SECTION 3 - IGNITION and ELECTRICAL SYSTEMS

MERCURY
SNOWMOBILES

PART C - TIMING and ADJUSTING

MERCURY
MARINE

INDEX

TIMING and ADJUSTING
SNOWMOBILE MODELS 220 and 250

TIMING PROCEDURE

1. Connect Tachometer (C-91-31591) to engine. Place tachometer sensing ring over No. 2 spark plug.

   NOTE: No. 1 cylinder - blower side; No. 2 cylinder - flywheel side.

2. Connect Timing Lite (C-91-35507A1) to engine.
   a. Connect large red lead to No. 1 spark plug.
   b. Connect one lead to negative battery post and other lead to positive battery post.

   NOTE: On manual starting vehicles, an auxiliary 12-volt battery must be used as a power source. In addition to above connections, place a jumper wire from negative battery post to a convenient engine ground.

3. Depress button on timing lite and, if properly connected, the timing lite will "buzz".
4. Place vehicle on kick stand.

   CAUTION: Make sure that vehicle is secure on kick stand and that track is not making contact with ground.

5. Start engine. (On 220 model, place ignition advance lever in full "RUN" position.)
6. Turn idle speed adjustment screw to right (clockwise) to increase and maintain RPM at 2000.

   WARNING: Centrifugal clutch engagement occurs at approximately 2000 RPM. Keep hands and feet clear of moving parts at all times.

7. Aim timing lite at pointer on engine mount plate. (Figure 1) With engine running at 2000 RPM, timing mark on flywheel rim should align with pointer on mount plate or within 1/16" (14° BTDC)

   NOTE: Some 220 Snow Vehicle engines were timed on No. 2 cylinder. If timing mark on flywheel rim cannot be located when connected to No. 1 spark plug, engine must be timed on No. 2 cylinder.

8. If readjustment is necessary, proceed as follows:
   a. Stop engine.
   b. Remove trigger inspection plate and 2 plastic plugs from right lower corner of blower housing.
   c. Using a feeler gauge, check "air gap" between magnets in blower and poles in trigger coil. (Figure 2) If necessary, add or remove shim under trigger mounting plate to maintain .020"-.040" air gap.

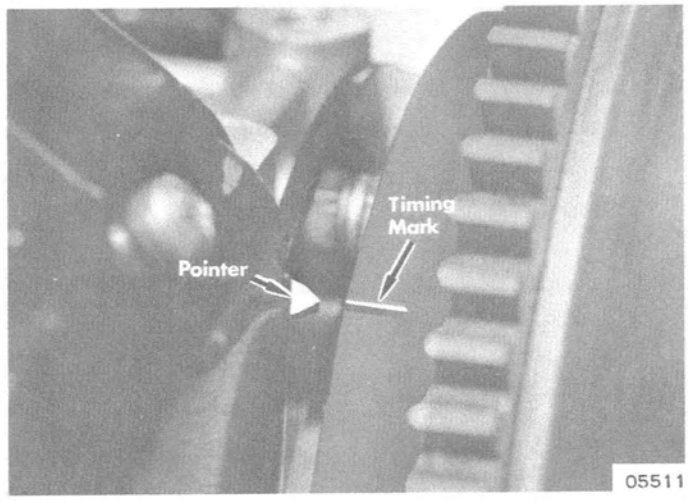

Figure 1. Timing Marks Aligned

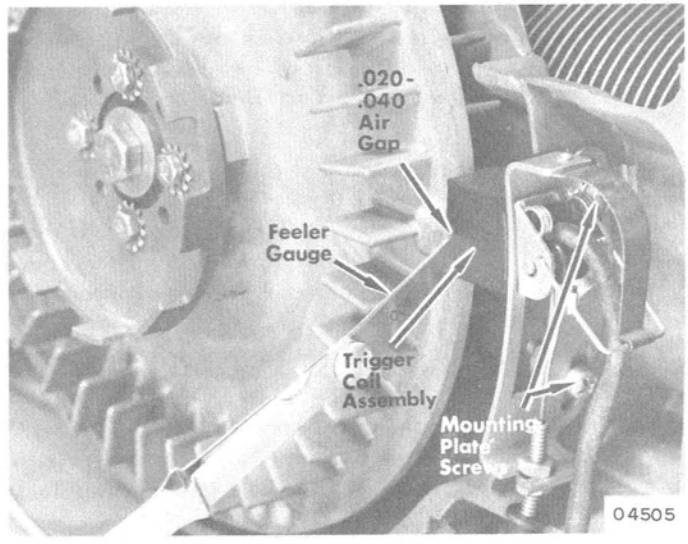

Figure 2. Checking Air Gap (Model 220 Shown)

   d. Loosen 2 mounting plate screws which secure trigger coil assembly to blower backplate.

   e. Align timing mark on flywheel rim with pointer on mount plate by rotating crankshaft.

   f. While maintaining the alignment outlined in previous Step "e" (DO NOT allow crankshaft to rotate), adjust trigger coil mounting plate to obtain 5/16" from leading edge of blower magnet to leading edge of trigger pole. (Figure 3)

IMPORTANT: When making this adjustment on 220 model, DO NOT move the trigger coil in the mounting plate, as the coil is controlled by actuating the ignition advance lever. Move only the trigger coil mounting plate assembly.

g. Tighten 2 trigger coil mounting plate screws.

9. Recheck timing with timing lite. Timing mark on flywheel rim and pointer on mount plate should align within 1/16".
10. Reset idle speed to 1250-1350 RPM.

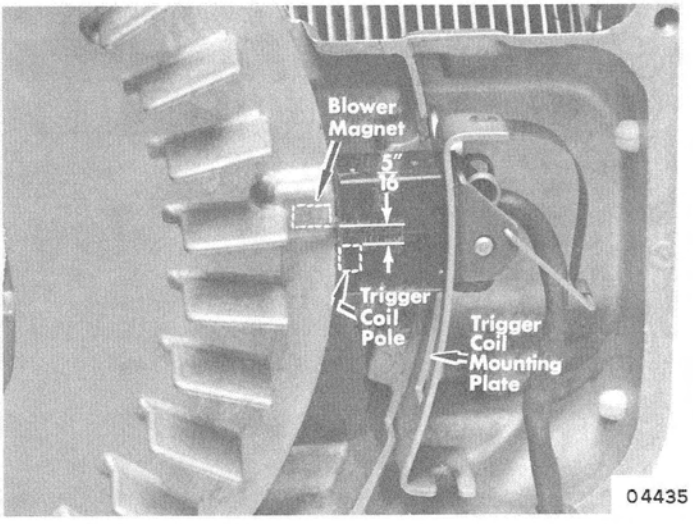

Figure 3. Trigger Coil Assembly Adjustment (Model 220 Shown)

CARBURETOR ADJUSTMENTS

1. High Speed Adjustment

a. No high speed adjustment required. Carburetor is equipped with fixed high speed jet. Refer to Section 8A - "Specifications" for carburetor jet sizes and specifications.

b. Driver sprockets of different sizes are available as optional equipment for high altitude operation or operation under various load conditions. Refer to Section 2-"Chassis" - Part D for proper application.

2. Idle Adjustment (Figure 4)

a. Idle adjustment has been set at the factory. If readjustment is necessary, start with the low speed mixture adjusting needle one and one-quarter (1¼) turn open.

b. Warm engine before attempting adjustment.

c. Set idle speed adjustment screw to attain 1250-1350 RPM. Turn idle speed adjustment screw to right (clockwise) to increase RPM, to left (counterclockwise) to decrease RPM.

d. With engine running at idling speed, turn low speed mixture adjusting needle counterclockwise until engine starts to "load up" or fire unevenly due to over-rich mixture.

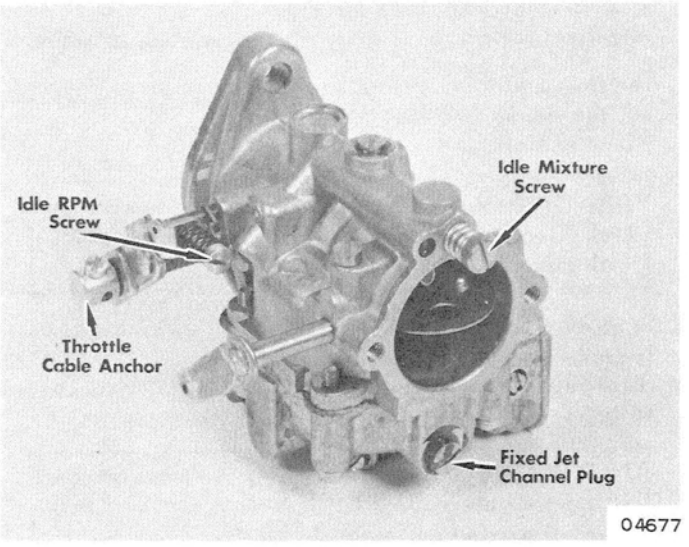

Figure 4. Carburetor Adjustments

e. Slowly turn needle clockwise until engine picks up speed and fires evenly.

f. Do not adjust leaner than necessary to achieve reasonably smooth idling. Turn needle 1/8-turn at a time, then wait sufficient time for engine to respond to this adjustment.

TIMING and ADJUSTING - 200 MODEL

BREAKER POINT ADJUSTMENT

1. Remove top cowl.
2. Remove blower housing and rewind starter as an assembly by removing 4 allen screws.
3. Remove 3 allen screws from flywheel nut locking washer and remove locking washer, starter cup and dust cover.
4. Observe point gap and rotate flywheel until maximum point gap is obtained (flywheel keyway will be straight up). Check point gap with a feeler gauge thru flywheel slot. (Figure 1)
5. Loosen retaining screw and adjust points to specifications. Tighten point retaining screw.

   NOTE: Points can be adjusted with flywheel removed by removing cam from flywheel.

6. If point gap is changed, adjust timing as outlined, following.

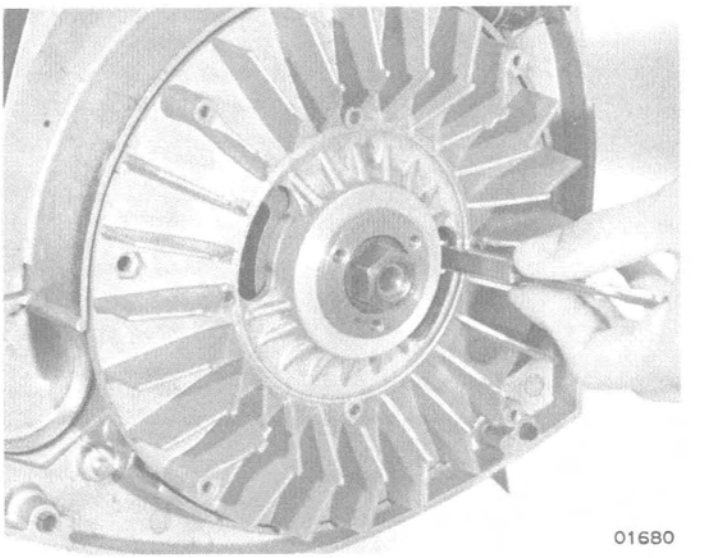

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Figure 1. Checking Point Gap

TIMING PROCEDURE

1. Check breaker point adjustment as previously outlined.
2. Connect a suitable meter, which will indicate point opening, to brown and black stator harness leads.
3. Align reference point "A" and top dead center "OT" mark. (Figure 2)

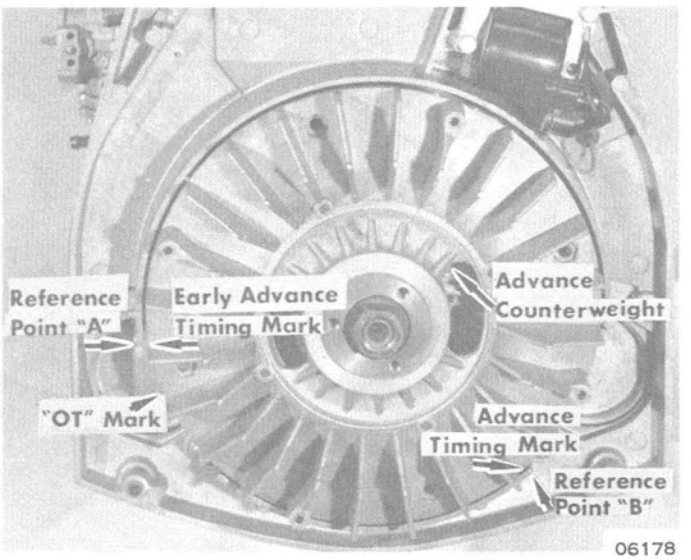

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Figure 2. Timing Marks

NOTE: If no timing mark is present opposite "OT" mark as shown in Figure 2, advance timing by aligning early timing advance mark with reference point "A".

4. Push advance counterweight (Figure 3) upward thru opening in flywheel to full advance position and rotate flywheel counterclockwise to align advance timing mark with reference point "B". (Figure 2)

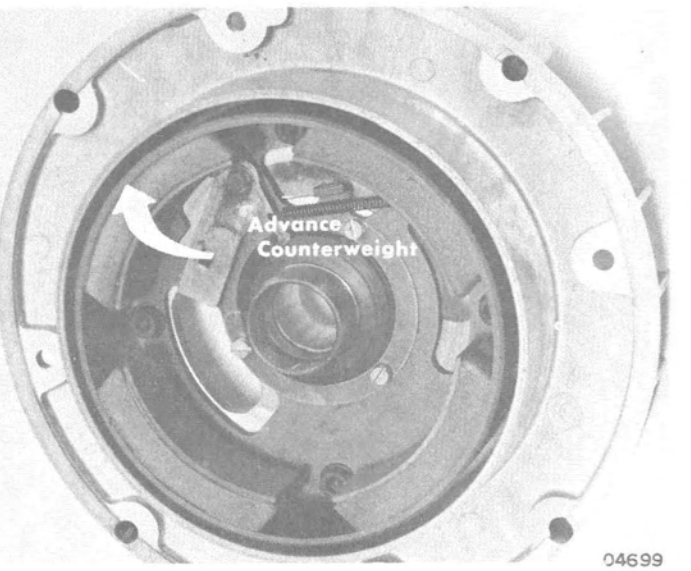

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Figure 3. Advance Cam

5. Note point opening location on equipment used.
6. If points do not just open at advance timing mark, loosen stator screws and rotate stator until points just open.

   NOTE: It may be necessary to decrease point gap if stator cannot be retarded enough to correct timing.

7. Tighten stator screws and recheck point gap. Repeat timing procedure if point gap is changed.
8. Install flywheel dust cover starter cup and locking washer.
9. Install blower housing and rewind starter assembly.
10. Install top cowl.

CARBURETOR ADJUSTMENT

IDLE ADJUSTMENT

1. Adjust idle mixture screw to obtain a smooth, steady idle and readjust idle speed screw to obtain idle speed recommended. Recheck idle mixture adjustment at recommended idle speed. (Figure 4)
2. An over-rich idle mixture will cause engine to fire unevenly and exhibit smoke from exhaust. A lean idle mixture usually causes backfiring.

HIGH SPEED ADJUSTMENT

1. Operate vehicle at full throttle under normal load conditions and slowly turn high speed mixture screw outward (counterclockwise) until engine starts to fire unevenly ("four-cycles") which indicates an over-rich fuel mixture. (Figure 4)
2. At this point, slowly turn high speed mixture screw inward (clockwise) until engine fires evenly (smooths-out).

IMPORTANT: DO NOT adjust carburetor leaner than necessary to attain reasonably smooth operation. IT IS PREFERABLE to operate with mixture SLIGHTLY RICH rather than too lean. Under normal operating conditions at sea level, final setting of high speed mixture screw MUST NOT BE less than three-quarter (¾) turn from seat.

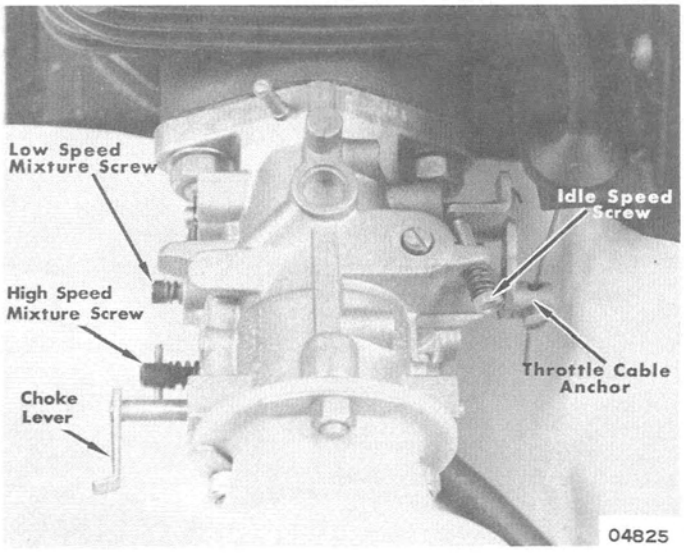


Figure 4. Carburetor Adjustments

TIMING and ADJUSTMENTS
ROCKET (339cc) and LIGHTNING (398cc)

BREAKER POINT ADJUSTMENT

1. Remove spark plugs and rewind starter.
2. Remove upper fan pulley, fan belt, rewind starter, lower fan pulley and flywheel dust cover.

   NOTE: To adjust points, initially position flywheel with keyway at approximate position shown in chart below. Rotate flywheel until maximum point gap is achieved.

