Gathering of the Green
2002 Winter Convention

March 8, 2002
Moline, IL

Spark Plugs used on
John Deere Tractors

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Knoxville, TN
Outline of Talk

• History of Spark Plug Development
• Technical Points about Plugs
• OE Plug Suppliers to John Deere
  – Identification and brief history
• Summary of Plugs Used by Model and Year
  – Came in tractors from the factory
  – Waterloo Boy to end of 30 Series in 1960
• Recommended Plugs for Special Situations
• Proper Spark Plug Usage
• Modern Plug Equivalents
• Summary
History of Spark Plug Development

• Lenoir, working in Paris, developed first production internal combustion engine in 1860
  – Used a “sparking device”

  – Patented “Sparking Plug” in 1860
History of Spark Plug Development, continued

- Early Spark Plugs were often bolted on

![Daimler Spark Plug Diagram]

- Terminals
- Metal casing
- Two wire electrodes in insulating matrix
History of Spark Plug Development, continued

• Much early plug development in Europe
  – Count De Dion standardized on 18mm
  – Plugs imported regularly to USA

• Association of Licensed Automobile Manufacturers (ALAM) adopted 7/8”-18 thread as standard in 1908

• Henry Ford disliked metric, was in disagreement with ALAM, selected 1/2” pipe thread for Model T in 1908

• Hence, three plug thread types from the get-go
Examples of spark plug types available in 1902
History of Spark Plug Development, continued

• Many innovations(?) from 1900-40
  – Double-ended plugs  *Twin, Hire Fire, Dubl Servis*
  – Primer plugs  *Champion, Red Head, Mosler*
  – Coil plugs  *Perfex, Primary, Orswell*
  – Self-Cleaning  *Turn Clean, Myers, Fouless, Fan Flame*
  – Breather Plugs  *LeVac Northwind, Shurnuff*
  – Detachable Plugs  *EverClean, Breech Block*
  – Double Plug  *Bosch, Edison, Twin Tact*
  – Visible Spark  *Viz Spark, Window*
  – Model T Plugs  *For A Ford, Long Henry, Henrys’*
  – Radioactive Plugs  *Firestone Polonium*
History of Spark Plug Development, continued

- Spark Plug Collectors of America collect plugs
  - Over 5000 different plugs on Master List
  - Meetings at Portland and Hershey shows
  - “The Ignitor” quarterly publication
• We will look at
  – Construction of spark plugs
    • Base and hex sizes
    • Insulators
  – Two-piece “take-aparts”
  – “Reach” and “skirt” of a plug
  – Ground electrode designs
  – Heat Range
    • Definition
    • Illustrations
    • Tables
    • Application
  – Miscellaneous comments
Components of a Spark Plug

- Insulator (Porcelain)
- Center Electrode
- Shell
- Ribs
- Hex
- Gap
- Reach
One Piece Plug

Two Piece ‘Take Apart’ Plug

Bushing
TYPICAL TWO-PIECE CONSTRUCTION

- BUSHING
- SILLMENT SEAL
- UPPER INSIDE GASKET
- SHELL
- LOWER INSIDE GASKET
Reach = Thread Length + Skirt
<table>
<thead>
<tr>
<th>Plug Type</th>
<th>Thread Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Com.</td>
<td>7/8&quot;-18</td>
</tr>
<tr>
<td>2 Com.L</td>
<td>7/8&quot;-18</td>
</tr>
</tbody>
</table>

LONG REACH
Types of Electrodes

H10
1Com
8Com

2ComL
33

C4

Racing Plugs
“Heat Range” : classification of plugs according to ability to transfer heat

- Cold plug: transfers heat rapidly – use in Heavy Service applications
- Hot plug: transfers heat slowly – use in Light Service applications
- Heat range determined primarily by distance between insulator tip and (1) gasket where it meets shell, and (2) the shell itself
• Cold plugs on left, Hot plugs on right

• For a Hot plug, heat generated at tip of plug has to travel farther to reach water-cooled shell
Terminology, continued (Heat Range)

- Heat Range is **KEY** to selection of proper plug for satisfying tractor operation!!!
- Most plugs removed from John Deere tractors are oily or sooty. This a clear sign of too COLD a plug.
- For most operation of antique tractors, the hottest plug which can be used should be tried (ensuring it does not interfere with mechanical operation of motor)
- Signs of too hot a plug are pre-ignition (ignition of fuel-air mixture from hot plug tip, not spark), and a white, burned tip upon inspection
Terminology, continued (Heat Range)

