1974-79 EXHAUST EMISSION SYSTEMS
Mazda Ignition Timing Control

1975-79 Rotary Engines

DESCRIPTION

Ignition control system is used to regulate operation of leading and trailing systems of distributor to help reduce hydrocarbon (HC) and carbon monoxide (CO) emissions by aiding converter warm-up during cold engine starts. System consists of leading and trailing components of distributor, control unit (if equipped), vacuum control valve (if equipped), idle switch, relays and connecting wiring and tubing.

OPERATION

The trailing spark cut-out system operates when engine is cold and running between 1150-4600 RPM and when engine is hot and running between 1150-3000 RPM. System is inoperable during deceleration. The control unit, if equipped, operates switches and timers.

TESTING

TRAILING IGNITION TIMING

1975 Models - 1) Connect tachometer and timing light to trailing spark plug wire (topmost spark plug). Start engine and gradually decrease engine speed from 4500 RPM. Timing light should go out when engine speed drops to 3600-4400 RPM.
2) With speed still decreasing, timing light should come on again at 1050-1250 RPM and remain on down to idle speed. Slowly increase engine speed. Timing light should stop flashing within 80-200 RPM (180-320 RPM on pickup) of speed at which it came on.
3) Set engine speed to 2000 RPM (timing light out). Timing light should come on when idle switch is pushed on manual transmission equipped models (kickdown switch on RX3 and RX4 automatic transmission equipped models).
4) On automatic transmission equipped pickup, disconnect water temperature switch and connect a jumper wire to both connector terminals. *See Fig. 2.* Start engine and set engine speed at 2000 RPM with choke knob.
5) Slowly accelerate engine. Timing light should flash at 4400-5200 RPM. Push choke knob in and gradually decrease engine speed from 3000 RPM. Timing light should stop flashing at 2300-2700 RPM.
6) With speed still decreasing, timing light should come on again at 1050-1250 RPM and remain on down to idle speed. Slowly increase engine speed. Timing light should stop flashing within 180-320 RPM of speed at which it came on.
1976-77 Federal Models - Connect voltmeter to positive terminal of leading ignition coil. Start engine and increase engine speed to 3600-4400 RPM. Voltage should increase by 1-2 volts.
1976-77 California Models - 1) Connect tachometer and timing light to trailing spark plug wire (topmost spark plug). Disconnect water temperature switch and connect a jumper wire to both connector terminals. *See Fig. 2.*
2) Start engine and set engine speed at 2000 RPM with choke knob. Slowly accelerate engine. Timing light should flash at 4200-5000 RPM. Push choke knob in and return engine to idle speed.
3) Slowly increase engine speed. When engine speed reaches 3600-4400 RPM, pull choke knob out. Timing light should flash for about 104-156 seconds. After 156 seconds, push choke knob in and return engine to idle speed.