Engine Serial No.	No. 1 Cyl.	No. 2 Cyl.
2999999 and Below	1 O'Clock	7 O'Clock
3800000 and Up	5 O'Clock	11 O'Clock

3. Check and adjust point gap to specifications through flywheel slot.(Figure 1)
4. If point adjustment is changed, check timing as outlined following.

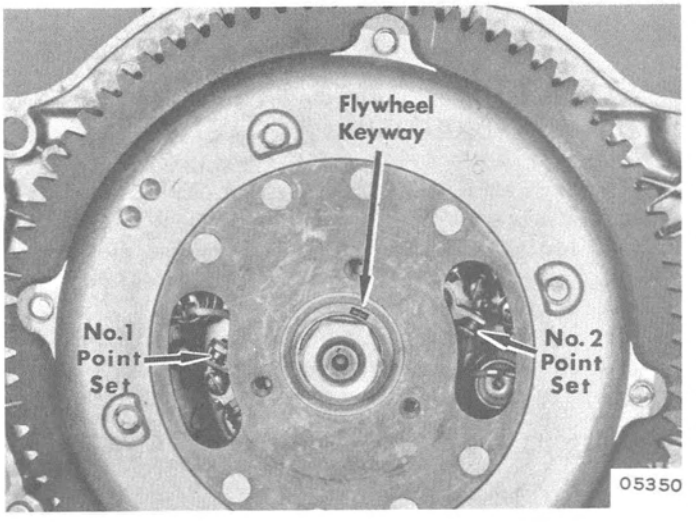
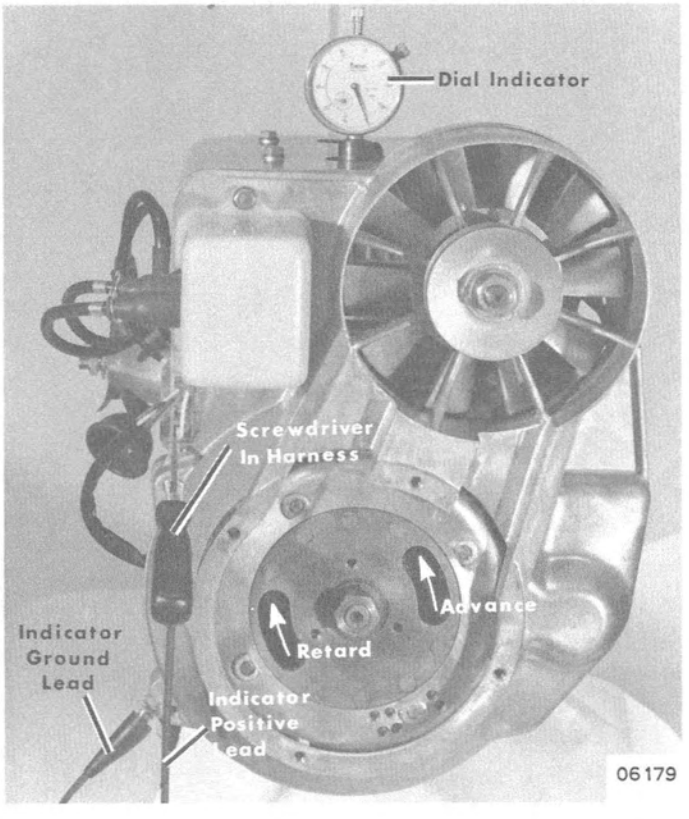


Figure 1. Breaker Point Adjustment

TIMING PROCEDURE

1. Check point clearance as outlined, preceding.
2. Install Dial Indicator (C-91-58222) in No. 1 (fan side) cylinder spark plug hole.
3. Zero dial indicator at piston TDC (top dead center).



4. Connect suitable meter, buzzer or light to engine ground and No. 1 white primary wire.

   NOTE: Connections to white or red primary wire can be made by inserting a small bladed screwdriver into engine harness. (Figure 2)

5. Rotate flywheel counterclockwise (viewed from fan side) until dial indicator shows timing degree listed in specifications.
6. Adjust stator until No. 1 cylinder points break at position outlined in Paragraph 5.

   NOTE: When viewed from fan side of engine, counterclockwise rotation of stator advances timing, and clockwise rotation of stator retards timing.

7. Install dial indicator in No. 2 (clutch side) cylinder spark plug hole and zero at TDC.
8. Connect suitable meter buzzer or light to engine ground and to No. 2 (red) primary wire.
9. Rotate flywheel counterclockwise until points close.
10. Points must make or break at timing advance specifications, as shown by dial indicator.
11. Install flywheel dust cover, lower fan and rewind starter pulley, upper fan pulley and belt.
12. Install rewind starter assembly and spark plugs.

Figure 2. Timing Adjustment

CARBURETOR ADJUSTMENT

IDLE ADJUSTMENT

1. Adjust idle mixture screw to obtain a smooth, steady idle and readjust idle speed screw to obtain idle speed recommended. Recheck idle mixture adjustment at recommended idle speed. (Figure 3)
2. An over-rich idle mixture will cause engine to fire unevenly and exhibit smoke from exhaust. A lean idle mixture usually causes backfiring.

HIGH SPEED ADJUSTMENT

1. Operate vehicle at full throttle under normal load conditions and slowly turn high speed mixture screw outward (counterclockwise) until engine starts to fire unevenly ("four-cycles") which indicates an over-rich fuel mixture. (Figure 3)
2. At this point, slowly turn high speed mixture screw inward (clockwise) until engine fires evenly (smooths-out).

IMPORTANT: DO NOT adjust carburetor leaner than necessary to attain reasonably smooth operation. IT IS PREFERABLE to operate with mixture SLIGHTLY RICH rather than too lean. Under normal operating conditions at sea level, final setting of high speed mixture screw MUST NOT BE less than three-quarter (¾) turn from seat.

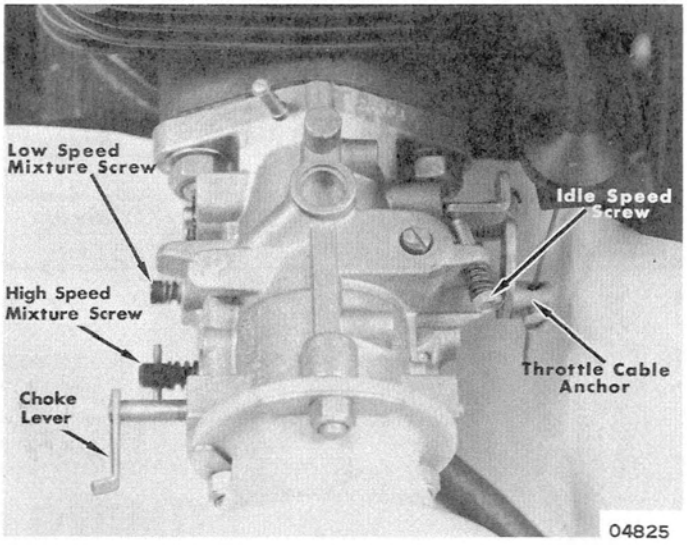


Figure 3. Carburetor Adjustments

TIMING and ADJUSTING - HURRICANE MODEL

CHECKING IGNITION TIMING

1. Connect Tachometer (C-91-31591) to engine. Place tachometer sensing ring over No. 2 (PTO end) spark plug.
2. Connect Timing Lite (C-91-35507A1) to engine.
   a. Connect large red lead to No. 1 spark plug.
   b. Connect one remaining lead to negative battery post and other lead to positive battery post.

   NOTE: Be sure that battery is fully charged.

   c. Depress button on timing lite and, if properly connected, timing lite will "buzz".
3. Support rear of vehicle off ground.

CAUTION: Make sure vehicle is secure on support and that track is not making contact with ground.

4. Start engine.

WARNING: Centrifugal clutch engagement occurs at approximately 1800-2000 RPM. Keep hands and feet clear of moving parts at all times.

5. Turn idle speed adjustment screw to right (clockwise) to increase and maintain RPM at 3000.
6. Aim timing lite at timing decal (located on fan housing cover). (Figure 1)

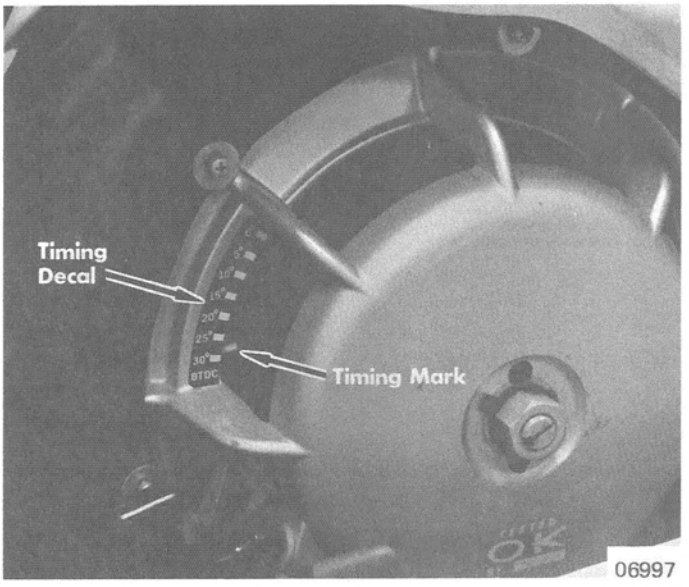


Figure 1. Timing Decal Location

7. With engine running at 3000 RPM, timing mark on fan blade should fall between 27°-30° on timing decal.
8. If readjustment is necessary, refer to "Timing Procedure", following.
9. Reset idle speed to 900-1000 RPM.

TIMING PROCEDURE

1. Remove flywheel assembly.

   NOTE: Leave locating key in crankshaft keyway.

2. Install Dial Indicator (C-91-58222) in No. 1 cylinder and establish T.D.C. (Figure 2)

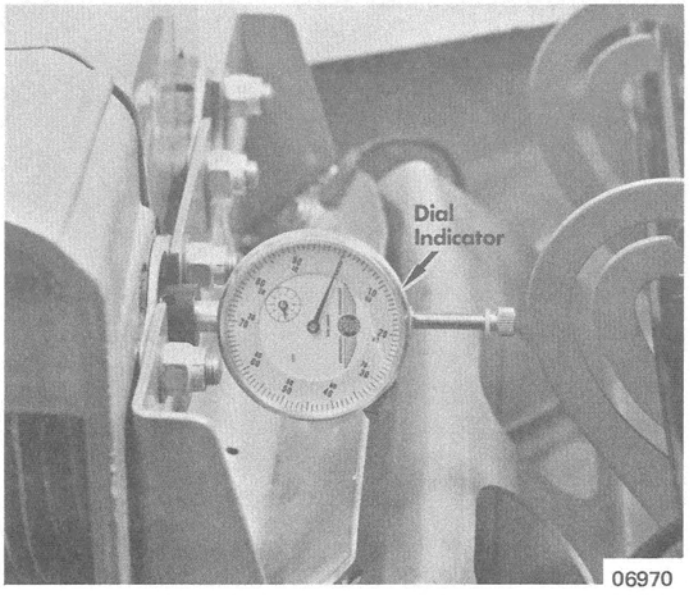


Figure 2. Dial Indicator Installed

3. Install Auxiliary Cam (D-61071), part of Timing Tool (C-91-62527A2), on crankshaft. (Figure 3)

   NOTE: It may be necessary to hold maker-point rubbing blocks out, in order to install cam completely to bottom.

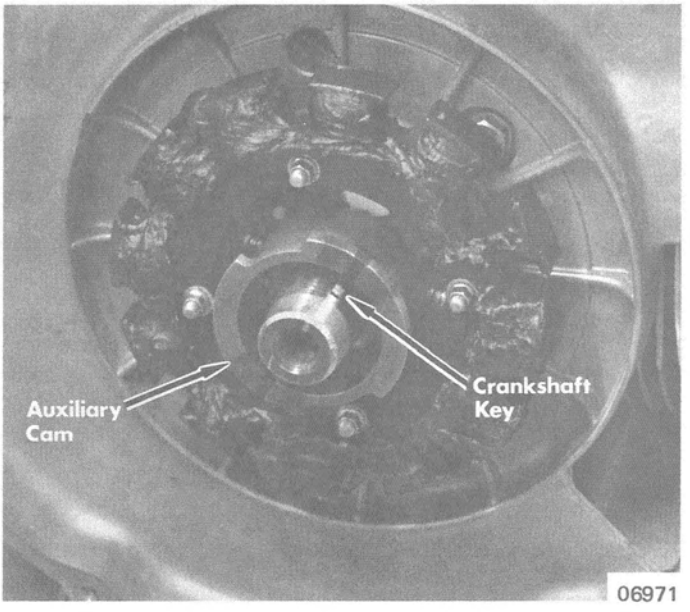


Figure 3. Auxilliary Cam Installed

4. Rotate cam to obtain maximum point opening on No. 1 point set (white lead).
5. Adjust points to .020" gap.
6. Align keyway in cam with crankshaft key and install Advance Timing Fixture, part of Timing Tool (C-91-62527A2) on crankshaft, inside cam. (Figure 4)
7. Rotate cam (NOT CRANKSHAFT) approximately ¼" clockwise to align slots in lip of cam with bolts in fixture. Secure wing nuts.
8. Rotate crankshaft COUNTERCLOCKWISE to .180" B.T.D.C.

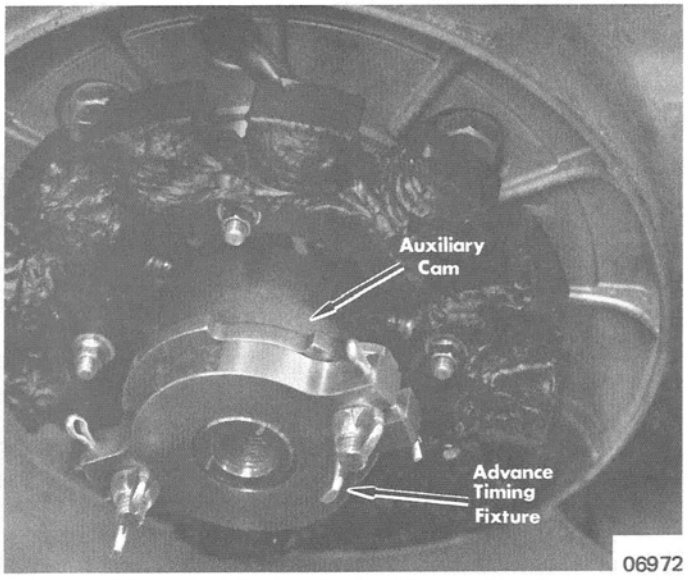


Figure 4. Advance Timing Fixture Installed

9. Connect suitable meter, buzzer or light to No. 1 (white lead) point set and loosen contact housing attaching nuts. (Figure 5)
10. Using Contact Housing Tool, part of Timing Tool (C-91-62527A2), adjust contact housing until No. 1 points just close. (Figure 6) Secure contact housing.
11. Install dial indicator in No. 2 cylinder (PTO end) and position No. 2 piston at .180" BTDC.
12. Adjust No. 2 (brown lead) points to just close.

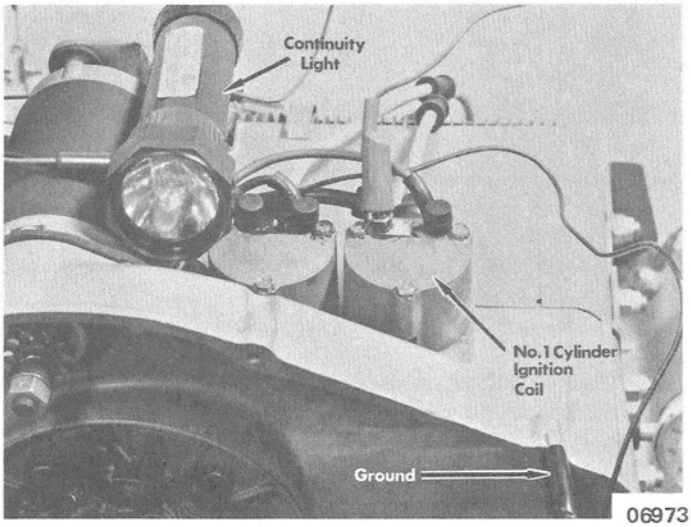


Figure 5. Continuity Light Connection

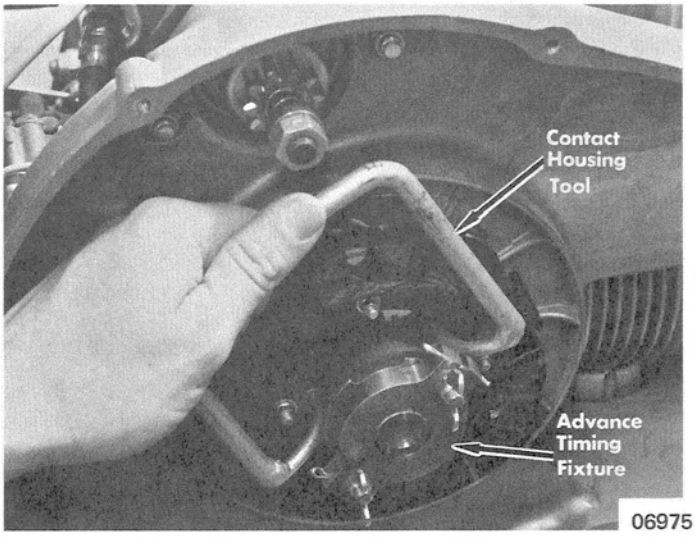


Figure 6. Adjusting Contact Housing

CARBURETOR ADJUSTMENTS

HIGH SPEED ADJUSTMENT

1. High speed adjustment is not required. Carburetor is equipped with fixed high speed jet. Refer to Section 8A - "Specifications" for carburetor jet sizes and specifications.
2. A drive sprocket is available as optional equipment for high altitude operation or operation under various load conditions. Refer to Section 2 - "Chassis" - Part D for proper application.

