CHAMPION TECHNICAL BULLETIN

AVIATION DEPARTMENT
CHAMPION SPARK PLUG COMPANY
TOLEDO 1, OHIO

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SPARK PLUG GASKET THERMOCOUPLE - VARIATION IN HEAD TEMPERATURE INDICATION

WHEN SPARK PLUG TYPES ARE CHANGED, THE USE OF INSTALLATION GASKET OR WASHER TYPE THERMOCOUPLES CAN RESULT IN PILOT REPORTS OF CHANGES IN CYLINDER HEAD TEMPERATURE READINGS. SUCH REPORTS COME FROM PLUG DESIGN DIFFERENCES AND MAY OCCUR EVEN WHEN BOTH PLUGS ARE OF THE SAME MAKE.

FOR EXAMPLE, REPLACING THE REM39N WITH THE INCREASINGLY POPULAR FOUL RESISTANT REM40E COULD CAUSE REPORTS OF HIGHER HEAD TEMPERATURES. THE REASONS FOR THIS ARE BEST EXPLAINED BY REFERRING TO CROSS-SECTIO CUTS OF THESE PLUGS.

REM39N

REM40E

CONSTRUCTION DIFFERENCES CREATE DIFFERENT FLOW PATHS FOR THE HEAT, ABSORBED BY THE INSULATOR NOSE, TO PASS THROUGH THE SHELL BODY AND INTO THE CYLINDER HEAD AND FINS.

IN THE REM39N, THE HEAT TRANSFER POINT CLOSEST TO THE INSULATOR NOSE IS THE LOWER CORE SUPPORTING GASKET. THE MOST DIRECT HEAT PATH FROM HERE TO THE CYLINDER HEAD IS THROUGH THE UPPER PLUG INSTALLATION THREADS, AS SHOWN BY THE HEAVY ARROW. ONLY A PARTIAL AMOUNT OF HEAT FOLLOWS THE MORE INDIRECT PATH THROUGH THE INSTALLATION OR THERMOCOUPLE GASKET. THE TEMPERATURE OF THE GASKET WILL THEREFORE BE LOWER THAN THAT OF THE UPPER THREAD AREA.

IN THE REM40E THE HEAT TRANSFER POINT CLOSEST TO THE INSULATOR NOSE IS THE LOWER AREA OF THE CORE RETAINING COPPER SLEEVE. NOTE THAT THIS POINT IS FARTHER ABOVE THE INSTALLATION THREAD AREA THAN IN THE REM39N. THIS RESULTS AS SHOWN BY THE HEAVY ARROW, IN MOST OF THE HEAT BEING TRANSFERRED THROUGH THE INSTALLATION OR THERMOCOUPLE GASKET. A LESSER AMOUNT IS THEN PASSED THROUGH THE INSTALLATION THREADS. THE TEMPERATURE OF THE THERMOCOUPLE GASKE IS NOW GREATER ON THIS PLUG DESIGN EVEN THOUGH THE INSULATOR CORE TEMPERATUF REMAINS THE SAME AS ON THE REM39N. THIS RESULTS IN A HIGHER TEMPERATURE INDICATION ON THE PILOT'S CYLINDER HEAD TEMPERATURE GAUGE.

THE VARIATION BETWEEN AMOUNT OF HEAT TRANSFERRED THROUGH INSTALLATION THREADS AS COMPARED WITH AMOUNT TRANSFERRED THROUGH THE GASKET MAY BE EVEN MORE PRONOUNCED BETWEEN PLUG TYPES OF DIFFERENT MANUFACTURE. THIS MAY ALSO BE MORE NOTICEABLE IN LONG REACH PLUGS WHERE DIFFERENCES IN DESIGN PHILOSOPH COULD HAVE A GREATER EFFECT ON CONSTRUCTION DETAILS.

KEEP IN MIND THEN THAT WHEN ONE APPROVED PLUG IS SUBSTITUTED FOR ANOTHE (SAME HEAT RANGE ALSO) AND ALL OTHER FACTORS REMAIN THE SAME, THE SPARK PLUG CHANGE DOES NOT CAUSE A CHANGE IN CYLINDER HEAD OPERATING TEMPERATURE.

ENGINE MANUFACTURERS HAVE LONG RECOGNIZED THIS TEMPERATURE INDICATING DISCREPANCY VARIABLE AND WHERE PRECISE ACCURATE HEAD TEMPERATURE INDICATION IS REQUIRED, HAVE DESIGNED THEIR CYLINDER TO ACCEPT THE STANDARD "AN" IMBEDDED, BAYONET TYPE THERMOCOUPLE. THIS THERMOCOUPLE LOCATION GIVES A TRUER CYLINDER HEAD TEMPERATURE INDICATION AND, BEING REMOTED AWAY FROM THE SPARK PLUG, IS NOT AFFECTED BY DIFFERENCES IN SPARK PLUG DESIGNS.

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