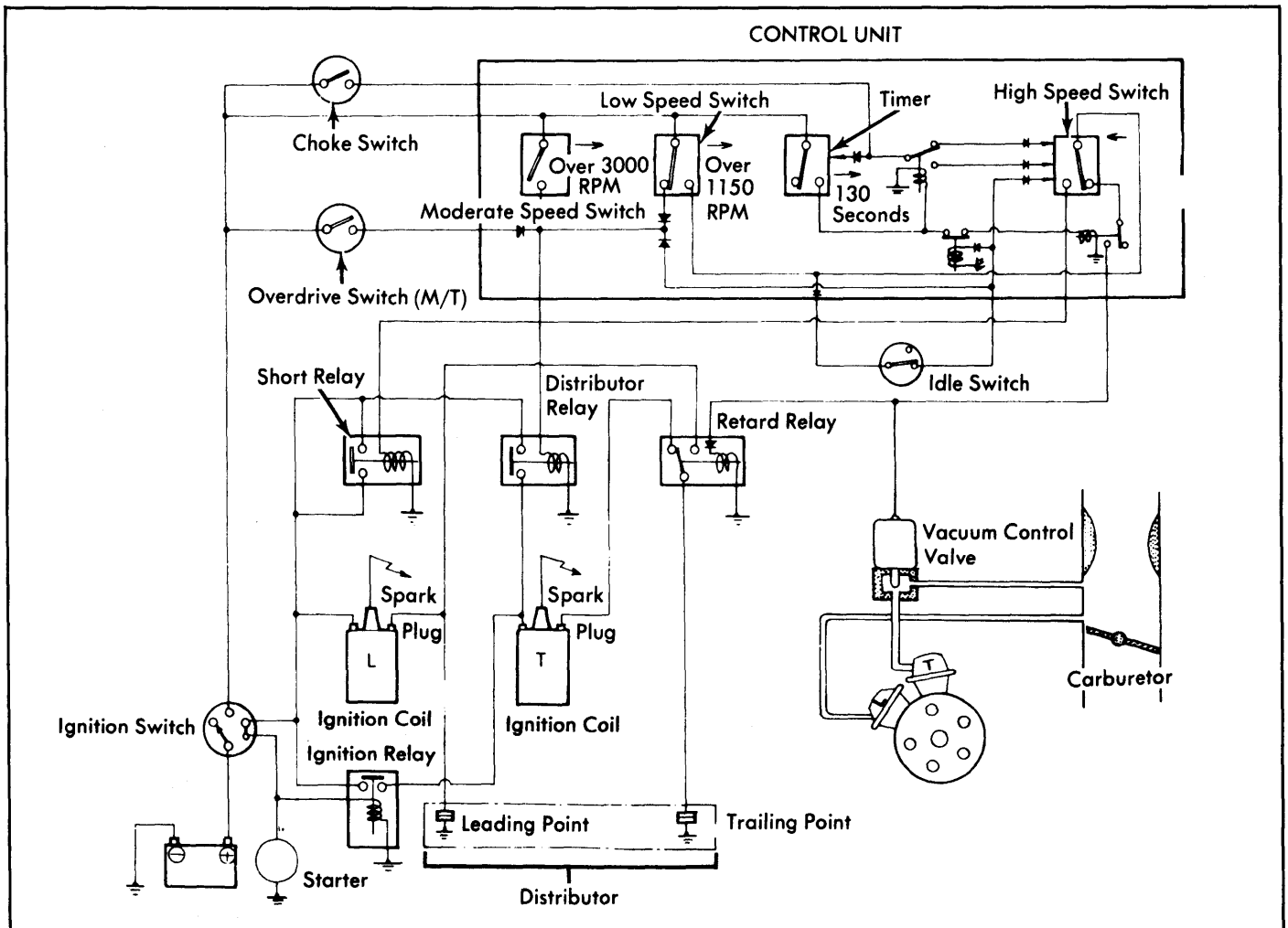

Fig. 1: 1977-78 Ignition Timing Control System (California Cosmo & RX4 With Manual Transmission Shown)

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Mazda Ignition Timing Control (Cont.)

4) Slowly increase engine speed again. Timing light should flash at 2700-3300 RPM (2300-2700 RPM with automatic transmission). Return engine to idle speed.
5) Slowly increase engine speed to 2000 RPM and allow engine speed to slowly decrease. Timing light should flash at 1050-1250 RPM. Return engine to idle speed.
6) Slowly increase engine speed again. Timing light should stop flashing within 100-200 RPM of speed recorded in step **5)**. Increase engine speed to 2000 RPM. Timing light should flash when idle switch lever is pushed completely toward idle position.
7) On manual transmission equipped vehicles, set engine speed to 2000 RPM and depress clutch pedal. Timing light should flash when shifting into 5th gear. Return transmission to Neutral.
1978 Models & 1979 RX7 - 1) Disconnect vacuum sensing tube from dashpot diaphragm. Connect tachometer and timing light to trailing spark plug wire (topmost spark plug).
2) Warm engine to normal operating temperature. Gradually increase engine speed and check that timing light flashes when engine speed is more than 2700-3300 RPM.
3) Return engine to idle. Increase engine speed to 2000 RPM and slowly decrease engine speed. Record speed at which timing light starts flashing. Speed should be 1000-1300 RPM.
4) Slowly increase engine speed and record speed at which timing light stops flashing. This speed should not vary from speed recorded in step **3)** by more than 100-200 RPM.
5) On manual transmission equipped vehicles, set engine speed to 2000 RPM. Depress clutch pedal and check to see that timing light flashes when shifting into 4th or 5th gear. Return transmission to Neutral.
6) On manual transmission equipped vehicles, again raise engine speed to 3000 RPM and quickly release throttle. Timing light should start flashing and continue to flash during deceleration and at idle speed.