IDLE ADJUSTMENT (Figure 7)

1. Idle adjustment has been set at the factory. If readjustment is necessary, start with the low speed mixture adjusting needle at one (1) turn out.
2. Warm engine before attempting adjustment.
3. Set idle speed adjustment screw to attain 900-1000 RPM. Turn idle speed adjustment screw to right (clockwise) to increase RPM, to left (counterclockwise) to decrease RPM.
4. With engine running at idling speed, turn low speed mixture adjusting needle counterclockwise until engine starts to "load up" or fire unevenly due to over-rich mixture.
5. Slowly turn needle clockwise until engine picks up speed and fires evenly.

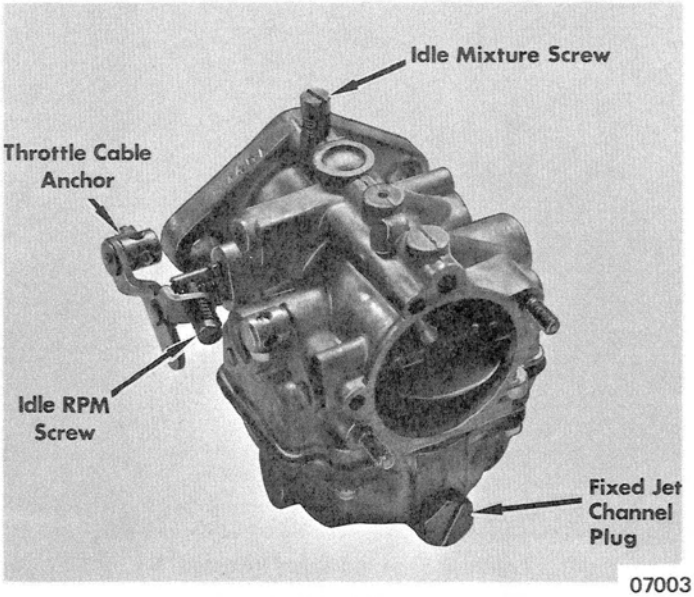


Figure 7. Carburetor Adjustments

6. Do not adjust leaner than necessary to achieve reasonably smooth idling. Turn needle 1/8-turn at a time, then wait sufficient time for engine to respond to this adjustment.

TIMING and ADJUSTING - 440 MAX and 440 S/R (Chassis Serial No. 3795657 and Below)

BREAKER POINT ADJUSTMENT

1. Open top cowl and dashboard cover.
2. Remove spark plugs and rewind starter assembly.
3. Remove rewind starter pulley, lower fan pulley and flywheel dust cover (if so equipped).

   NOTE: To adjust points, initially position flywheel with keyway at approximate position shown in chart below. Rotate flywheel until maximum point gap is achieved. It will be necessary to remove flywheel nut and washers to see flywheel keyway. If removed, reinstall flywheel washers and nut and torque to specification.

No. 1 Cylinder (Rewind Side Cylinder - Rear Point Set)	No. 2 Cylinder (PTO Side Cylinder - Front Point Set)
6 O'clock	12 O'clock

4. Check and adjust point gap to specifications (refer to "Specifications" Section 8) thru flywheel slot. (Figure 1)
5. If point adjustment is changed, check timing, following.

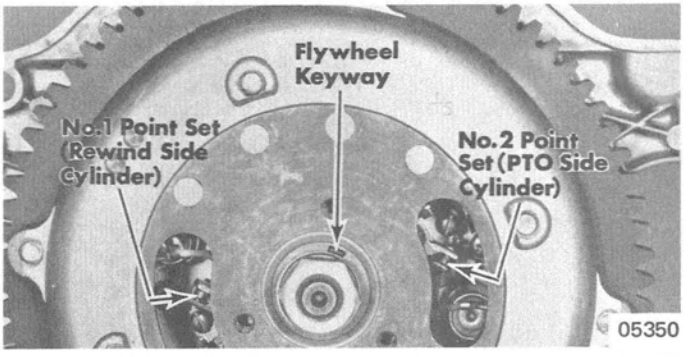


Figure 1. Breaker Point Adjustment

TIMING PROCEDURE

NOTE: If stator plate has been removed, initially position stator plate in center of slots.

1. Check breaker point adjustment, preceding.
2. Disconnect engine harness from engine harness connector.
3. Install Dial Indicator (C-91-58222A1) in No. 1 (fan side) cylinder spark plug hole.
4. Zero dial indicator at piston TDC (top dead center).
5. Connect suitable meter, buzzer or light to engine ground and No. 1 (white) primary ignition coil wire. (Figure 2)

   NOTE: Connections to white or red primary ignition coil wire can be made by inserting a small bladed screwdriver into engine harness connector (Figure 2) or by disconnecting red and white secondary ignition coil wires and making connection to red or white wire from engine harness connector.
6. Rotate flywheel counterclockwise (viewed from fan side) until dial indicator shows timing degree listed in specifications. (Refer to "Specifications" Section 8.)
7. Adjust stator plate until No. 1 cylinder points break at position outlined in Paragraph 6, preceding.

   NOTE: When viewed from fan side of engine, counterclockwise rotation of stator plate advances timing. Clockwise rotation of stator plate retards timing.
8. Install dial indicator in No. 2 (PTO end) cylinder spark plug hole and zero dial indicator at TDC.
9. Connect suitable meter, buzzer or light to engine ground and to No. 2 (red) primary ignition coil wire.
10. Rotate flywheel counterclockwise until No. 2 points close.
11. Slowly rotate flywheel clockwise until points just break. Points must break when timing specifications show on dial indicator.

    NOTE: If points do not break at the specified time, adjust point gap of the No. 2 point set as necessary.
12. Remove dial indicator from engine. Disconnect meter, buzzer or light from engine.
13. Connect engine harness to engine harness connector and secondary ignition coil wires (red and white wires) to wires from engine harness connector (red and white wires), if disconnected.
14. Place fan belt around lower fan pulley. Using 3 cap screws, attach flywheel dust cover (if so equipped), lower fan pulley and rewind starter pulley to flywheel.
15. Install spark plugs and rewind starter assembly.

    NOTE: Ground wire from cowl support must be attached to rewind starter assembly.
16. Close dashboard cover and top cowl.

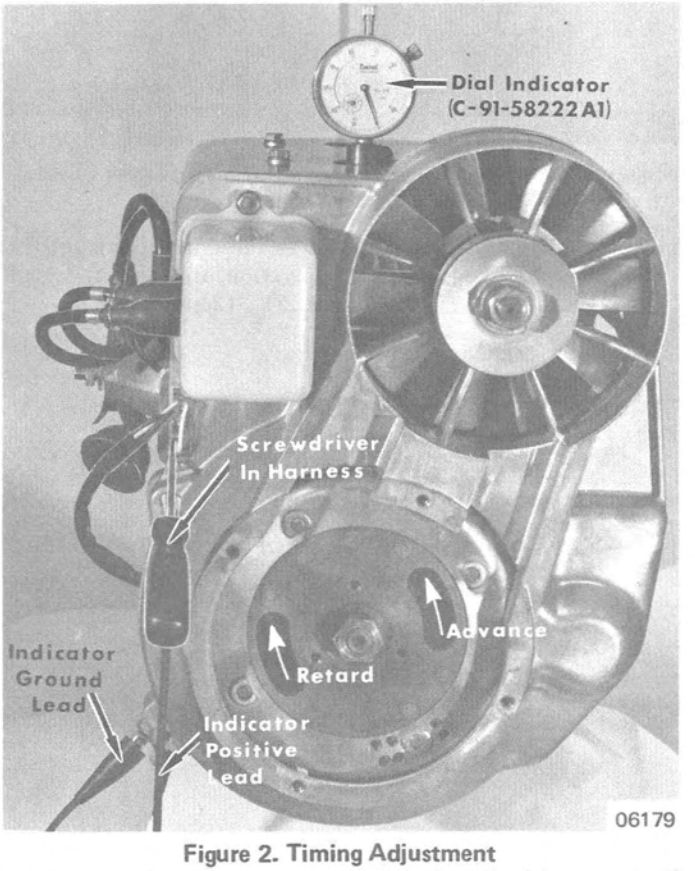


Figure 2. Timing Adjustment

CARBURETOR ADJUSTMENT

HIGH SPEED ADJUSTMENT

1. High speed adjustment is not required. Carburetor is equipped with fixed high speed jet or fixed high speed metering rod. Refer to "Specifications" Section 8 for carburetor jet sizes or metering rod sizes and specifications.

Figure 3. Carburetor Adjustments - 440 Models with Chassis Serial No. 3447382 and Below

2. Sprocket options are available as optional equipment for high elevation operation or operation under various load conditions. Refer to Section 2D "Chassis" for proper application.

IDLE ADJUSTMENT (Figure 3 or 4)

1. Idle adjustment has been set at the factory. If readjustment is necessary, turn low speed mixture needle one (1) turn out from closed position.
2. Start engine and thoroughly warm before attempting adjustment.

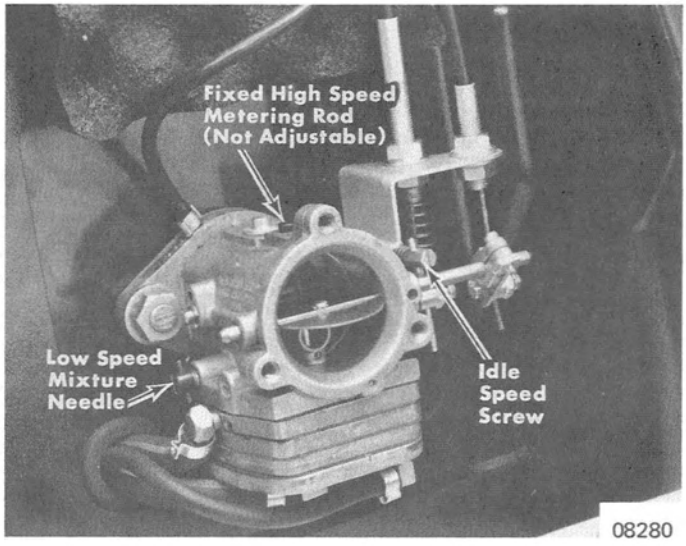


Figure 4. Carburetor Adjustments - 440 Models with Chassis Serial No. 3709838 and Above

3. Set idle speed screw to attain recommended idle RPM. Refer to "Specifications" Section 8. Turn idle speed screw inward (clockwise) to increase RPM or outward (counterclockwise) to decrease RPM.
4. With engine running at idle speed, turn low speed mixture needle outward (counterclockwise) until engine starts to "load up" or slow down or fire unevenly due to over-rich fuel mixture.
5. Slowly turn low speed mixture needle inward (clockwise) until engine picks up speed and fires evenly.

   NOTE: Turn mixture needle 1/8-turn at a time, then wait sufficient time for engine to respond to this adjustment.

   IMPORTANT: DO NOT adjust carburetor leaner than necessary to attain reasonably smooth operation. It is preferable to operate with mixture SLIGHTLY RICH rather than too lean.

6. Recheck idle RPM and readjust idle speed screw if necessary.
7. Stop engine.

TIMING and ADJUSTING - MARK I (644cc) and MARK II (644cc)

TIMING PROCEDURE

1. Open top cowl.
2. Connect Tachometer (C-91-59339) to engine. Place tachometer sensing ring over No. 2 (PTO end) spark plug lead.
3. Connect Timing Lite (C-91-35507A2) to engine.
   a. Connect large, red lead to No. 1 spark plug.
   b. Connect one remaining lead to negative battery post and other lead to positive battery post.

   NOTE: Be sure that battery is fully charged.

   c. Depress button on timing lite and, if properly connected, timing lite will "buzz".
4. Support rear of snowmobile off ground.

CAUTION: Make sure that snowmobile is secure on support and that track is not making contact with ground.

5. Start engine.

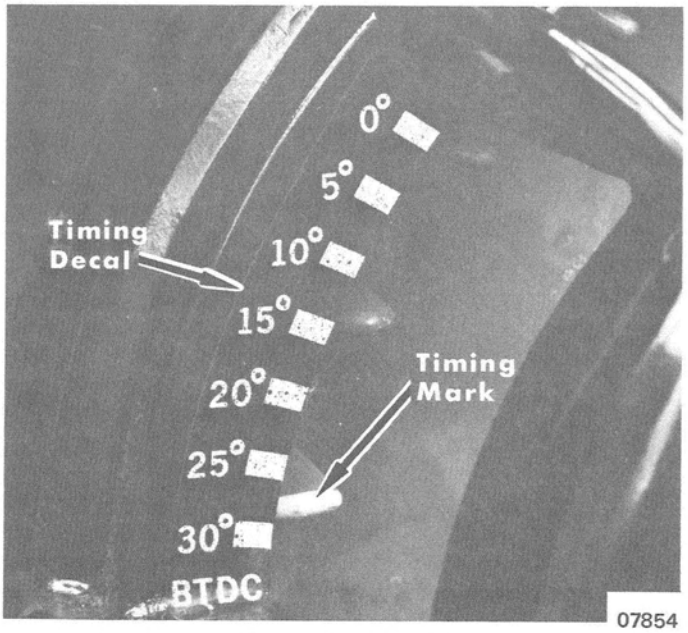


Figure 1. Timing Decal Location

WARNING: Drive sheave engagement occurs slightly above idle RPM. Keep hands and feet clear of moving parts at all times.

6. Turn idle speed screw(s) inward (clockwise) to increase and maintain RPM at 3000.
7. Aim timing lite at timing decal (located on fan housing cover). (Figure 1)

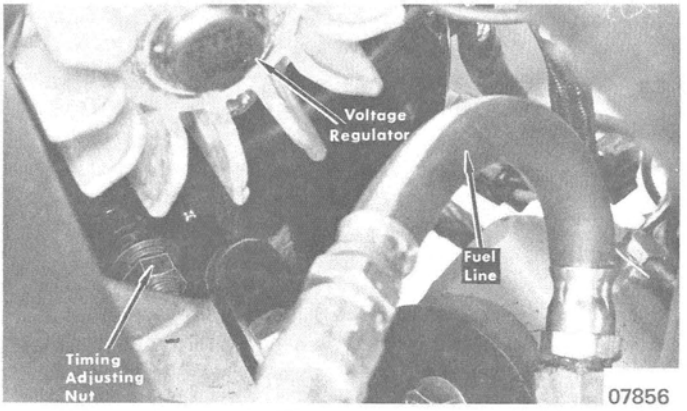


Figure 2. Timing Nut Location - Mark I

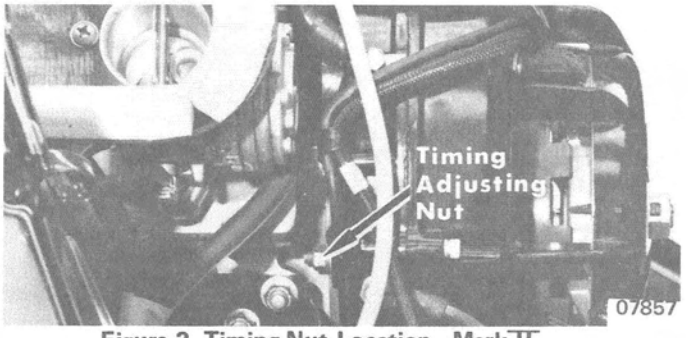


Figure 3. Timing Nut Location - Mark II

8. With engine running at 3000 RPM, timing mark on fan blade should fall between recommended specifications on timing decal. Refer to "Specifications" Section 8.

   NOTE: Ignition timing is "fully advanced" at 3000 RPM.

9. If readjustment is necessary, proceed as follows:
   a. Stop engine.
   b. Loosen timing adjusting nut (Figure 2 or 3) several turns and adjust. Move timing nut "up" to retard spark and "down" to advance spark.

   NOTE: If trigger plate has been replaced, for initial setting position timing adjustment nut in center of slot and tighten.

   c. Tighten timing adjusting nut.

CAUTION: DO NOT over-tighten timing adjusting nut.

   d. Start engine and recheck timing with timing lite.
10. Reset idle speed to recommended specifications. Refer to "Specifications" Section 8.
11. Stop engine and place snowmobile on ground.
12. Disconnect tachometer and timing lite from engine.
13. Close top cowl.

CARBURETOR ADJUSTMENT

HIGH SPEED ADJUSTMENT

1. High speed adjustment is not required. Carburetor is equipped with fixed high speed jet or fixed high speed metering rod. Refer to "Specifications" Section 8 for carburetor jet sizes or metering rod sizes and specifications.

2. Sprocket options are available as optional equipment for high elevation operation or operation under various load conditions. Refer to "Chassis" Section 2D for proper application.

IDLE ADJUSTMENT (Figure 4 or 5 or Figures 6 and 7)

1. Idle adjustment has been set at the factory. If readjustment is necessary, turn low speed mixture needle one (1) turn out from closed position.
2. Start engine and thoroughly warm before attempting adjustment.
3. Set idle speed screw(s) to attain recommended idle RPM (refer to "Specifications" Section 8). Turn idle speed screw(s) inward (clockwise) to increase RPM or outward (counterclockwise) to decrease RPM.

