide open throttle.
   D. Wide open throttle only.

5. The RPM Limiter limits:

   A. Top RPM.
   B. RPM to below engagement.
   C. Both.

6. The compound cam on the Sportfire secondary:

   A. Affects top end.
   B. Affects low end.
   C. Affects complete shift pattern.

7. The rubber track with low profile cleats is used on which of the following models.

   A. Liquifire.
   B. Sportfire.
   C. Trailfire.
   D. Spitfire.

8. The Spitfire ignition system eliminates the need for:

   A. Coil output test.
   B. CD unit output test.
   C. Exciter coil test.

STUDENT EVALUATION QUESTIONNAIRE

Your frank and honest evaluation will help us improve our course. Please answer all questions as specifically and completely as possible. Your suggestions will be appreciated very much. (Use the reverse side if necessary.) The evaluation need not be signed.

Title of Course:

Instructor's Name:

Date of completion of this form:

Did the course meet your expectations? Please explain.

What else, if anything, would you like to have covered in a program of this type?

What specific improvements could be made?

Was there any conflicting instructions? In what sessions?

How has this program helped you?

Would you recommend this course to others? Why or why not?

What other comments or suggestions do you have?

Thank you for taking the time to complete this evaluation.

TRAINING MATERIAL REPORT

TO THE INSTRUCTOR:

Your frank and honest evaluation will help us to improve our course. Please answer all questions as specifically and completely as possible. Your suggestions will be appreciated very much. (Use the reverse side if necessary.) Please send this Training Material Report to:

Service Training Coordinator
JOHN DEERE HORICON WORKS
Horicon, Wisconsin 53032

Title of course:

Instructor:

Date of completion of this form:

How many times did you present this class?

How many students were present?

Were the students:

a. experienced servicemen
b. new servicemen
c. office and/or management personnel
d. customers

Were you provided with enough instructional information?

Was it presented as suggested?

Does it need to be changed:

Comments:

Were the students able to meet the objectives of the class?

Should the objectives be rewritten?

Comments:

ANSWERS TO MULTIPLE CHOICE QUIZ

1. A
2. C
3. A
4. C
5. C
6. C
7. B, C, D
8. B