- Application charts, and John Deere tractors from the factory, all assume “Normal Service”, which may not be correct for our purposes

- John Deere was slow to provide recommendations for hotter plugs – first recognition FSB 144 (April, 1943)
  - Note: C-H below should be C-4

<table>
<thead>
<tr>
<th>Size</th>
<th>Make</th>
<th>Part No.</th>
<th>Regular Hot Plug</th>
<th>Very Hot</th>
<th>Extremely Hot</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/8&quot;</td>
<td>Edison</td>
<td>AA2044R</td>
<td>(X-46)</td>
<td>33*</td>
<td>32*</td>
</tr>
<tr>
<td>7/8&quot;</td>
<td>Champion</td>
<td>AC600R</td>
<td>(No. 2 Commercial L)</td>
<td>C-H*</td>
<td>No. 3 Commercial*</td>
</tr>
<tr>
<td>18 M.M.</td>
<td>Edison</td>
<td>AH702R</td>
<td>(Z-19)</td>
<td>43*</td>
<td>42T</td>
</tr>
<tr>
<td>18 M.M.</td>
<td>Champion</td>
<td>AH803R</td>
<td>(No. 8 Commercial C)</td>
<td>C-7*</td>
<td>No. 9 Commercial*</td>
</tr>
</tbody>
</table>

(*Purchase locally from a supply house)
Terminology, continued (Heat Range)

• FSB 156 (October 1946) assigned John Deere part numbers to hotter plugs

• Introduction of gasoline engines for Models A and B in 1947 caused headaches – too cold plugs – 6Com - were initially used

• By FSB 165 (November 1949), they had designed a new optional gas manifold and gone to AC 88L-Com plugs as Champion did not make a plug hot enough
• Will hot plugs solve all fouling problems? – Nope!
• Hot plugs will slow down fouling if due to engine
  – Oil fouling
    • Worn cylinders
    • Worn intake valve guides
    • Worn rings
    • Worn pistons
  – Gas fouling
    • Carburetor problems
    • Weak spark
    • Old fuel (or bad new fuel?)
    • Too cold operating temperature
• New, hot plugs will not solve engine problems
• Fouled plugs are only the messenger
Companies providing spark plugs to John Deere, and their histories

• Five companies provided plugs used in production by John Deere to 1960
  – Splitdorf Electrical Company, Newark, NJ
  – AC Spark Plug Division, GM, Flint, MI
  – Champion Spark Plug Company, Toledo, OH
  – Edison-Splitdorf Company, West Orange, NJ
  – Electric Auto-Lite Company, Toledo, OH

• Brief history of each company, and years of service to John Deere
Companies: Splitdorf Electrical Company

- Building spark plugs by 1907
- Bought out by Edison Company in 1932
- Built Dixie and Aero magnetos
- Early spark plugs were unique hexagonal shape, with a mica insulator and green porcelain surface
- Provided plugs to John Deere from 1918 – 1924
Companies: AC Spark Plug Division, General Motors

- William Durant (founder of GM) hired Albert Champion from Champion Spark Plug Company to develop reliable, US made spark plugs for GM
- Albert Champion was a French bicycle racer who set up an importing business for spark plugs, and began building his own
- Champion Ignition Company (CICO) incorporated 10/08
Companies: AC Spark Plug Div., GM, cont.

- Company expanded rapidly as GM added Cadillac and Oakland to Buick and Oldsmobile
- 1922 lawsuit with Champion Spark Plug Company resulted in name change to AC Spark Plug Company (Albert Champion’s initials)
- Company is presently AC-Delco, an affiliate of GM
- Connection with John Deere
  - April 1918 ad – “supplier to Deere Tractors”
  - On and off relationship – supplier 1930-35, then 1949-present
Companies: Champion Spark Plug Company

- Organized by Frank Stranahan (a Boston entrepreneur) prior to 1905
- First business to associate with Albert Champion – hired to develop spark plugs
  - Durant bought out Champion’s interest in Champion Spark Plug, but Stranahan retained Champion name
- Robert Stranahan graduated from Harvard, joined Frank, and made a key development for sealing 2 piece plugs
Companies: Champion, continued

- Stranahan courted John Willys of Willys-Overland – agreed to move to Toledo to supply Willys with plugs
- Won Ford contract for 1911 – off and running!
- Champion Spark Plug Company sold out in 1991, stopped production in Toledo, now owned by Federal-Mogul
- Connection with John Deere
  - Provider of plugs from 1923 – present
Companies: Edison-Splitdorf, subsidiary of T. A. Edison Co.