WARNING: Keep hands and arms clear of sheaves and drive belt at all times. On Mark II Model with Chassis Serial No. 3787640 and above, use a long shank screwdriver or stop engine each time low speed mixture needle on No. 2 carburetor (PTO side) is adjusted.

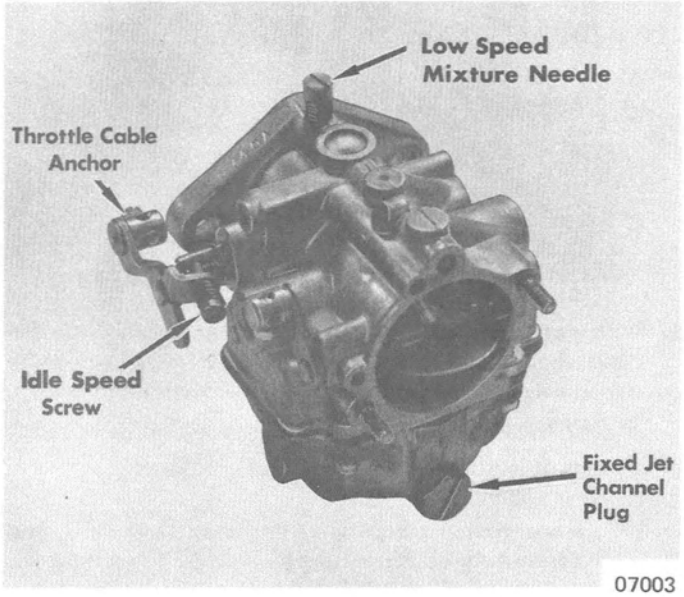


Figure 4. Carburetor Adjustments - Mark I

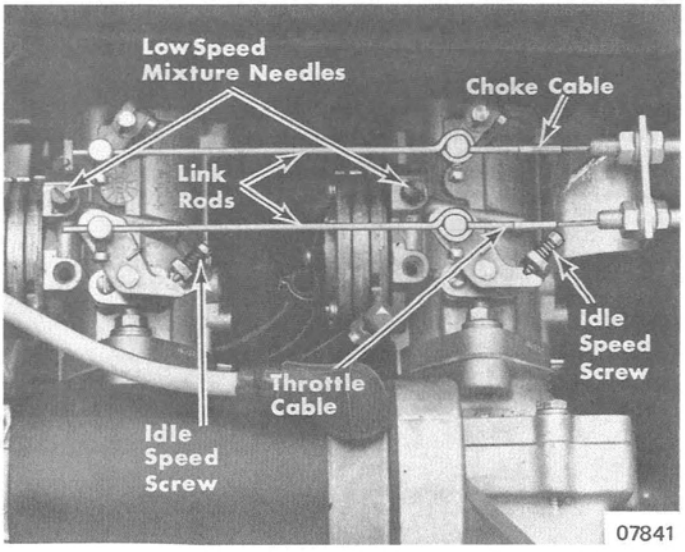


Figure 5. Carburetor Adjustments - Mark II Model with Chassis Serial No. 3591478 and Below

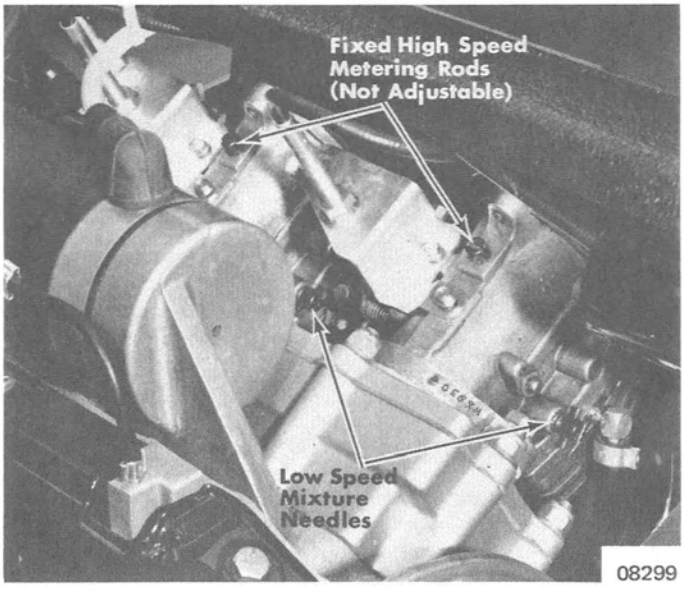


Figure 6. Carburetor Adjustments - Mark II Model with Chassis Serial No. 3787640 and Above

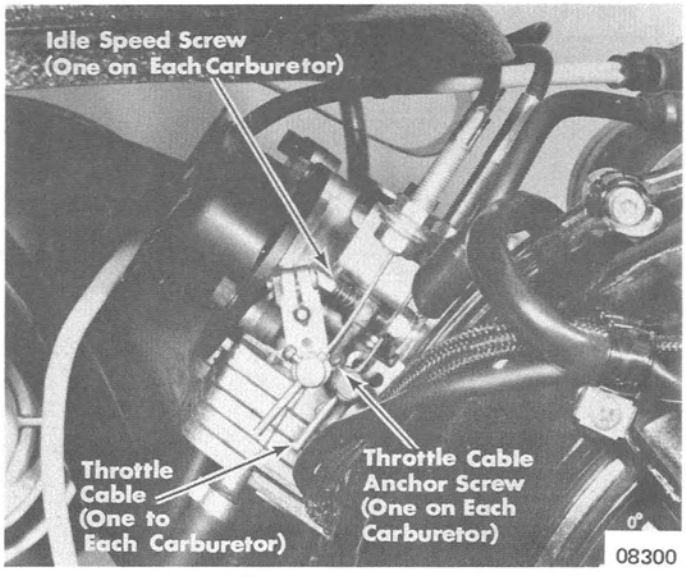


Figure 7. Carburetor Adjustments - Mark II Model with Chassis Serial No. 3787640 and Above

4. With engine running at idle speed, turn low speed mixture needle counterclockwise until engine starts to "load up" or slow down or fire unevenly due to over-rich fuel mixture.

   NOTE: When adjusting carburetors on Mark II, adjust one (1) carburetor at a time. Mark II carburetors must be synchronized. (Refer to Section 4.)

5. Slowly turn low speed mixture needle clockwise until engine picks up speed and fires evenly.

   NOTE: Turn mixture needle 1/8-turn at a time, then wait sufficient time for engine to respond to this adjustment.

   IMPORTANT: DO NOT adjust carburetor leaner than necessary to attain reasonably smooth operation. It is preferable to operate with mixture SLIGHTLY RICH rather than too lean.

6. Recheck idle RPM and readjust idle speed screw(s) if necessary.
7. Stop engine.

TIMING and ADJUSTING - 340 S/T, 400 S/T and 440 S/T

CHECKING IGNITION TIMING

1. Open top cowl and remove drive belt guard.
2. Disconnect spark plug wires and remove spark plug from No. 1 (PTO side) cylinder.

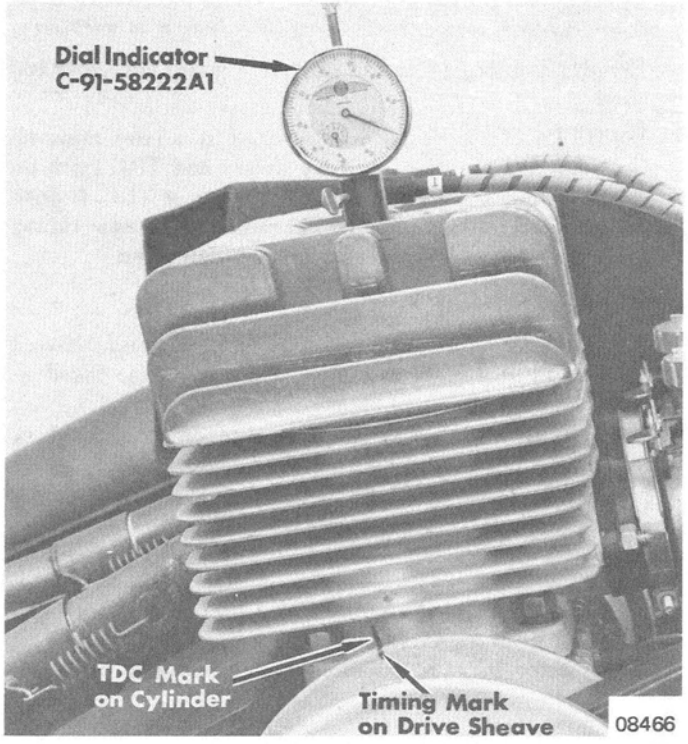


Figure 1. Dial Indicator Installed

3. Install Dial Indicator (C-91-58222A1) in No. 1 (PTO side) cylinder spark plug hole. (Figure 1)
4. Zero dial indicator at piston TDC (top dead center).

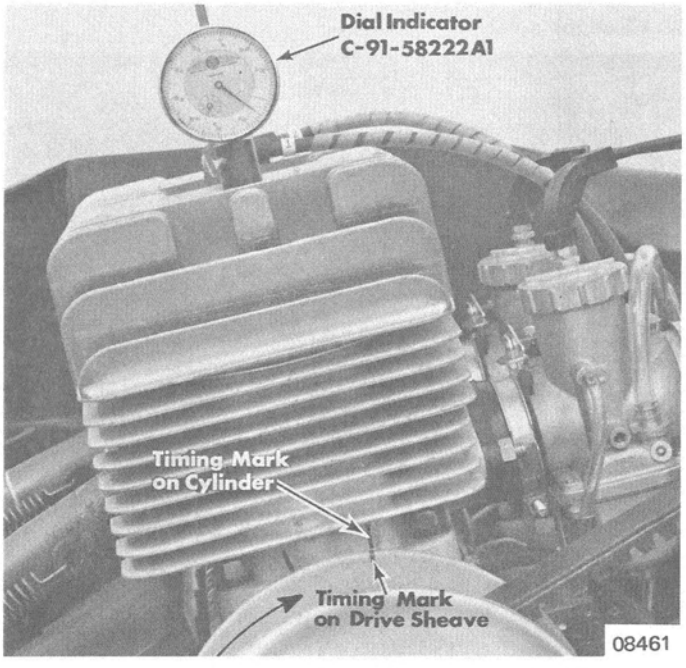


Figure 2. Placing Timing Mark on Cylinder

5. With piston at TDC, place a mark on cylinder and another mark on edge of fixed face of drive sheave directly opposite mark on cylinder. (Figure 1)
6. Rotate drive sheave clockwise (viewed from PTO side), until dial indicator shows timing degree listed in specifications. (Refer to "Specifications" Section 8.) Place a mark on cylinder directly opposite mark on drive sheave. (Figure 2)

   NOTE: If preferred, timing mark can be placed on flywheel sheave plate and edge of flywheel bell housing instead of cylinder and drive sheave. With timing mark on rewind side, it will be necessary to remove rewind starter assembly and start engine with emergency starter rope to check ignition timing. If rewind starter cup and flywheel sheave plate are removed, be sure that timing mark on flywheel sheave plate is properly aligned with timing mark on flywheel bell housing during reassembly and not reinstalled 90° or 180° out-of-position.

7. Remove dial indicator and install spark plug. Connect No. 2 (rewind side) spark plug wire to No. 2 spark plug.

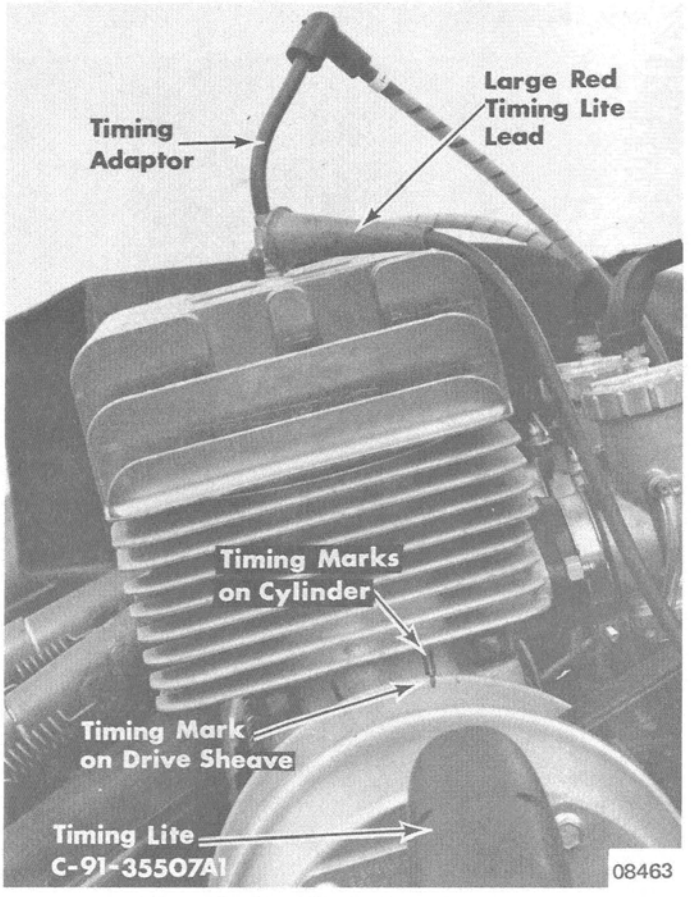


Figure 3. Checking Ignition Timing

8. Connect Timing Lite (C-91-35507A1) to engine and a 12-volt battery as follows:
   a. Insert timing adaptor (Figure 3) between No. 1 (PTO side) spark plug and No. 1 spark plug wire.
   b. Connect large red timing lite lead to timing adaptor. (Figure 3)

c. Connect one remaining timing lite lead to negative battery terminal and other lead to positive battery terminal of a fully charged 12-volt battery.
d. Depress button on timing lite and, if properly connected, timing lite will "buzz".

9. Start engine.

WARNING: Drive sheave engagement occurs at approximately 3800-4000 RPM. Keep hands and feet clear of moving parts at all times. If engine will be operated above 3000 RPM, skis MUST BE blocked and track supported OFF ground.

10 Aim timing lite at timing marks made on cylinder and fixed face of drive sheave. (Figure 3)

11. With engine running at 3000 RPM, timing mark on drive sheave should be aligned with timing mark made on cylinder. (Figure 3)

NOTE: Ignition timing is "fully advanced" at 3000 RPM.

12. Stop engine.
13. If readjustment is necessary, refer to "Timing Procedure", following, and readjust trigger assembly, as required, to properly align timing marks.

NOTE: Check ignition timing on No. 2 cylinder (rewind side) in same manner as outlined, preceding. Timing on either cylinder MUST NOT be advanced further than recommended specification. Readjust timing as necessary.

14. Remove timing lite, install drive belt guard and close top cowl.

IMPORTANT: If timing is rechecked at a later time, be sure that timing mark on drive sheave and TDC mark on cylinder are aligned when No. 1 piston is at TDC. If drive sheave has been removed from crankshaft, a new timing mark must be made on fixed face of drive sheave.

TIMING PROCEDURE

1. Open top cowl.
2. Disconnect spark plug wires and remove both spark plugs.
3. Remove exhaust pipes and rewind starter assembly.
4. Remove rewind starter pulley and flywheel sheave from flywheel.
5. Remove flywheel. (Refer to Section 5, Part F.)
6. Remove stator attaching bolts and move stator to one side.
7. Install Dial Indicator (C-91-58222A1) in No. 1 (PTO side) cylinder spark plug hole. (Figure 4)

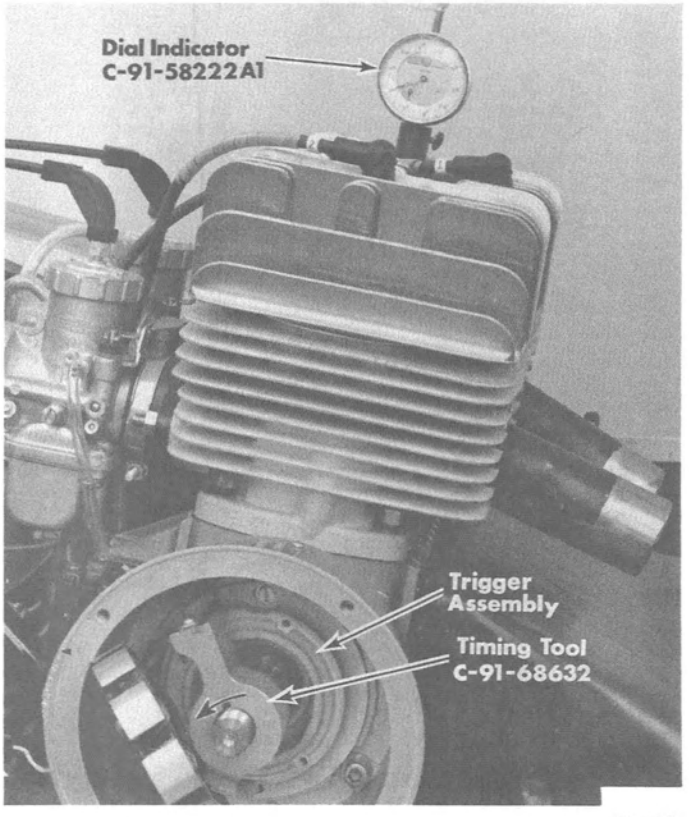


Figure 4. Timing Adjustment

8. Zero dial indicator at piston TDC (top dead center).
9. Align Timing Tool (C-91-68632) with crankshaft key and install tool on crankshaft taper as far as possible. (Figure 4)
10. Loosen 2 screws which secure trigger assembly to flywheel bell housing.
11. Rotate crankshaft counterclockwise (viewed from rewind side) until dial indicator shows timing degree listed in specifications. (Refer to "Specifications" Section 8.)
12. **Without moving crankshaft from position outlined in Paragraph 11, preceding, adjust trigger assembly until pointer on timing tool is aligned with SECOND timing mark (from left) on trigger assembly. (Figure 5)**
13. Tighten 2 screws which secure trigger assembly to flywheel bell housing.
14. Remove timing tool from crankshaft taper and dial indicator from spark plug hole.
15. Move stator back in position and secure with attaching bolts.
16. Install flywheel. (Refer to Section 5, Part F.)
17. Place flywheel sheave and rewind starter pulley in position on flywheel and secure to flywheel with attaching bolts.
18. Install rewind starter assembly and exhaust pipes.
19. Install spark plugs. Torque to specification. (Refer to "Specifications" Section 8.)
20. Connect spark plug wires to respective spark plugs.
21. Check ignition timing as outlined under "Checking Ignition Timing", preceding. Reposition timing ring as necessary.
22. Close top cowl.