LEADING IGNITION TIMING

1975 Models - 1) Connect tachometer and timing light to leading spark plug wire. Disconnect water temperature switch and connect a jumper wire to both connector terminals. *See Fig. 2.* Start engine and set engine speed at 2000 RPM with choke knob.
2) Observe timing marks on shaft pulley. Timing indicator should point between Yellow (leading) and Red (trailing) ignition timing marks. Engine speed should increase by several hundred RPM 104-156 seconds (96-148 seconds on pickup) after engine is started.

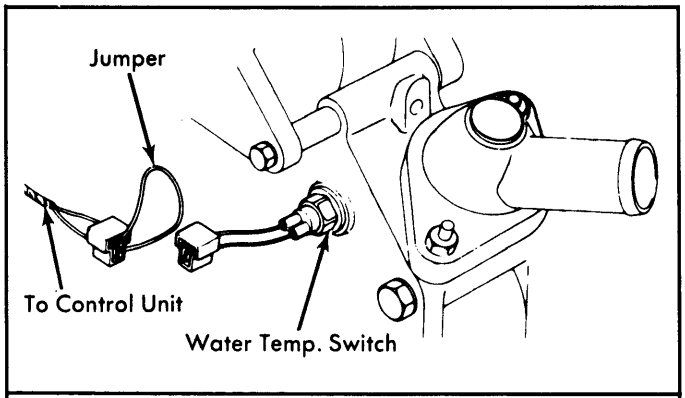

Fig. 2: By-Passing Water Temperature Switch

1976-77 California Models - 1) Connect tachometer and timing light to leading spark plug wire. Disconnect water temperature switch and connect a jumper wire to both connector terminals. *See Fig. 2.* Start engine and set engine speed at 2000 RPM with choke knob.
2) Observe timing marks on shaft pulley. Timing indicator should point between Yellow (leading) and Red (trailing) ignition timing marks. Timing should quickly advance past Yellow mark 104-156 seconds after engine is started.
3) Connect voltmeter to positive terminal of leading ignition coil. Slowly increase engine speed to 3600-4400 RPM. Voltage should increase by 1-2 volts.
1978 Models & 1979 RX7 - 1) Connect tachometer and timing light to leading spark plug wire. Warm engine to normal operating temperature. Check to see that timing light flashes at any engine speed.
2) Stop engine. Disconnect water temperature switch and connect a jumper wire to both connector terminals. *See Fig. 2.* Start engine and set engine speed at 2000 RPM with choke knob.
3) Observe timing marks on shaft pulley. Timing indicator should point between leading and trailing ignition timing marks. *See Fig. 3.*
4) Increase engine speed with throttle and check that timing advances and lines up with indicator when engine speed increases to more than 4600 RPM. After 130 seconds and after pulling choke knob out, portion "1" should advance quickly and portion "3" should take its place.