- Formed 1932 via purchase of Splitdorf Electrical
- Developed and sold Edison-Splitdorf CD and RM magnetos to John Deere starting 1936
- Supplier of spark plugs to John Deere starting July 1938
- November 1947 Edison acquired assets of Edison-Splitdorf, plugs now carry only Edison name
Companies: Edison-Splitdorf, continued

- May 1949 Wico purchased Edison magneto line
- December 1950 Edison stopped making spark plugs
- Edison Company bought by McGraw Electric in 1957
- John Deere bought plugs from Edison (-Splitdorf) from 1938 – 1950
- Appears they were not primary supplier – hard to find NOS plugs
Companies: Electric Auto-Lite Company

- Formed 1936 to provide plugs to Chrysler
- Late, but successful entry into spark plug business
- Presently owned by Honeywell International
  - Excellent history available on www
- John Deere began using plugs in Dubuque-built tractors by 1952
- Alternate supplier to Waterloo Tractor Works by 1955
- Produced plugs under Prest-O-Lite name and Motorcraft name
Summary of Plugs used during Production

- What plugs were in tractors when they rolled off the line?
  - Information presented by years for the following models and groups of models:
    - Waterloo Boy
    - D
    - C and GP
    - A
    - B
    - L series
    - G
    - H
    - M series
    - 50-70 series
    - 20 and 30 series
    - Pony motors
Summary of Production Plugs, continued

• Documentation sources include:
  – Decision records
  – Field Service Bulletins
  – Parts Books covering years of production
  – Branch House Service Bulletins
  – Spark Plug company catalogs and application charts
  – Early Farm Implement News magazine articles
  – Magazine ads
  – SPCOA “Ignitor” magazine and members
  – J. R. Hobbs books provided (most) beginning and ending production dates
  – Generous sharing of information by several speakers at this conference
Summary of Production Plugs, continued

• Cases where dates cannot be pinned down are noted in ITALICS
• Information is my “best” at present, but new information continues to turn up – if you have any I would appreciate your sharing it with me
Plugs: Waterloo Boy

• Production began 8/14 (R) and ended 10/24 (N)

• Early information sketchy
  – Reprints of Instruction/Parts List No.3 (R), and No. 5 (8/1/17) (R) do not list spark plugs
  – Parts List No. 7 (4/1/20) provides p/n 410R and picture characteristic of Splitdorf plug
  – Splitdorf ad from 1918 wholesaler’s catalog lists Splitdorf P141 plug for Waterloo Boy

• Based on years of experience, Ken Kass believes that Splitdorf plugs were used on Waterloo Boy tractors

• Splitdorf P141 1/2” Extra Long pipe thread
Plugs: Model D

- Production began 6/23 and ended 7/53
- Early
  - Champion 7 1/2” pipe thread 6/23 – 9/29
    - Not to be confused with Champion 7 18mm plug!
- Champion renamed their 7 to 31
  - Champion 31 1/2” pipe thread 9/29 – 11/30
- John Deere changed to a block using 7/8” plug
  - Champion 3X, C4, or AC L-12 11/30 – 7/10/35
- John Deere changed to Champion 2 7/10/35 – 1/37
- Champion introduced Commercial version of 2
  - Champion 2Com 1/37 – 7/25/38
Plugs: Model D, continued

• John Deere added Edison Splitdorf as a plug supplier – already using magnetos
  – Champion 2Com or E-S X-46

• John Deere introduced styled D
  – Champion 2Com or E-S X-46

7/25/38 – 4/39
4/39 – 1/40
• Champion introduced a Long version of 2Com
  – Champion 2ComL (2-Rib) or E-S X-46 1/40 – 12/50

• Champion changed from 2-Rib to 5-Rib plugs in 1950, E-S stopped production 12/50
  – Champion 2ComL (5-Rib) 12/50 – 12/52

• AC replaced E-S as supplier of plugs
  – Champion 2ComL (5-Rib) or AC 77L-Com 12/52 – 7/53
Plugs: Models C and GP


• Production of Model C
  – Champion 7, same p/n as D  

• John Deere production of Model GP - small bore, 1/2” pipe thread plug
  – Champion 7  