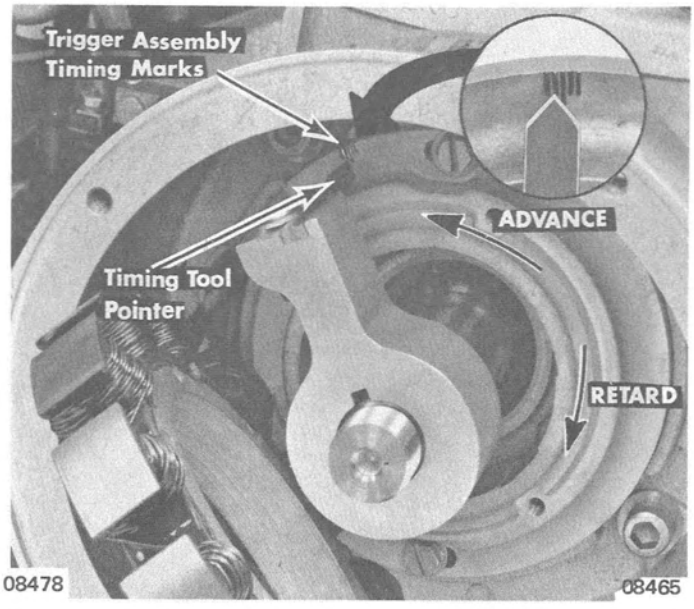


Figure 5. Timing Adjustment

400 S/T CARBURETOR ADJUSTMENT

HIGH SPEED ADJUSTMENT

1. Each carburetor is equipped with a replaceable fixed high speed jet. Fixed high speed jet is located in carburetor float bowl and is visible when plug and fiber washer are removed from float bowl. (Figure 6) Each jet is stamped with a number which indicates maximum amount of fuel flow that it can meter; i.e., No. 310 stamped on jet indicates that 310cc of fuel can be metered thru that jet in one (1) minute.

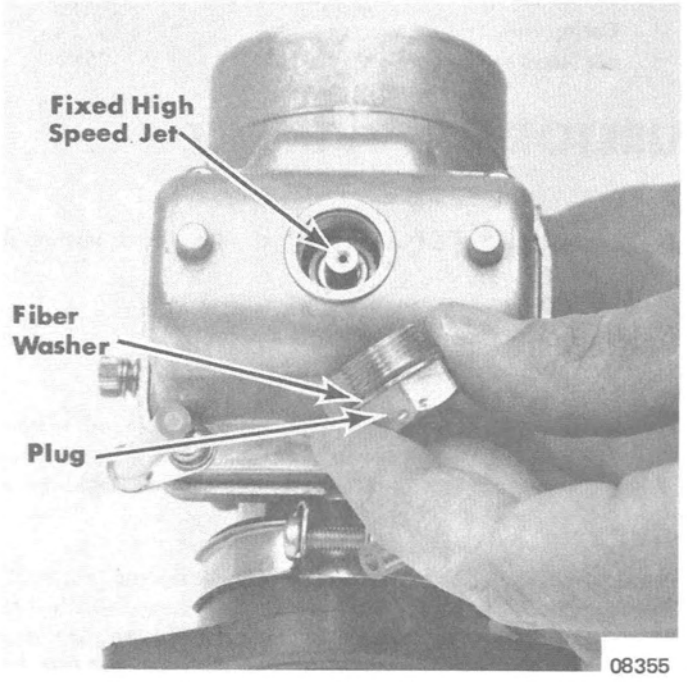


Figure 6. Carburetor Fixed High Speed Jet

Increase in temperature and/or elevation will require installation of smaller fixed high speed jet, and a decrease in temperature and/or elevation will require installation of larger fixed high speed jet to maintain maximum engine performance. Refer to "Specifications" Section 8 for carburetor jet sizes and specifications.

2. Sprocket options are available as optional equipment for high elevation operation or operation under various load conditions. Refer to "Chassis" Section 2D for available sprockets.

IDLE ADJUSTMENT (Figure 7)

1. Synchronize carburetor throttle valves. (Refer to Section 4, Part A.)
2. Turn low speed mixture needles inward (clockwise) until they seat lightly, then turn back out 1½-turns. (Figure 7)

IMPORTANT: This approximate setting will permit starting, but may be found too rich or too lean for normal operation; therefore, to obtain peak performance and prevent possible engine damage, as soon as engine starts, correct final adjustments must be made as instructed, following.

3. Start engine and allow to "warm-up" before attempting adjustment.

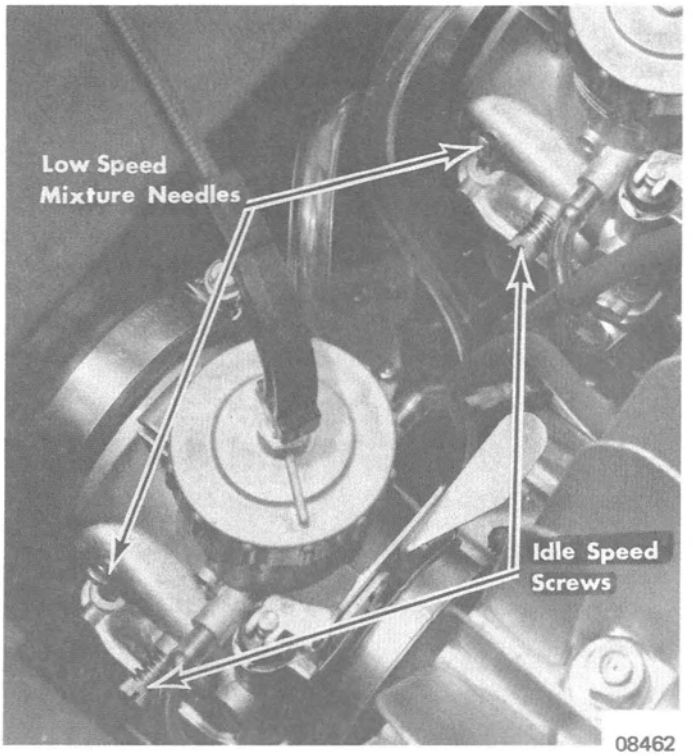


Figure 7. Carburetor Adjustments

4. Set idle speed screws to attain recommended idle RPM (refer to "Specifications" Section 8). Turn idle speed screws inward (clockwise) to increase idle RPM or outward (counterclockwise) to decrease idle RPM.

IMPORTANT: Idle speed screws control the amount of throttle valve opening at idle setting. Idle speed screws should be adjusted identical so that each idle speed screw will make contact with its respective throttle valve.

5. With engine running at idle speed, turn low speed mixture needles inward (clockwise) until engine starts to "load up" or slow down or fire unevenly because of an over-rich fuel mixture.
6. Slowly turn low speed mixture needles outward (counterclockwise) until engine picks up speed and fires evenly.

NOTE: Adjust one (1) carburetor at a time. Turn low speed mixture needles approximately 1/8-turn at-a-time, then wait sufficient time for engine to respond to this adjustment.

IMPORTANT: DO NOT adjust carburetors leaner than necessary to attain reasonably smooth idling. It is preferable to set idle mixture a little RICH rather than too lean.

7. Recheck idle RPM and readjust idle speed screws if necessary.
8. Stop engine.

MID-RANGE (JET NEEDLE) ADJUSTMENT (Figure 8)

Each carburetor is equipped with an adjustable jet needle (located in throttle valve) which controls air/fuel mixture ratio

when throttle valve is between ¼ and ¾ open. Changing location of jet needle "E" ring in jet needle slots will control fuel mixture ratio during these throttle valve openings (¼ to ¾). Lean air/fuel mixture at this range by placing "E" ring in a higher slot on jet needle. Enrich air/fuel mixture by placing "E" ring in a lower slot on jet needle.

"E" ring was in center slot (3rd slot from top) on jet needle when snowmobile was shipped from factory. "E" ring SHOULD BE repositioned in 4th slot from top for ALL trail-riding or slower speed applications. During operation under race conditions ONLY, it will be necessary to reposition "E" ring in center slot on jet needle to maintain maximum performance. If readjustment is necessary, refer to Section 4 (Part A) for carburetor disassembly.

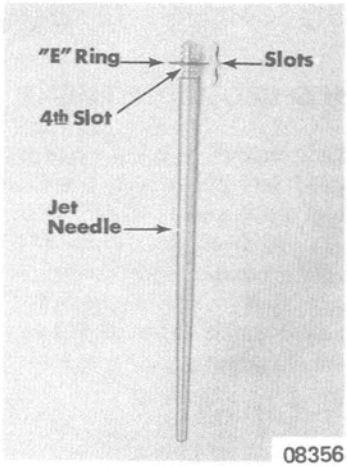


Figure 8. Carburetor Jet Needle

340 S/T and 440 S/T CARBURETOR ADJUSTMENT

IDLE ADJUSTMENT

1. Synchronize carburetor throttle valves. (Refer to Section 4, Part A.)
2. Turn low speed mixture needles inward (clockwise) until they seat lightly, then turn back out 1½-turns. (Figure 7)

   IMPORTANT: This approximate setting will permit starting, but may be found too rich or too lean for normal operation; therefore, to obtain peak performance and prevent possible engine damage, as soon as engine starts, correct final adjustments must be made as instructed, following.

3. Start engine and allow to "warm-up" before attempting adjustment.
4. Set idle speed screws (Figure 7), to attain recommended idle RPM (refer to "Specifications" Section 8). Turn idle speed screws inward (clockwise) to increase idle RPM or outward (counterclockwise) to decrease idle RPM.

   IMPORTANT: Idle speed screws control the amount of throttle valve opening at idle setting. Idle speed screws should be adjusted identically so that each idle speed screw will make contact with its respective throttle valve.

5. With engine running at idle speed, turn low speed mixture needles inward (clockwise) until engine starts to "load up" or slow down or fire unevenly, because of an over-rich fuel mixture.
6. Slowly turn low speed mixture needles outward (counterclockwise) until engine picks up speed and fires evenly.

   NOTE: Adjust one (1) carburetor at-a-time. Turn low speed mixture needles approximately 1/8-turn at-a-time, then wait sufficient time for engine to respond to this adjustment.

   IMPORTANT: Low speed mixture needles REGULATE AIR RATHER THAN FUEL at idle speed. Turning the low speed mixture needles inward (clockwise) reduces air supply, thus causing low speed mixture to richen. Turning low speed mixture needles outward (counterclockwise) increases air supply and results in a leaner low speed mixture. DO NOT adjust carburetors leaner than necessary to attain reasonably smooth idling. It is preferable to set idle mixture a little RICH rather than too lean.

7. Recheck idle RPM and readjust idle speed screws if necessary.
8. Stop engine.

MID-RANGE (JET NEEDLE) ADJUSTMENT

Each carburetor is equipped with an adjustable jet needle (located in throttle valve) which controls air/fuel mixture ratio when throttle valve is between ¼ and ¾ open (mid-range throttle settings).

Positioning of jet needle "E" ring in jet needle slots (Figure 8) determines fuel mixture ratio during mid-range throttle settings. Lean the fuel mixture at this setting by placing "E" ring in a higher slot on jet needle. Enrich the fuel mixture by placing "E" ring in a lower slot on jet needle.

Jet needle "E" rings were positioned in the following slots when snowmobiles were shipped from the factory:

340 S/T - 4th slot from top of jet needle
440 S/T - 2nd slot from top of jet needle

Factory settings for jet needle "E" rings WILL BE SUITABLE for operation under MOST CONDITIONS. If readjustment of jet needles is necessary, keep in mind that it is preferable to have jet needles adjusted a little rich rather than too lean. Be sure that both jet needles are adjusted to same setting. (Refer to Section 4, Part A, for carburetor disassembly.)

CAUTION: Improperly adjusted jet needles (too lean) may result in serious engine damage. DO NOT RE-ADJUST jet needles to a LEANER setting, particularly if snowmobile will be used for trail riding and/or slow speed applications.

HIGH SPEED ADJUSTMENT

1. Each carburetor is equipped with an adjustable high speed mixture needle (Figure 9) in addition to a fixed high speed jet (located inside carburetor float bowl - Figure 10).

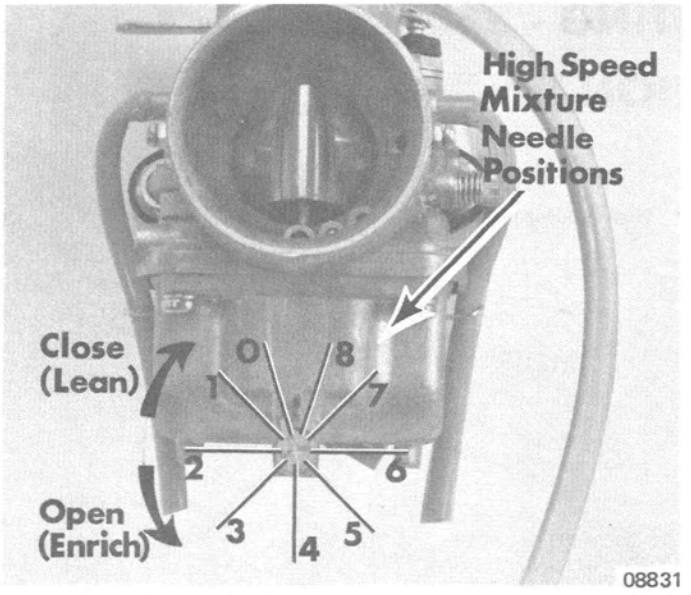


Figure 9. High Speed Mixture Needle

When the high speed mixture needles are closed (clockwise as far as possible - Figure 9), fuel is metered thru the fixed high speed jet only. As the high speed mixture needles are opened (turned counterclockwise), additional fuel (in addition to fuel metered thru fixed jet) is metered to the main discharge nozzles.

An increase in temperature and/or elevation will require leaning of high speed mixture [readjusting high speed mixture needles and/or installing smaller fixed high speed jets (No. 220)], and a decrease in temperature and/or elevation will require richening of high speed mixture [readjusting high speed mixture needles and/or installing larger fixed high speed jets (No. 320)] to maintain maximum engine performance and prevent possible engine damage. Refer to Section 4, Part A for carburetor adjusting charts and information.

2. A drive sheave elevation kit (D-71712A1), carburetor elevation kits (D-1393-5872A1 for 340 S/T and D-1393-5854A1 for 440 S/T) and sprocket options are available as optional equipment for high elevation operation. Refer to "Chassis" Section 2D for available sprockets.

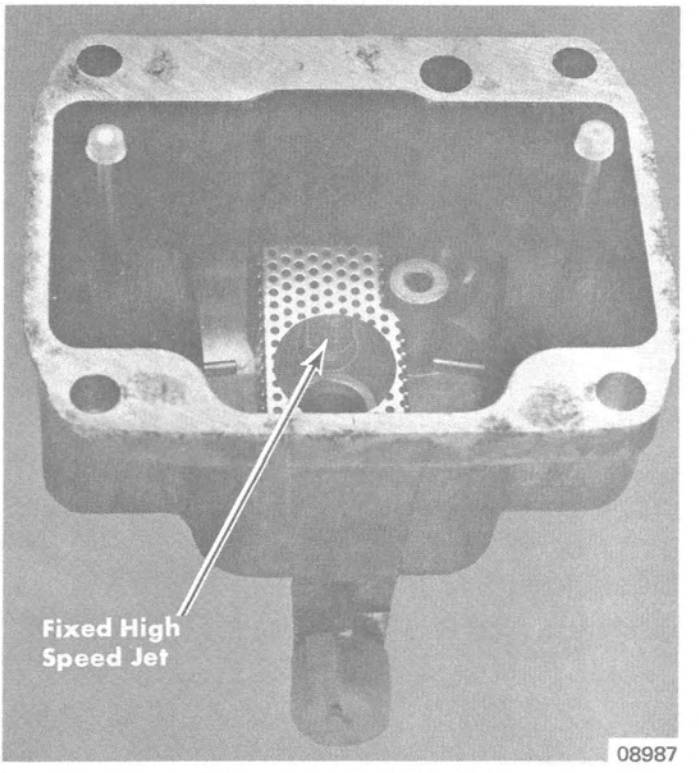


Figure 10. Fixed High Speed Jet

TIMING and ADJUSTING - 340 S/R

CHECKING IGNITION TIMING

1. Remove drive sheave guard.
2. Disconnect both spark plug wires and remove spark plug protector and spark plug from No. 1 (PTO side) cylinder.