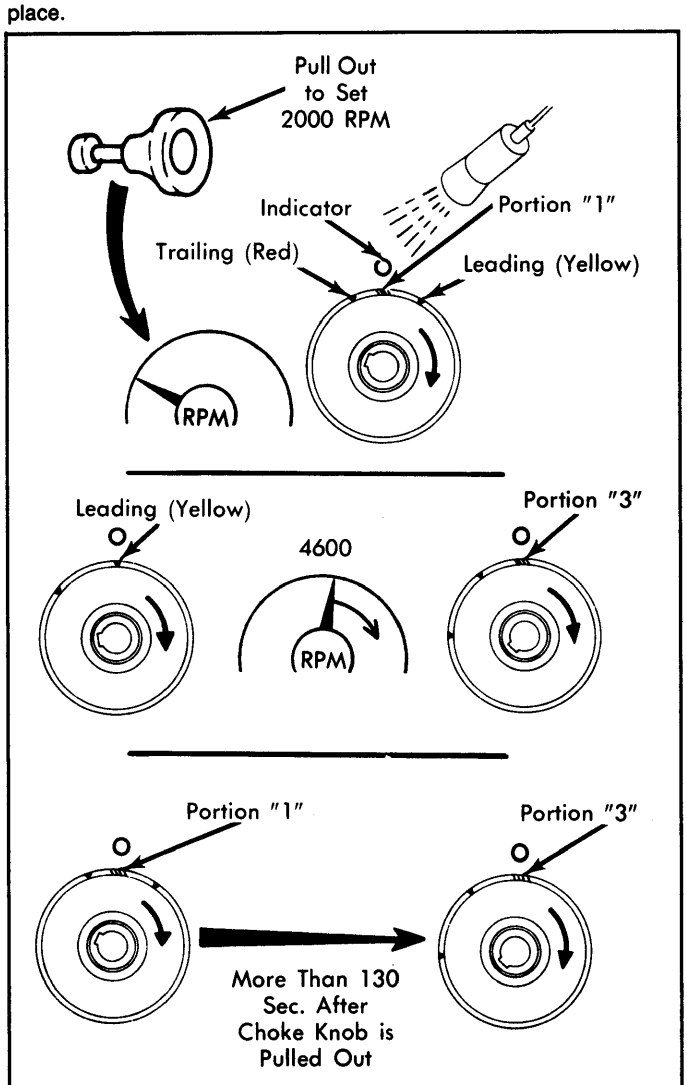

Fig. 3: Leading Ignition Timing Test

VACUUM CONTROL VALVE

1976-78 Models (Except RX7 Man. Trans.) - 1) Disconnect vacuum tube from trailing vacuum control unit of distributor. Disconnect water temperature switch and connect a jumper wire to both connector terminals. *See Fig. 2.*
2) Start engine and set engine speed at 2000 RPM with choke knob. No vacuum should be felt at vacuum sensing tube. On Federal models, push choke knob in fully. Suction should now be felt at disconnected trailing vacuum tube. On California models, suction should be felt 104-156 seconds after starting engine.

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1978-79 RX7 (Man. Trans.) - 1) Disconnect vacuum sensing tubes from vacuum control valve and vacuum pipe. Disconnect vacuum control valve. Blow through vacuum sensing tube. Air should pass through valve and come out the side fitting (vacuum pipe).
2) Apply battery power to vacuum control valve at one valve electrical terminal and ground the other. *See Fig. 4.* Again, blow through vacuum sensing tube. Air should come out of air filter. If valve does not respond in this manner, replace it.

