Ignition Battery Management Module

Revisited

BY ROBERT L. NUCKOLLS III

*The January 1994 issue of **SPORT AVIATION** carried an article wherein I proposed an Ignition Battery Management Module (I suggest you review that article for background). The purpose of the IBMM was to address reliability concerns for complete electronic replacement of aircraft magnetos. I received few responses but there were some very good ones. Based upon conversation with readers of **SPORT AVIATION**, the original concept has been simplified. It's easy to implement and yields a great Failure Mode Effects Analysis. I submit the following as another example of how EAA members, **SPORT AVIATION** and communication work together to advance an idea into a practical solution*

Figure 1 illustrates a preferred architecture for dual electronic ignition systems power management on aircraft engines. This design meets several important design goals: (1) connection of an auxiliary battery to the main bus is accomplished through hard contacts—no voltage drop and no heat sink; (2) ignition system power switches take "always hot" feeds directly from batteries—ignition systems operations are independent of all other electrical systems conditions; (3) there is immediate, automatic disconnect of the AUX battery from MAIN bus when bus voltage drops below 13.0 volts; (4) a warning light announces response to alternator failure and (5) the system is fully testable inflight and during pre-flight.

Ignition system switches have been rewired slightly from those shown in

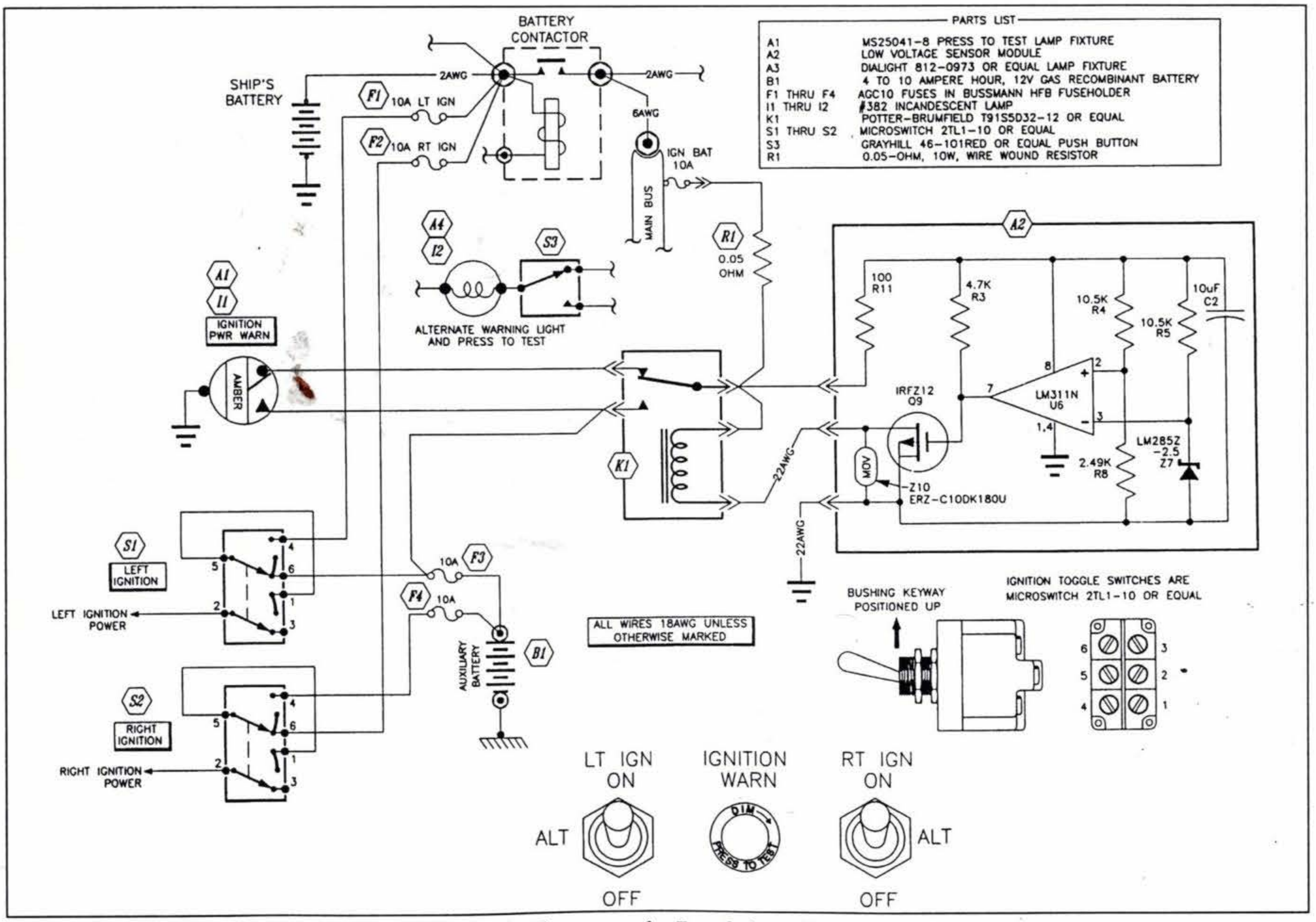

Figure 1 Dual Electronic Ignition Power System

the earlier article: When both switches are fully up (ON), the RIGHT system runs from the AUX battery; the LEFT system from the MAIN bus. Of course, while the alternator is working, relay K1 is closed, therefore, in reality BOTH systems are powered from the MAIN bus. The ALTernate position of each switch permits powering either ignition from its alternate power source.

If the main bus drops below 13.0 volts for any reason, relay K1 will open and disconnect the RIGHT ignition and AUX battery from the MAIN bus. The IGN PWR WARN light will illuminate.

PRE-FLIGHT TEST

1. IGN POWER WARN—Press to Test. *This tests alternate path for left ignition and shows AUX battery has some charge.*
2. BATTERY MASTER—ON. *Observe IGN POWER WARN indicator illuminates. This shows that relay K1 is de-energized.*
3. RIGHT IGNITION—ON. *The right ignition system is used to start the engine using a battery that is not loaded down with starter drain.*
4. ENGINE—Start.
5. ALTERNATOR FIELD—ON. *Observe IGN PWR WARN indicator goes out.*
6. LEFT IGNITION—ON. RIGHT IGNITION—ON. *Observe engine operates on left ignition.*
7. RIGHT IGNITION—ON.

Continue remainder of preflight check list.

IN-FLIGHT TESTS

ALTERNATOR FIELD—OFF. *Switch may be turned OFF in flight at any time. Within 30 seconds, relay K1 should drop out and illuminate the IGNITION PWR WARN light.*

ALTERNATOR FIELD—ON. *Observe IGNITION PWR WARN lamp goes out.*

The information in Figure 1 is sufficient for anyone with rudimentary skills in electronics to assemble the low voltage sensing module. My sincere thanks to those who contributed to the evolution of this concept. Let me know if you have an interest in purchasing the low voltage sensor module assembled and tested. Given sufficient interest, I'll develop a qualified source for assembled units.

Written coverage plus real-time consulting services by the author on this and other electrical systems topics are available from the AeroElectric Connection, 6936 Bainbridge Rd., Wichita, KS 67226-1008. $42 USD buys all materials in print (13 chapters, lots of illustrations, 5 appendices, 200+ pages) plus one year's subscription to newsletters and the next issue of chapters on specific topics. Overseas subscribers add $20 USD for airmail postage. MasterCard and Visa are accepted. The author may be contacted directly at 316/685-8617 or Compuserve 72770,552. ◆