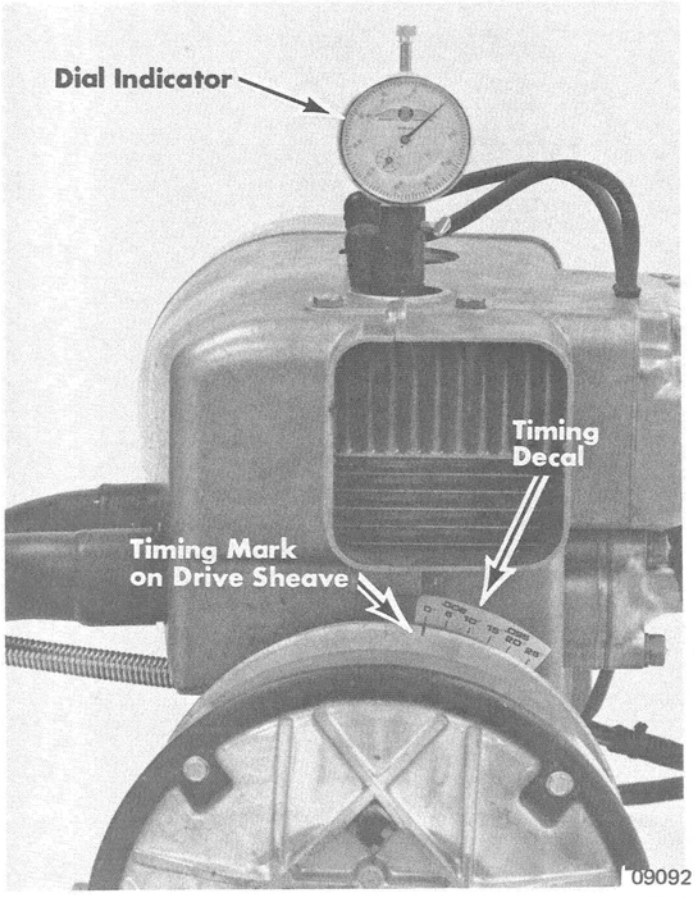


Figure 1. Dial Indicator and Timing Decal

3. Install Dial Indicator (C-91-58222A1) in No. 1 (PTO side) cylinder spark plug hole. (Figure 1)
4. Zero dial indicator at piston TDC (top dead center).
5. With No. 1 piston at TDC, place a mark on edge of fixed face of drive sheave directly opposite 0° mark on timing decal. (Figure 1)
6. Remove dial indicator and install spark plug and spark plug protector.
7. Connect Tachometer (C-91-59339) to engine by placing tachometer sensing ring over No. 2 (rewind side) spark plug wire. Connect No. 2 spark plug wire to No. 2 spark plug.
8. Connect Timing Lite (C-91-35507A1) to engine and a 12-volt battery as follows:
   a. Insert timing adaptor (Figure 2) between No. 1 (PTO side) spark plug and No. 1 spark plug wire.
   b. Connect large red timing lite lead to timing adaptor. (Figure 2)
   c. Connect one remaining timing lite lead to negative battery terminal and other lead to positive battery terminal of a fully charged 12-volt battery.
   d. Depress button on timing lite and, if properly connected, timing lite will "buzz".

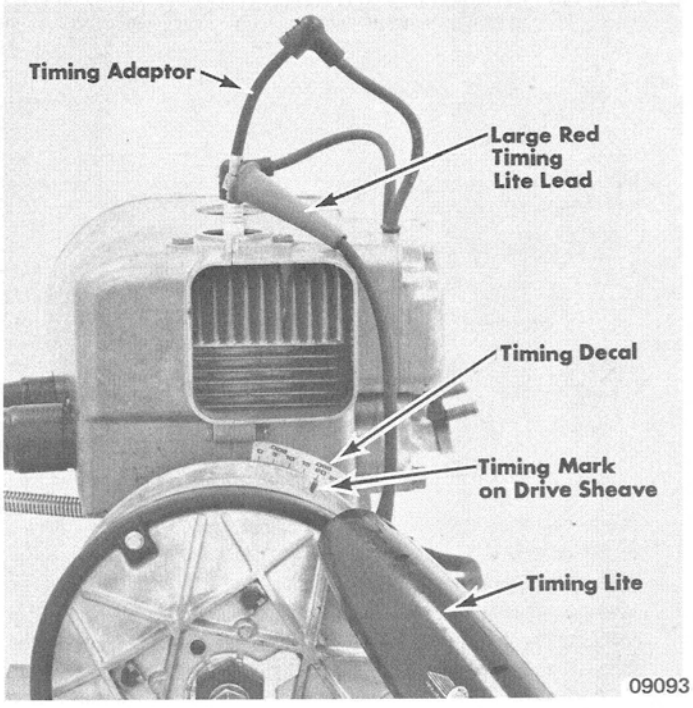


Figure 2. Checking Ignition Timing

9. Start engine.

WARNING: Drive sheave engagement occurs at approximately 3300 to 3600 RPM. DO NOT operate engine above 2500 RPM when checking ignition timing. Keep clear of moving parts at all times.

10. Aim timing lite at timing decal and timing mark on fixed face of drive sheave. (Figure 2)
11. With engine running at 2500 RPM, timing mark on drive sheave should be opposite 20° (BTDC) mark on timing decal. (Figure 2)

    NOTE: Ignition timing is "fully advanced" at 2500 RPM. A dynamic timing of 20° BTDC is equal to a static timing of .088" to .092" BTDC.

12. Stop engine.
13. If readjustment is necessary, refer to "Breaker Point Adjustment" and "Timing Procedure", following.

    NOTE: Check ignition timing on No. 2 cylinder (rewind side) in same manner as outlined, preceding. Timing on either cylinder MUST NOT be advanced further than recommended specification. Readjust timing as necessary.

14. Remove timing lite and tachometer. Install drive sheave guard.

IMPORTANT: If timing is rechecked at a later time, be sure that timing mark on drive sheave and 0° mark on timing decal are aligned when No. 1 piston is at TDC. If drive sheave has been removed from crankshaft, a new timing mark must be made on fixed face of drive sheave.

BREAKER POINT ADJUSTMENT

1. Remove both spark plugs and rubber spark plug protectors.
2. Remove rewind starter assembly, rewind starter cup and lower fan pulley from engine.

   NOTE: To adjust points, initially position flywheel with keyway at approximate position shown in chart below. Rotate flywheel until maximum point gap is achieved. It will be necessary to remove flywheel nut and washer to see flywheel keyway. If removed, reinstall flywheel washer and nut and torque to specifications before proceding to "Timing Procedure", following.

No. 1 Cylinder (PTO Side Cylinder - Bottom Point Set)	No. 2 Cylinder (Rewind Side Cylinder - Top Point Set)
11 O'clock	5 O'clock

3. Check gap of each set of points by inserting thickness gauge thru larger slot in flywheel when point set is at maximum gap. (Figure 3)
4. Readjust point gap(s) as necessary to attain recommended gap. (Refer to "Specifications" Section 8 for specified point gap.)
5. If points are readjusted, refer to "Timing Procedure", following, and check timing.

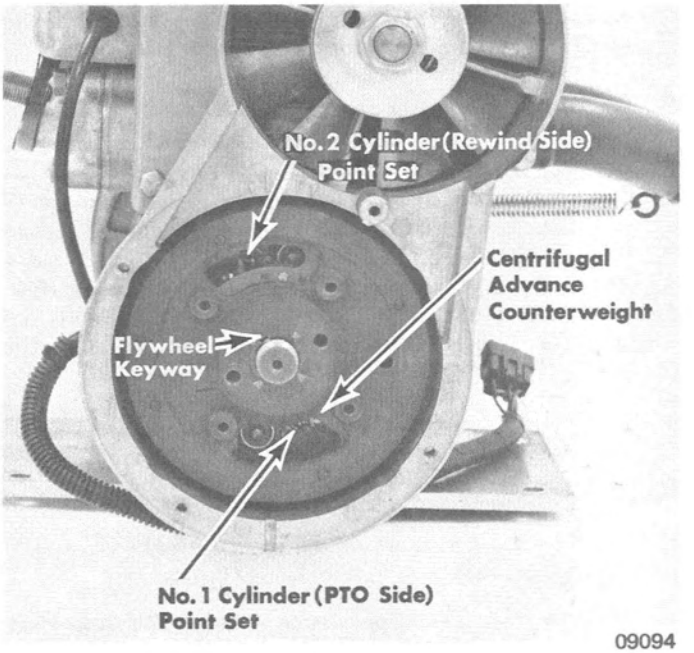


Figure 3. Breaker Point Adjustment

TIMING PROCEDURE

NOTE: If stator plate has been removed, initially position stator plate in center of slots.

1. Check breaker point adjustment, preceding.
2. Disconnect engine harness from chassis harness by separating "plug-in" connector (located by right front engine mount).
3. Install Dial Indicator (C-91-58222A1) in No. 1 cylinder (PTO side) spark plug hole.
4. Zero dial indicator at piston TDC (top dead center).
5. Connect suitable meter, buzzer or light to engine ground and black wire (at engine harness connector) which is attached to No. 1 point set (bottom set). (Figures 3 and 4)

   NOTE: Two black stator plate wires are attached to engine harness connector (one black wire goes to each set of points). Meter must be connected to black wire which goes to No. 1 point set. Check connection as follows: While looking thru large slot in flywheel, rotate flywheel back-and-forth so that No. 1 points (bottom set) open and close. If meter is connected to proper black wire, action of points will be indicated by meter movement. If meter does not move, connect meter leads to other black wire and check for meter movement. If desired, meter may be connected to secondary ignition coil wires instead of black wires. Removal of dash, carburetor and coil cover is required to gain access to coil wires. Blue/red ignition coil wire goes to No. 1 point set and blue wire to No. 2 point set.

6. **Move centrifugal advance counterweight (Figure 3) to full advance position. Hold counterweight in this position while timing engine.**
7. Rotate flywheel counterclockwise (viewed from flywheel side) until No. 1 points close.
8. Slowly rotate flywheel clockwise until No. 1 points just break (as indicated by meter, buzzer or light). At this

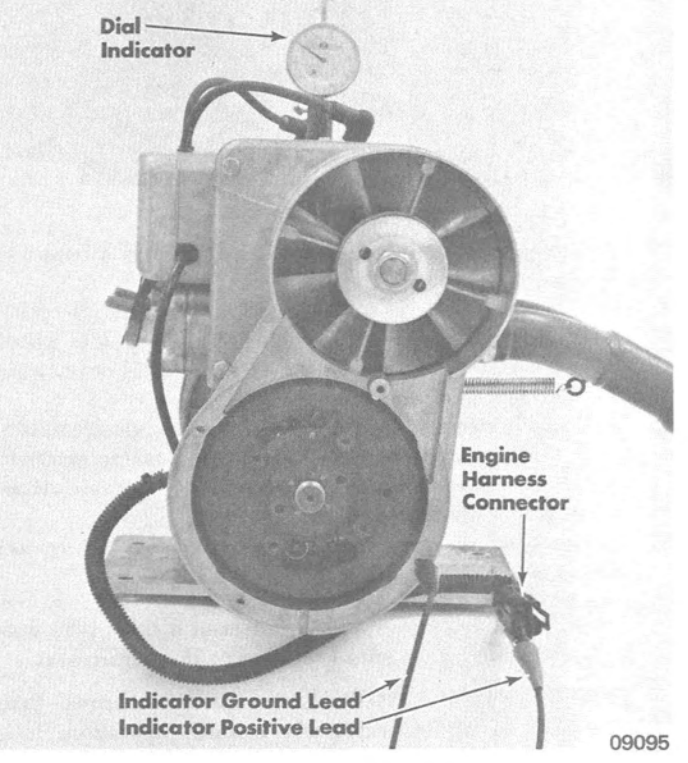


Figure 4. Timing Adjustment

point, dial indicator should show timing specification as listed in "Specifications" Section 8. If timing is not correct, adjust stator plate until No. 1 point set breaks at specified timing.

NOTE: When viewed from flywheel side of engine, counterclockwise rotation of stator plate advances timing. Clockwise rotation of stator plate retards timing.

9. Remove dial indicator from No. 1 cylinder and install in No. 2 cylinder (rewind side) spark plug hole.
10. Zero dial indicator at piston TDC (top dead center).
11. Connect suitable meter, buzzer or light to engine ground and other black wire (at engine harness connector) which is attached to No. 2 point set (top set). (Figures 3 and 4)
12. Rotate flywheel counterclockwise until No. 2 points close.
13. Slowly rotate flywheel clockwise until No. 2 points just break (as indicated by meter, buzzer or light). At this point, dial indicator should show specified timing. If timing is not correct, adjust point gap until No. 2 point set breaks at specified timing.

NOTE: Advance timing by increasing point gap and retard timing by decreasing point gap.

14. Remove dial indicator from engine. Disconnect meter, buzzer or light from engine.
15. Connect engine harness to chassis harness.
16. Place fan belt between halves of lower fan pulley. Attach lower fan pulley halves and rewind starter cup to flywheel.
17. Install rewind starter assembly, spark plugs and spark plug protectors. Connect spark plug wires to respective spark plugs.

NOTE: Ground wire from cowl support must be attached at rewind starter assembly.

CARBURETOR ADJUSTMENT

IDLE ADJUSTMENT (Figure 5)

1. Turn low speed mixture needle inward (clockwise) until it seats lightly, then turn back out one (1) turn.

IMPORTANT: This approximate setting will permit starting, but may be found too rich or too lean for normal operation; therefore, to obtain peak performance and prevent possible engine damage, as soon as engine starts, correct final adjustments must be made as instructed, following.

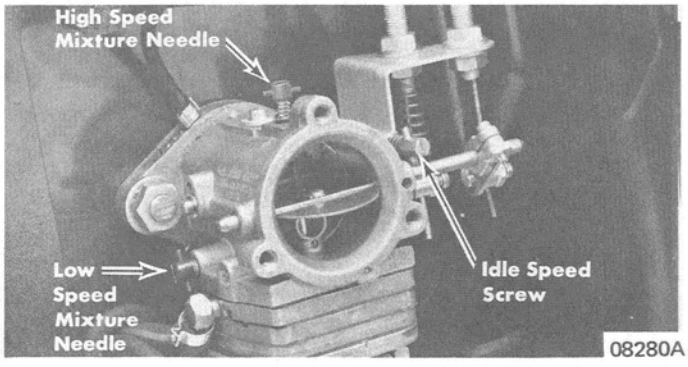


Figure 5. Carburetor Adjustment

2. Start engine and allow to "warm up" before attempting adjustment.
3. Set idle speed screw to attain recommended idle RPM (refer to "Specifications" Section 8). Turn idle speed screw inward (clockwise) to increase idle RPM or outward (counterclockwise) to decrease idle RPM.
4. With engine running at idle speed, turn low speed mixture needle outward (counterclockwise) until engine starts to "load up" or slow down or fire unevenly because of an over-rich fuel mixture.
5. Slowly turn low speed mixture needle inward (clockwise) until engine picks up speed and fires evenly.

NOTE: Turn mixture needle 1/8-turn at a time, then wait sufficient time for engine to respond to this adjustment.

IMPORTANT: DO NOT adjust carburetor leaner than necessary to attain reasonably smooth operation. It is preferable to operate with mixture SLIGHTLY RICH rather than too lean.

6. Recheck idle RPM and readjust idle speed screw, if necessary.
7. Stop engine.

HIGH SPEED ADJUSTMENT (Figure 5)

1. Perform high speed adjustment as follows:
   a. Turn high speed mixture needle inward (clockwise) until it seats lightly, then turn back out 1½-turns.

IMPORTANT: This approximate setting may be too rich or too lean for normal operation; therefore, to obtain peak performance and prevent possible engine damage, as soon as engine starts, correct final adjustments must be made as instructed, following.

   b. Start engine and allow to "warm up" before attempting adjustment.
   c. While operating snowmobile at full throttle (under normal load conditions), slowly turn high speed mixture needle outward (counterclockwise) until engine starts to "load up" or fire unevenly or "four-cycle" because of an over-rich fuel mixture.
   d. At this point, slowly turn high speed mixture needle inward (clockwise) until engine "smooths-out" and fires evenly.

NOTE: Turn mixture needle 1/8-turn at a time, then wait sufficient time for engine to respond to this adjustment.

IMPORTANT: DO NOT adjust carburetor leaner than necessary to attain reasonably smooth operation. It is preferable to operate with mixture SLIGHTLY RICH rather than too lean. If in doubt about high speed adjustment, check coloration of spark plugs after a full throttle run of approximately 100 yards. The correct high speed adjustment will result in gray, tan or light brown coloration of spark plug insulator tip. Under normal operating conditions (at sea level), final setting of high speed mixture needle should be 1¼ to 1½-turns open.

   e. Stop engine.
2. Sprocket options are available as optional equipment for high elevation operation or operation under various load conditions. Refer to Section 2D, "Chassis", for proper application.

TIMING and ADJUSTING - 440 M/X and 440 S/R (Chassis Serial No. 4064097 and Above)

CHECKING IGNITION TIMING

1. Remove drive sheave guard.
2. Disconnect both spark plug wires and remove spark plug from No. 1 (rewind side) cylinder.

