IGNITION CIRCUIT OPERATION

The function of the ignition circuit is to produce spark across the gap of spark plugs (E1 and E2). The circuit is a battery ignition type that fires both spark plugs simultaniously, thus eliminating the need for a distributor. The ignition circuit automatically stops the engine anytime the operator rises off the seat for more than one second when tractor is in gear or if PTO is engaged.

OPERATOR ON SEAT—MACHINE IN GEAR AND/OR PTO ENGAGED:
When the key switch (S1) is turned to the RUN or START position, current flows from the positive terminal of battery (G1), through circuit breaker (F3), across key switch contacts at terminals "B" and "A", to fuses (F1 and F2). From fuse (F2), current flows across the contacts of seat switch (S6), through time delay IC (E), to switch transistor (D) located inside the TDC module. As long as current from the IC flows to the transistor, the transistor is "switched on". In this state, the transistor completes the path to ground for TDC ignition relay coil (B). The ground path allows current to flow from fuse (F1), through the relay coil to ground. This energizes the relay coil which closes relay contacts (A).

Current from fuse (F1) then flows across ignition relay contacts (A), out the TDC module to ignition coil (T1). The current flows through the coil primary windings, then through ignition module (A2) to ground.

Current flowing through the primary windings produces a magnetic field around the primary and secondary windings.

NOTE: For machines (S.N. —420000), ignition points (E3) are used. The ignition points are actuated by a pushrod that rides on a camshaft lobe.

The ignition module receives a signal from a trigger ring containing permanent magnets (the ring rotates with the engine crankshaft). This signal causes the ignition module to "break" the circuit, momentarily stopping current flow through the primary windings, and cause the magnetic field to collapse across the secondary windings. The collapsing magnetic field induces high voltage in the secondary windings of the ignition coil. The induced voltage flows from one end of the secondary windings, through the two spark plugs (jumping the plug gaps), then back to the opposite end of the secondary windings. The engine block completes the circuit between the two spark plugs.

When the operator rises from the seat, the seat switch contacts open, causing current to stop flowing to the time delay IC. If the operator does not return to the seat within approximately one second, the time delay IC stops current flow to transistor (D). The transistor will "switch off", causing current through relay coil (B) to stop flowing and de-energize the coil. With the coil no longer energized, relay contacts (A) will open. Current stops flowing to the ignition coil, thus stopping the engine.

NOTE: Driving the machine over rough terrain can cause the seat switch contacts to momentarily open and close. When this happens, the time delay IC allows the engine to operate without interruption.

If the operator returns to the seat within approximately one second, current flow is re-established to the time delay IC before it has a chance to "time out" and stop current flow to the transistor. Current flow is NOT interrupted to the ignition coil and the engine is allowed to continue operating.

OPERATOR OFF SEAT—MACHINE IN NEUTRAL AND PTO DISENGAGED:
When operator is off the seat, current to the ignition coil can still be maintained through the neutral start (interlock) circuit. For current to flow through the interlock circuit, the key switch must be turned to the RUN or START position, the hydrostatic control lever in the STOP position, the PTO switch(es) in the OFF position (PTO disengaged), and park brake engaged (later models only).

With these conditions met, current flows from terminal "A" of the key switch to fuse (F1). From fuse (F1), current flows through the interlock contacts of the PTO switch(es), transmission neutral switch, and brake switch to terminal "S1" on the key switch. From terminal "S1", current flows to transistor (C) located in the TDC module. As long as current from the interlock circuit flows to transistor (C), the transistor is "switched on". In this state, the transistor provides an alternate path to ground for relay coil (B). The energized relay closes the relay contacts, allowing current to flow to the igniton coil.