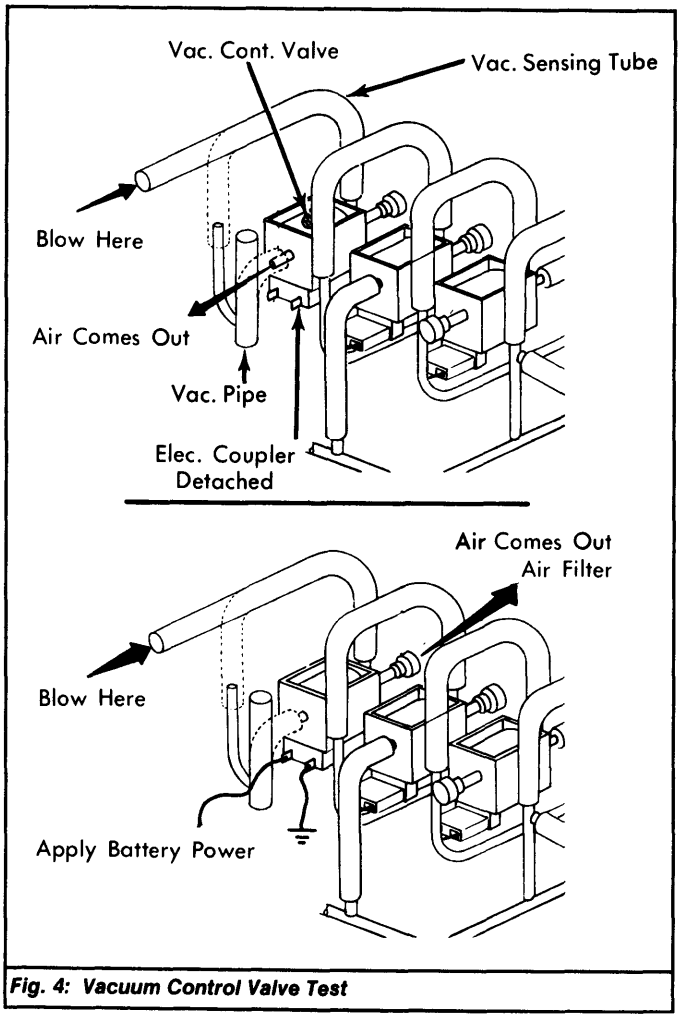

Fig. 4: Vacuum Control Valve Test

RELAYS

1975-78 Models (Except RX7) - 1) Disconnect wiring from relay. Connect battery positive lead to terminal No. 2 and negative lead to terminal No. 6. Continuity should exist between terminals No. 1 and 4. No continuity should exist between terminals No. 3 and 4. *See Fig. 5.*
2) Connect battery positive lead to terminal No. 5 and negative lead to terminal No. 6. Continuity should exist between terminals No. 3 and 4. No continuity should exist between terminals No. 1 and 4. If relay does not test as described, replace it.
1978-79 RX7 - 1) Disconnect wiring from relay. With no power applied, continuity should exist between terminals No. 1 and 2, No. 4 and No. 2, and terminals No. 4 and 1. No continuity should exist between terminals No. 3 and No. 2, or terminals No. 3 and 4.
2) Connect battery positive lead to terminal No. 6 and negative lead to terminal No. 5. Continuity should exist between terminals No. 3 and 2, and between terminals No. 4 and 3. No continuity should exist between terminals No. 1 and 2, No. 4 and 2, or terminals No. 1 and 4. If relay does not test as described, replace it.

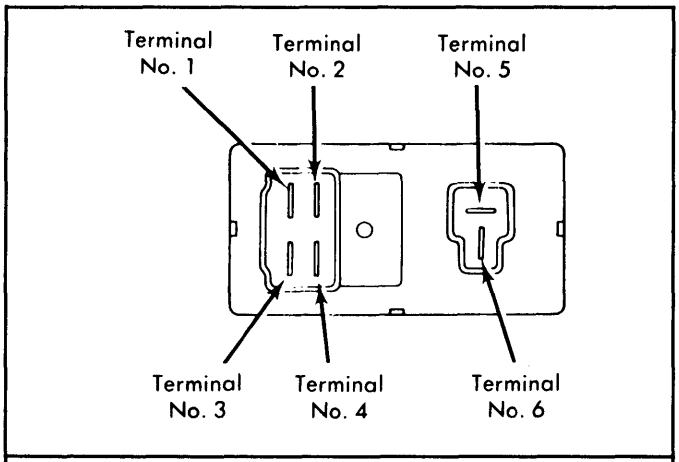

Fig. 5: Relay Terminal Identification

IDLE SWITCH

1975-78 Models - 1) Disconnect idle switch. Check continuity between switch terminals. Continuity should be as specified in IDLE SWITCH CONTINUITY table.
2) If not, remove limiter cap on switch. Connect tachometer to engine. Connect ohmmeter to switch terminals No. 1 and 3. *See Fig. 6.* With automatic transmission in Neutral, start engine.
3) Slowly increase engine speed. Turn adjusting screw until continuity is broken between terminals No. 1 and 3 at RPM specified in IDLE SWITCH CONTINUITY table. Replace switch if it does not operate within specifications.

IDLE SWITCH CONTINUITY

Engine Status	Continuity Between Terminals	No Continuity Between Terminals
Idle	1 & 3	1 & 2
950-1050 (Man. Trans.)	1 & 2	1 & 3
1150-1250 (Auto. Trans.)	1 & 2	1 & 3

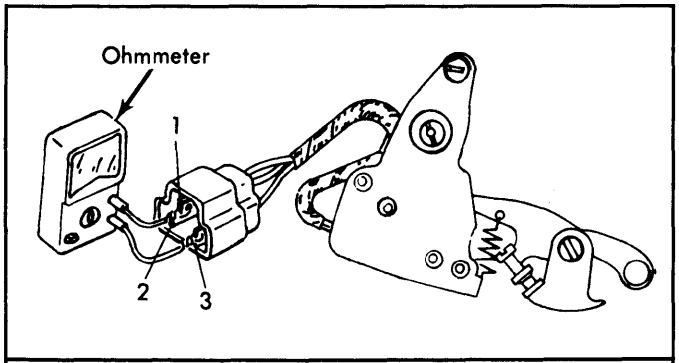

Fig. 6: Idle Switch Continuity Test