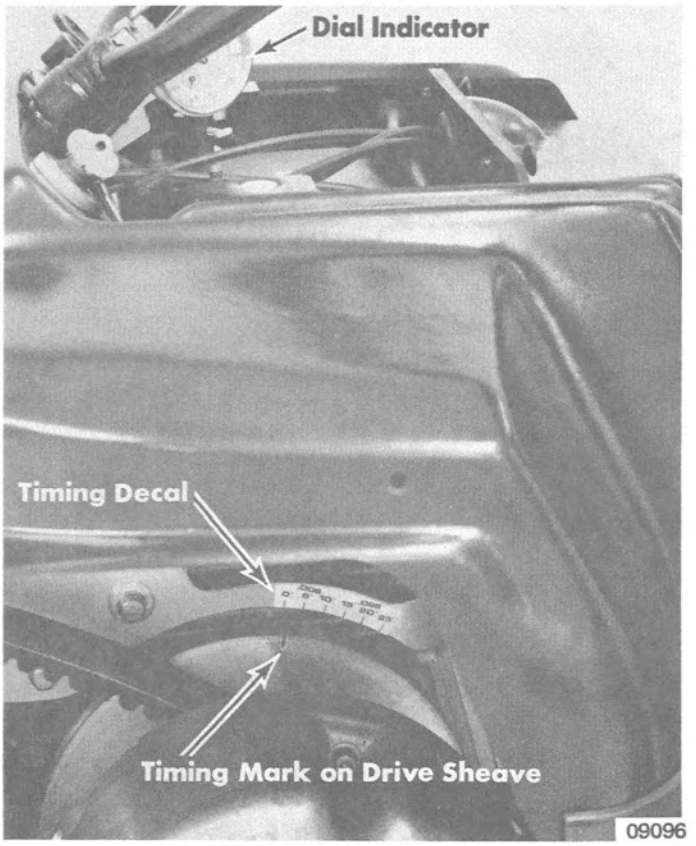


Figure 1. Dial Indicator and Timing Decal

3. Install Dial Indicator (C-91-58222A1) in No. 1 (rewind side) cylinder spark plug hole. (Figure 1)
4. Zero dial indicator at piston TDC (top dead center).
5. With No. 1 piston at TDC, place a mark on edge of fixed face of drive sheave directly opposite 0° mark on timing decal. (Figure 1)
6. Remove dial indicator and install spark plug.
7. Connect Tachometer (C-91-59339) to engine by placing tachometer sensing ring over No. 2 (PTO side) spark plug wire. Connect No. 2 spark plug wire to No. 2 spark plug.
8. Connect Timing Lite (C-91-35507A1) to engine and a 12-volt battery as follows:
   a. Insert timing adaptor (Figure 2) between No. 1 (rewind side) spark plug and No. 1 spark plug wire.
   b. Connect large red timing lite lead to timing adaptor. (Figure 2)
   c. Connect one remaining timing lite lead to negative battery terminal and other lead to positive battery terminal of a fully charged 12-volt battery.
   d. Depress button on timing lite and, if properly connected, timing lite will "buzz".
9. Start engine.
10. Aim timing lite at timing decal and timing mark on fixed face of drive sheave. (Figure 2)

WARNING: Drive sheave engagement occurs at approximately 3300 to 3600 RPM. DO NOT operate engine above 2500 RPM when checking ignition timing. Keep clear of moving parts at all times.

11. With engine running at 2500 RPM, timing mark on drive sheave should be opposite 17° to 19° (BTDC) mark on timing decal. (Figure 2)

    NOTE: Ignition timing is "fully advanced" at 2500 RPM. A dynamic timing of 17° to 19° BTDC is approximately equal to a static timing of .004" to .006" BTDC.

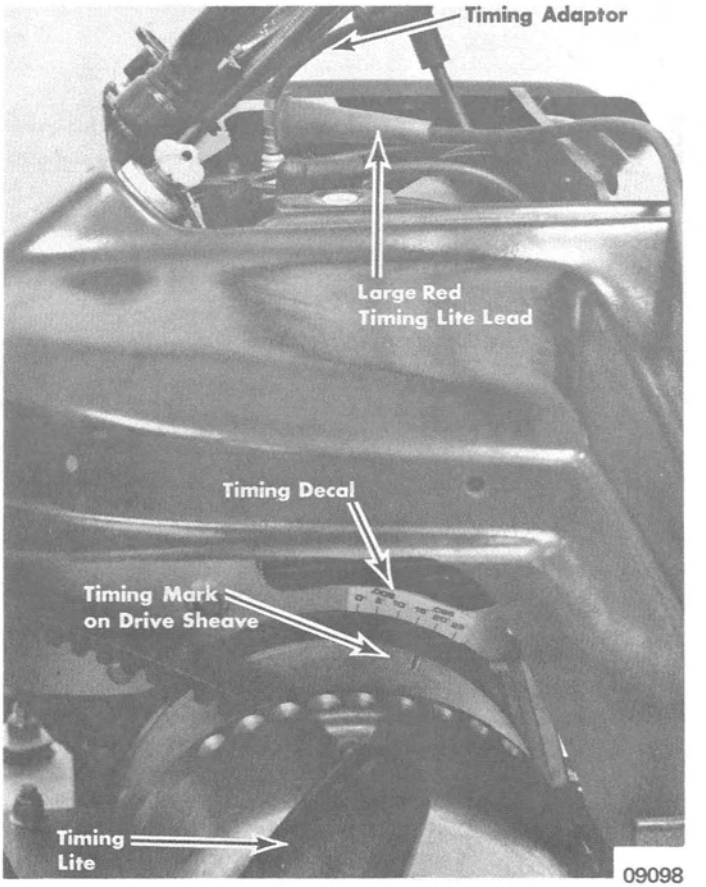


Figure 2. Checking Ignition Timing

12. Stop engine.
13. If readjustment is necessary, refer to "Breaker Point Adjustment" and "Timing Procedure", following.

    NOTE: Check ignition timing on No. 2 cylinder (PTO side) in same manner as outlined, preceding. Timing on either cylinder MUST NOT be advanced further than recommended specification. Readjust timing as necessary.

14. Remove timing lite and tachometer. Install drive sheave guard.

IMPORTANT: If timing is rechecked at a later time, be sure that timing mark on drive sheave and 0° mark on timing decal are aligned when No. 1 piston is at TDC. If drive sheave has been removed from crankshaft, a new timing mark must be made on fixed face of drive sheave.

BREAKER POINT ADJUSTMENT

1. Remove both spark plugs.
2. Remove rewind starter assembly, rewind starter cup and lower fan pulley from engine.

NOTE: To adjust points, initially position flywheel with keyway at approximate position shown in chart below. Rotate flywheel until maximum point gap is achieved. It may be necessary to remove flywheel nut and washers to see flywheel keyway. If removed, reinstall flywheel washers and nut. Torque nut to specification before proceeding to "Timing Procedure", following.

No. 1 Cylinder (Rewind Side Cylinder - Rear Point Set)	No. 2 Cylinder (PTO Side Cylinder - Front Point Set)
7 O'clock	1 O'clock

3. Check gap of each set of points by inserting thickness gauge thru slot in flywheel when point set is at maximum gap. (Figure 3)
4. Readjust point gap(s) as necessary to attain recommended gap. (Refer to "Specifications" Section 8 for specified point gap.)
5. If points are readjusted, refer to "Timing Procedure", following, and check timing.

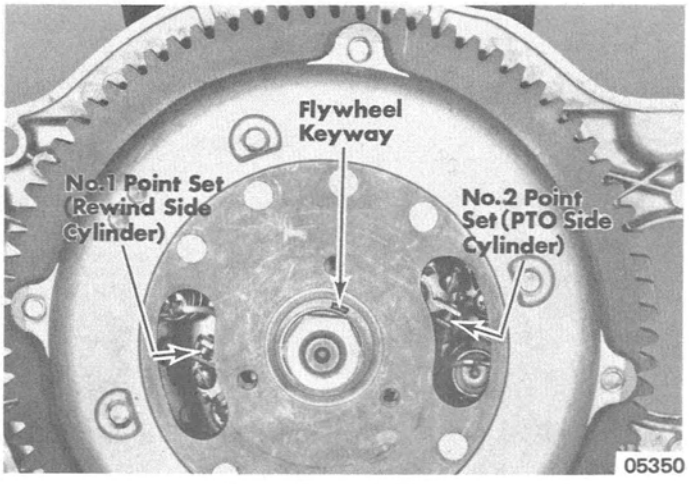


Figure 3. Breaker Point Adjustment

TIMING PROCEDURE

NOTE: If stator plate has been removed, initially position stator plate in center of slots.

1. Check breaker point adjustment, preceding.
2. Disconnect chassis harness from engine harness by separating "plug-in" connector (located beneath secondary ignition coils.
3. Disconnect white and red secondary ignition coil wires from white and red engine harness wires by separating "bullet" connectors.
4. Install Dial Indicator (C-91-58222A1) in No. 1 (rewind side) cylinder spark plug hole.
5. Zero dial indicator at piston TDC (top dead center).
6. Connect suitable meter, buzzer or light to engine ground and white engine harness wire which was disconnected from No. 1 (white) secondary ignition coil wire. (Figure 4)
7. Rotate flywheel counterclockwise (viewed from flywheel side) until No. 1 points (rear point set) close.
8. Slowly rotate flywheel clockwise until No. 1 points just break (as indicated by meter, buzzer or light). At this point, dial indicator should show timing specification as listed in "Specifications" Section 8. If timing is not correct, adjust stator plate until No. 1 point set breaks at specified timing.

NOTE: When viewed from flywheel side of engine, counterclockwise rotation of stator plate advances timing. Clockwise rotation of stator plate retards timing.

9. Remove dial indicator from No. 1 cylinder and install in No. 2 cylinder (PTO side) spark plug hole.
10. Zero dial indicator at piston TDC (top dead center).
11. Connect suitable meter, buzzer or light to engine ground and red engine harness wire which was disconnected from No. 2 (red) secondary ignition coil wire. (Figure 4)
12. Rotate flywheel counterclockwise until No. 2 points (front point set) close.
13. Slowly rotate flywheel clockwise until No. 2 points just break (as indicated by meter, buzzer or light). At this

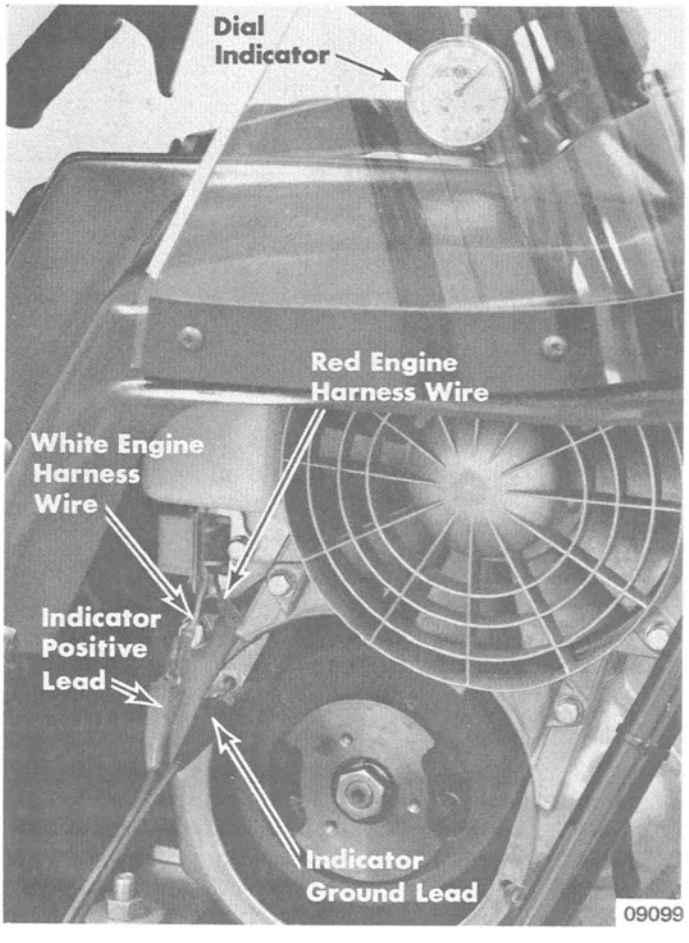


Figure 4. Timing Adjustment

point, dial indicator should show specified timing. If timing is not correct, adjust point gap until No. 2 point set breaks at specified timing.

NOTE: Advance timing by increasing point gap and retard timing by decreasing point gap.

14. Remove dial indicator from engine. Disconnect meter, buzzer or light from engine.
15. Connect chassis harness to engine harness by reconnecting "plug-in" connector (located beneath secondary ignition coils).
16. Connect secondary ignition coil wires to engine harness wires (white to white and red to red) by reconnecting "bullet" connectors.
17. Place fan belt around lower fan pulley. Attach lower fan pulley and rewind starter cup to flywheel.
18. Install rewind starter assembly and spark plugs.

NOTE: Ground wire from cowl support must be attached at rewind starter assembly.

19. Recheck timing as outlined under "Checking Ignition Timing", preceding. Timing should be 17° to 19° BTDC. If timing is not correct, readjust magneto so that timing of each cylinder is 17° to 19° BTDC.

CARBURETOR ADJUSTMENT

IDLE ADJUSTMENT (Figure 5)

1. Turn low speed mixture needle inward (clockwise) until it seats lightly, then turn back out one (1) turn.

IMPORTANT: This approximate setting will permit starting, but may be found too rich or too lean for normal operation; therefore, to obtain peak performance and prevent possible engine damage, as soon as engine starts, correct final adjustments must be made as instructed, following.

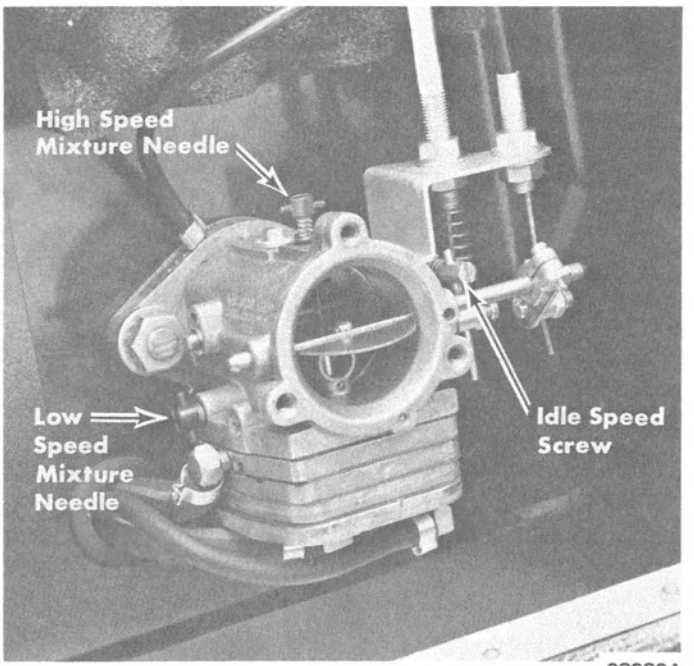


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Figure 5. Carburetor Adjustments

2. Start engine and allow to "warm-up" before attempting adjustment.
3. Set idle speed screw to attain recommended idle RPM (refer to "Specifications" Section 8). Turn idle speed screw inward (clockwise) to increase idle RPM or outward (counterclockwise) to decrease idle RPM.
4. With engine running at idle speed, turn low speed mixture needle outward (counterclockwise) until engine starts to "load up" or slow down or fire unevenly, because of an over-rich fuel mixture.
5. Slowly turn low speed mixture needle inward (clockwise) until engine picks up speed and fires evenly.

NOTE: Turn mixture needle 1/8-turn at a time, then wait sufficient time for engine to respond to this adjustment.

IMPORTANT: DO NOT adjust carburetor leaner than necessary to attain reasonably smooth operation. It is preferable to operate with mixture SLIGHTLY RICH rather than too lean.

6. Recheck idle RPM and readjust idle speed screw if necessary.
7. Stop engine.

HIGH SPEED ADJUSTMENT (Figure 5)

1. Perform high speed adjustment as follows:
   a. Turn high speed mixture needle inward (clockwise) until it seats lightly, then turn back out 1½-turns.

IMPORTANT: This approximate setting may be too rich or too lean for normal operation; therefore, to obtain peak performance and prevent possible engine damage, as soon as engine starts, correct final adjustments must be made as instructed, following.

   b. Start engine and allow to "warm-up" before attempting adjustment.
   c. While operating snowmobile at full throttle (under normal load conditions), slowly turn high speed mixture needle outward (counterclockwise) until engine starts to "load up" or fire unevenly or "four-cycle", because of an over-rich fuel mixture.
   d. At this point, slowly turn high speed mixture needle inward (clockwise) until engine "smooths-out" and fires evenly.

NOTE: Turn mixture needle 1/8-turn at a time, then wait sufficient time for engine to respond to this adjustment.

IMPORTANT: DO NOT adjust carburetor leaner than necessary to attain reasonably smooth operation. It is preferable to operate with mixture SLIGHTLY RICH rather than too lean. If in doubt about high speed adjustment, check coloration of spark plugs after a full throttle run of approximately 100 yards. The correct high speed adjustment will result in gray, tan or light brown coloration of spark plug insulator tip. Under normal operating conditions (at sea level), final setting of high speed mixture needle should be 1¼ to 1½ turns open.

   e. Stop engine.
2. Sprocket options are available as optional equipment for high elevation operation or operation under various load conditions. Refer to Section 2D, "Chassis", for proper application.