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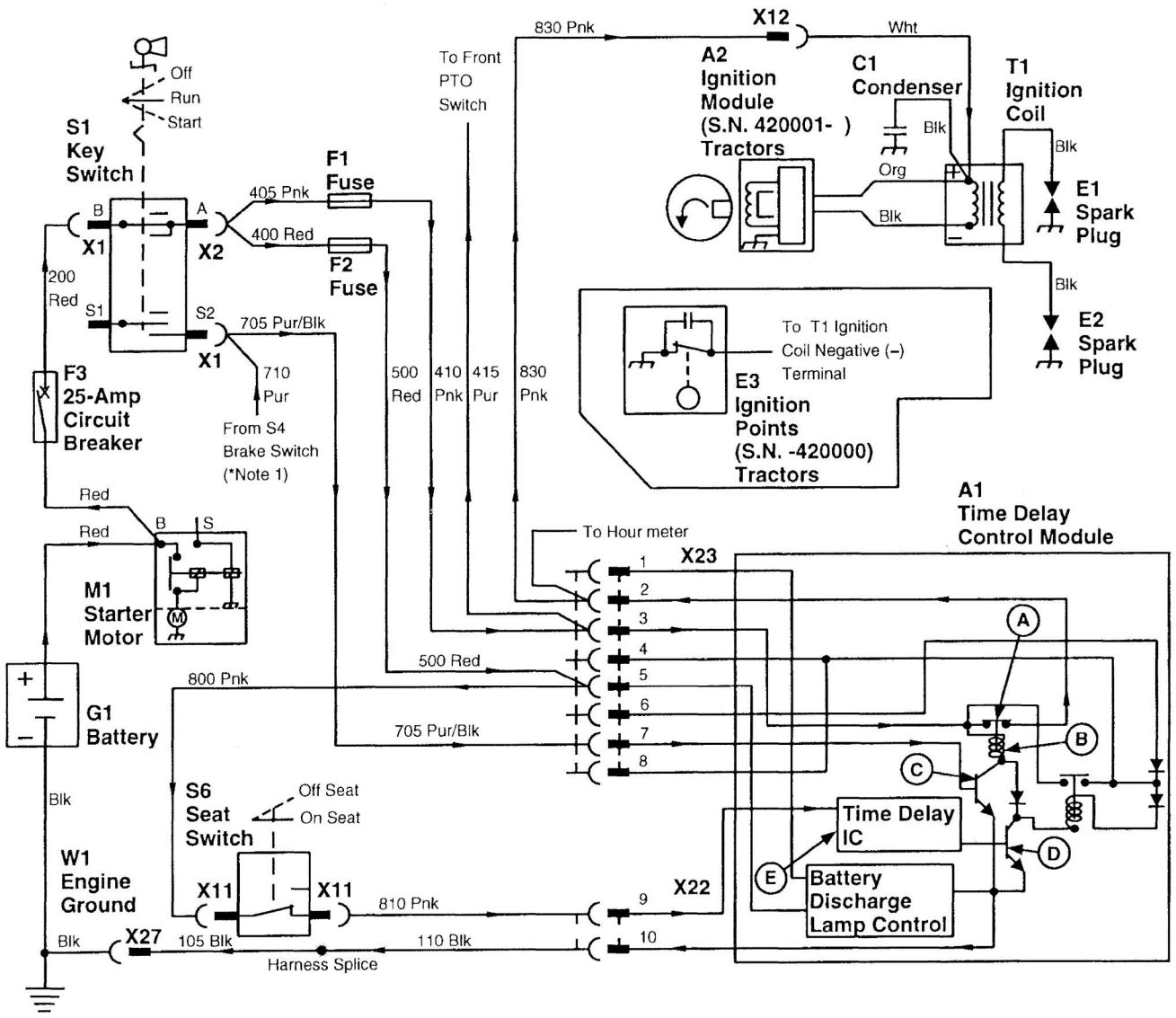

A—TDC Ignition Relay Contacts
B—TDC Ignition Relay Coil
C—Switch Transistor
D—Time Delay Switch Transistor
E—Time Delay IC (Internal Circuit)
A1—Time Delay Control (TDC) Module
A2—Ignition Module (S.N. 420001—)
C1—Condenser (S.N. 420001—)
E1—Spark Plug
E2—Spark Plug
E3—Ignition Points (S.N. —420000)
F1—20 Amp Fuse
F2—2 Amp Fuse (Early Machines)
3 Amp Fuse (Later Machines)
F3—25 Amp Circuit Breaker
G1—Battery
M1—Starter Motor
S1—Key Switch
S6—Seat Switch
T1—Ignition Coil
W1—Engine Ground
X1—Key Switch 5-Pin Connector
X2—Key Switch 1-Pin Connector
X11—Seat Switch 2-Pin Connector
X12—Engine Harness 3-Pin Connector
X22—TDC Module 2-Pin Connector
X23—TDC Module 8-Pin Connector
X27—Single Point Ground 1-Pin Connector:
316 (S.N. 596121—)
318 (S.N. 600305—)
420 (S.N. 595881—)

NOTE: 1. For machines 316 (S.N. —596120), 318 (S.N. —600304) and 420 (S.N. —595880), brake switch (S4) is not used. Interlock current flow to transistor (C) comes from transmission neutral start switch (S5).

NOTE: 2. The illustration shows ground circuit for machines (S.N. 475001—). For machines (S.N. —475000), the blk wire from the TDC module 2-pin connector terminates (grounds) at the right pedestal panel.

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