TIMING and ADJUSTING - 340 T/T and 440 T/T

CHECKING IGNITION TIMING

1. Remove carburetor air intake.
2. Disconnect spark plug wires and remove spark plug protector and spark plug from No. 1 (PTO side) cylinder.

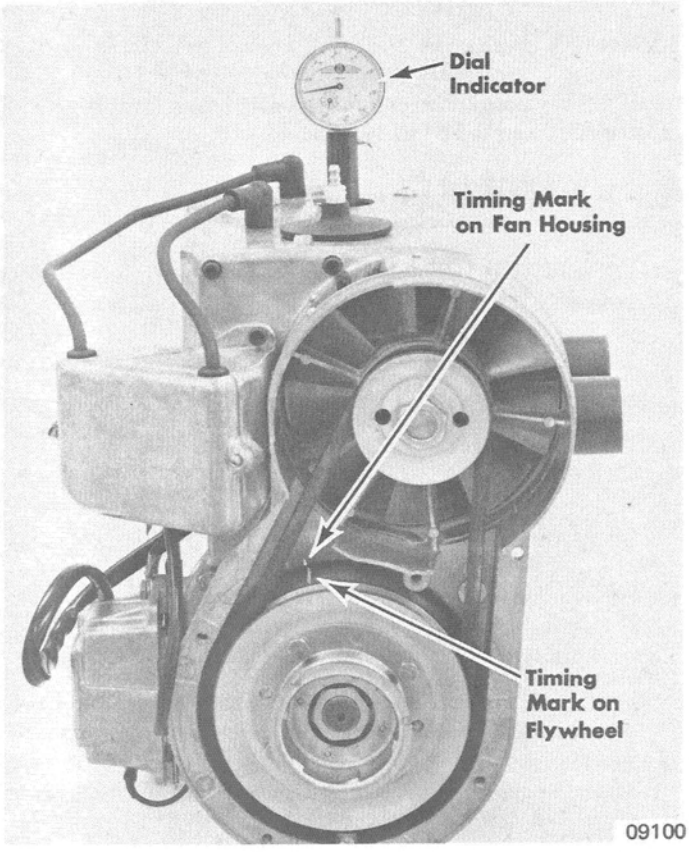

Figure 1. Dial Indicator Installed

3. Install Dial Indicator (C-91-58222A1) in No. 1 (PTO side) cylinder spark plug hole. (Figure 1)
4. Zero dial indicator at piston TDC (top dead center).
5. Rotate drive sheave clockwise (viewed from PTO side) until dial indicator shows timing degree listed in specifications. (Refer to "Specifications" Section 8.) At this point, timing mark on flywheel should be aligned with timing mark on fan housing. (Figure 1) If timing marks are not aligned, place a <u>new</u> mark on fan housing directly opposite timing mark on flywheel.
6. Remove dial indicator and install spark plug and spark plug protector. Connect No. 2 (rewind side) spark plug wire to No. 2 spark plug.
7. Connect Timing Lite (C-91-35507A1) to engine and to a 12-volt battery as follows:
   a. Insert timing adaptor (Figure 2) between No. 1 (PTO side) spark plug and No. 1 spark plug wire.
   b. Connect large red timing lite lead to timing adaptor. (Figure 2)
   c. Connect one remaining timing lite lead to negative battery terminal and other lead to positive battery terminal of a fully charged 12-volt battery.
   d. Depress button on timing lite and, if properly connected, timing lite will "buzz".
8. Start engine.

> **WARNING:** Drive sheave engagement occurs at approximately 3100-3600 RPM. Keep hands and feet clear of moving parts at all times. If engine will be operated above 3000 RPM, skis MUST BE blocked and track supported OFF ground.

9. Aim timing lite at timing marks on fan housing and flywheel. (Figure 2)

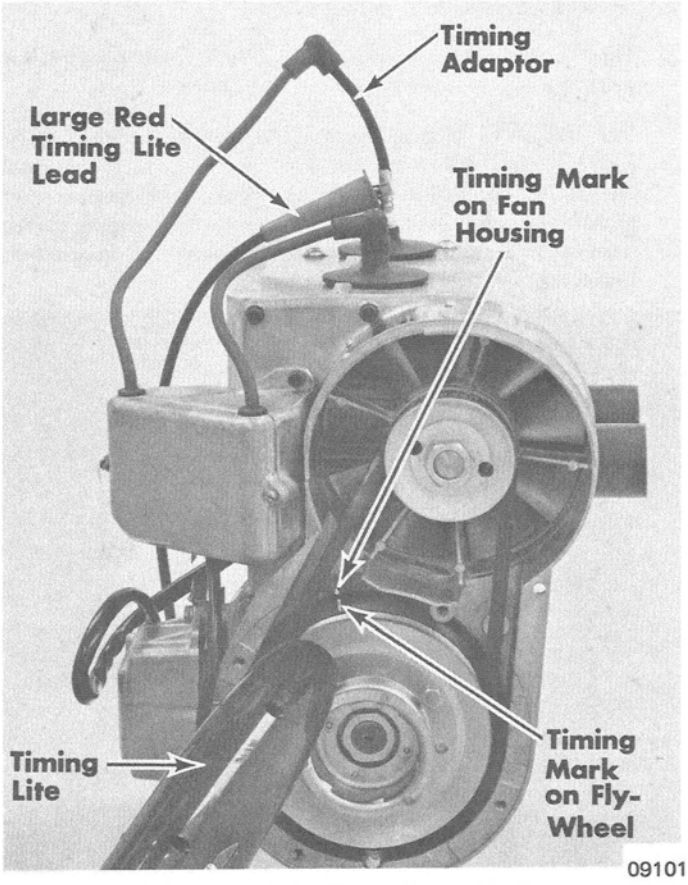

Figure 2. Checking Ignition Timing

10. With engine running at 3000 RPM, timing mark on flywheel should be aligned with timing mark on fan housing. (Figure 2)

    NOTE: Ignition timing is "fully advanced" at 3000 RPM.

11. Stop engine.
12. If readjustment is necessary, refer to "Timing Procedure", following, and readjust trigger assembly, as required, to properly align timing marks.

    NOTE: Check ignition timing on No. 2 cylinder (rewind side) in same manner as outlined, preceding. Timing on either cylinder MUST NOT be advanced further than recommended specification. Readjust as necessary.

13. Remove timing lite and install carburetor air intake.

TIMING PROCEDURE

1. Remove carburetor air intake.
2. Disconnect spark plug wires, remove spark plug protectors and spark plugs from engine.
3. Remove rewind starter assembly, rewind starter cup and fan pulley halves from flywheel.

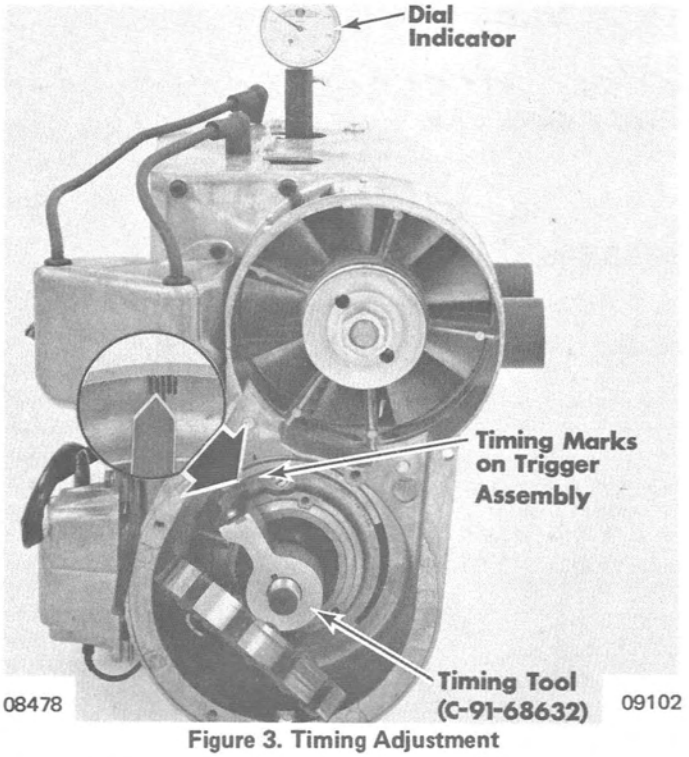

Figure 3. Timing Adjustment

4. Remove flywheel. (Refer to Section 5)
5. Remove stator attaching bolts and move stator to one side.
6. Install Dial Indicator (C-91-58222A1) in No. 1 (PTO side) cylinder spark plug hole. (Figure 3)
7. Zero dial indicator at piston TDC (top dead center).
8. Align Timing Tool (C-91-68632) with crankshaft key and install tool on crankshaft taper as far as possible. (Figure 3)
9. Rotate crankshaft counterclockwise (viewed from rewind side) until dial indicator shows timing degree listed in specifications. (Refer to "Specifications" Section 8.)
10. **Without moving crankshaft from position outlined in Paragraph 9, preceding, pointer on timing tool must align with SECOND timing mark (from left) on trigger assembly. (Figure 3) If timing tool is not aligned with correct timing mark, adjust trigger assembly as follows:**
    a. **Loosen 2 screws which secure trigger assembly to fan housing.**
    b. **Rotate trigger assembly until pointer on timing tool is aligned with SECOND timing mark (from left) on trigger assembly. (Figure 3)**
    c. **Tighten 2 screws which secure trigger assembly to fan housing.**
11. Remove timing tool from crankshaft taper and dial indicator from spark plug hole.
12. Move stator back in position and secure with attaching bolts.
13. Install flywheel.
14. Place fan belt between halves of fan pulley. Secure pulley halves and rewind starter cup to flywheel.
15. Install rewind starter assembly.
16. Install spark plugs and spark plug protectors. Connect spark plug wires to respective spark plug.
17. Check ignition timing as outlined under "Checking Ignition Timing", preceding. Reposition trigger assembly as necessary.
18. Install carburetor air intake.

CARBURETOR ADJUSTMENT

IDLE ADJUSTMENT

1. Synchronize carburetor throttle valves. (Refer to Section 4, Part A.)
2. Turn low speed mixture needles inward (clockwise) until they seat lightly, then turn back out 1½-turns. (Figure 4)

IMPORTANT: This approximate setting will permit starting, but may be found too rich or too lean for normal operation; therefore, to obtain peak performance and prevent possible engine damage, as soon as engine starts, correct final adjustments must be made as instructed, following.

3. Start engine and allow to "warm up" before attempting adjustment.
4. Set idle speed screws (Figure 4) to attain recommended idle RPM (refer to "Specifications" Section 8). Turn idle speed screws inward (clockwise) to increase idle RPM or outward (counterclockwise) to decrease idle RPM.

IMPORTANT: Idle speed screws control the amount of throttle valve opening at idle setting. Screws should be adjusted identical so that each will make contact with its respective throttle valve.

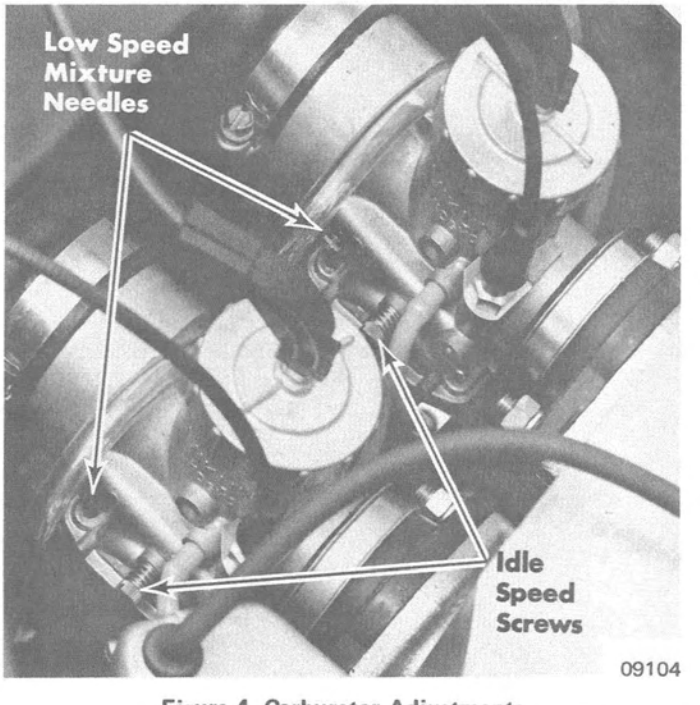

Figure 4. Carburetor Adjustments

5. With engine running at idle speed, turn low speed mixture needles inward (clockwise) until engine starts to "load up" or slow down or fire unevenly, because of an over-rich fuel mixture.
6. Slowly turn low speed mixture needles outward (counterclockwise) until engine picks up speed and fires evenly.

   NOTE: Adjust one (1) carburetor at a time. Turn low speed mixture needles approximately 1/8-turn at a time, then wait sufficient time for engine to respond to this adjustment.

   IMPORTANT: Low speed mixture needles REGULATE AIR RATHER THAN FUEL at idle speed. Turning low speed mixture needles inward (clockwise) reduces air supply, thus causing low speed mixture to richen. Turning low speed mixture needles outward (counterclockwise) increases air supply and results in a leaner low speed mixture. DO NOT adjust carburetors leaner than necessary to attain reasonably smooth idling. It is preferable to set idle mixture a little RICH rather than too lean.

7. Recheck idle RPM and readjust idle speed screws if necessary.
8. Stop engine.

MID-RANGE (JET NEEDLE) ADJUSTMENT

Each carburetor is equipped with an adjustable jet needle (located in throttle valve) which controls air/fuel mixture ratio when throttle valve is between ¼ and ¾ open (mid-range throttle settings).

Positioning of jet needle "E" ring in jet needle slots (Figure 5) determines fuel mixture ratio during mid-range throttle settings. Lean the fuel mixture at this setting by placing "E" ring in a higher slot on jet needle. Enrich the fuel mixture by placing "E" ring in a lower slot on jet needle.

Jet needle "E" rings were positioned in the following slots when snowmobile was shipped from the factory:

440 T/T (Chassis Serial No. 4210249 and Below)	- 3rd slot from top of jet needle
340 T/T	- 2nd slot from top of jet needle
440 T/T (Chassis Serial No. 4347125 and Above)	- 4th slot from top of jet needle

Factory settings for jet needle "E" rings WILL BE SUITABLE for operation under MOST CONDITIONS. If readjustment of jet needles is necessary, keep in mind that it is preferable to have jet needles adjusted a little rich rather than too lean. Be sure that both jet needles are adjusted to same setting. (Refer to Section 4, Part A, for carburetor disassembly.)

CAUTION: Improperly adjusted jet needles (too lean) may result in serious engine damage.

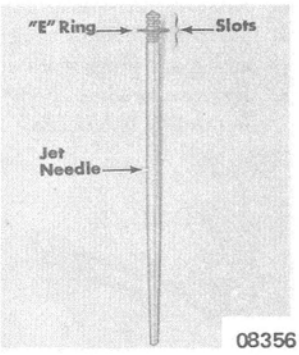

Figure 5. Carburetor Jet Needle

HIGH SPEED ADJUSTMENT

1. Each carburetor is equipped with a replaceable fixed high speed jet. Fixed high speed jet is located in carburetor float bowl and is visible when plug and fiber washer are removed from float bowl. (Figure 6) Each jet is stamped with a number which indicates maximum amount of fuel flow that it can meter; i.e., No. 270 (stamped on jet) indicates that 270cc of fuel can be metered thru that jet in one (1) minute.

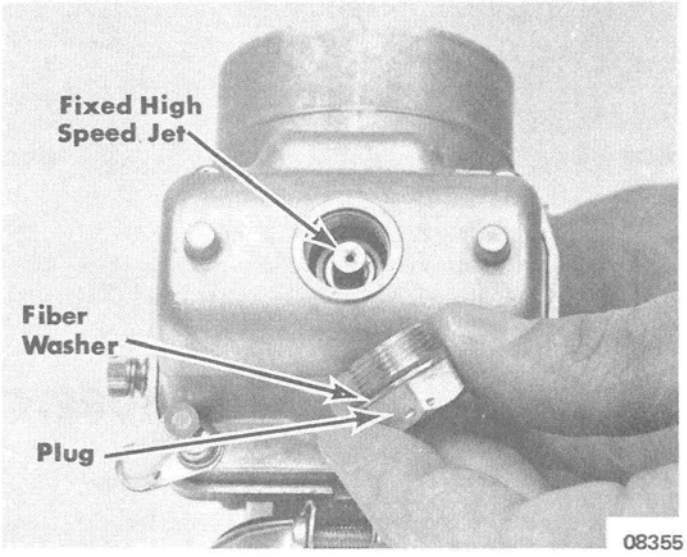

Figure 6. Carburetor Fixed High Speed Jet

High speed adjustment (changing jets) is not required unless snowmobile will be operated at an elevation above 5,000 ft. (1,524m). Refer to Sections 8 and 2D for carburetor jet sizes and recommendations.

2. Carburetor elevation kits (D-1393-6150A1 for 340 T/T and D-1393-5874A2 for 440 T/T's) and sprocket options are available as optional equipment for high elevation operation. Refer to "Chassis" Section 2D for available sprockets.