• Champion replaced 7 plug with 31 plug
  – Champion 31  

\[8/27 – 4/28\]
\[8/28 – 9/1/29\]
\[9/1/29 – 11/20/29\]
Plugs: Models C and GP, continued

• John Deere changed to Champion G24 plug, replaced by 33
  – Champion G24 (Champion 33) 11/20/29 – 8/30

• John Deere changed to a 7/8” plug with introduction of big-bore GP
  – AC L-12 12/30 – 3/35

• John Deere added Champion 3X and C4 plugs
  – Champion 3X, C4 and AC L-12 3/8/32 – 3/35
Plugs: Model A

- Production began 3/34 and ended 5/52
- Production of Model A begins
  - Champion 3X or C4, or AC L-12 3/34 – 7/10/35
- John Deere changed to a Champion 2
  - Champion 2 7/10/35 – 1/37
- Champion introduced commercial version of 2
  - Champion 2Com 1/37-7/25/38
- John Deere added Edison-Splitdorf as a supplier
  - Champion 2Com or E-S X-46 7/25/38 – 9/39
- John Deere changed block to use 18mm plug
  - Champion 8ComC or E-S Z-19 9/39 – 2/47
Plugs: Model A, continued

• John Deere introduces gasoline engine in addition to all-fuel engine
  – Champion 8ComC or E-S Z-19  
    3/47 – 12/50 All-Fuel
  – Champion 8ComC  
    12/50 – 5/52 All-Fuel
  – Champion 6Com or E-S Z-142  
    3/47 – 1948 (est) Gasoline
  – Champion 8Com or E-S Z-142  
    1948 (est) – 2/50 Gasoline
  – AC 88L-Com or E-S Z-142  
    2/50 – 12/50 Gasoline
  – AC 88L-Com  
    12/50 – 5/52 Gasoline

• AR - AO production continued until 5/53
  – Champion 8ComC  
    12/50 – 5/53 All-Fuel
  – Champion introduces 10Com-64 hot plug
  – AC 88L-Com or Champion 10Com-64  
    12/52 – 5/53 Gasoline
Plugs: Model B

• Production began 9/34 and ended 6/52
• Production of Model B begins
  – Champion 3X or C4, or AC L-12 9/34 – 7/10/35
• John Deere changed to a Champion 2
  – Champion 2 7/10/35 – 1/37
• Champion introduced a commercial version of 2
  – Champion 2Com 1/37 – 7/25/38
• John Deere added Edison-Splitdorf as a supplier
  – Champion 2Com or Edison-Splitdorf X-46 7/25/38 – 1/40
• Champion introduces a Long version of 2Com plug
  – Champion 2ComL or E-S X-46 1/40 – 8/40
Plugs: Model B, continued

- John Deere changes to an 18mm plug
  - Champion 8ComC or E-S Z-19 9/40 – 1/47

- John Deere introduces gasoline engine in addition to all-fuel engine
  - Champion 8ComC or E-S Z-19 2/47 – 12/50 All-Fuel
  - Champion 8ComC 12/50 – 6/52 All-Fuel
  - Champion 6Com or E-S Z-142 2/47 – 1948 (est) Gasoline
  - Champion 8Com or E-S Z-142 1948 (est) – 5/50 Gasoline
  - AC 88L-Com 5/50 – 6/52 Gasoline
Plugs: Models 62, L, and LA

- Production began 3/37 and ended 7/47
- First tractor produced by John Deere to burn only gasoline – initially used 7/8 – 18 thread
- Production of the 62
  - Champion 1Com 3/37 – 7/37
- Production of the Unstyled L
  - Champion 1Com 9/37 – 4/38
- Production of styled L with Hercules engine
  - Champion 1Com 8/38 – 8/41
- Production of styled L with John Deere engine – change to 14mm plug
  - Champion H10 7/41 – 7/46
- Production of the LA (John Deere engine)
  - Champion H10 8/41 – 8/46
• There is a problem pinning down the AL2785T part number in terms of a plug manufacturer’s number.

• I suspect it corresponds to a Champion H10, but the number is gone by 2/51, when it is replaced by AM514T, the H10 number for the Dubuque series.

• Why did not the L and LA with John Deere engines retain their number, and why did they utilize the M series part number?
Plugs: Model G

• Production began 5/37 and ended 1/53
  • Production of the unstyled G
    – Champion 2Com 5/37 – 7/25/38
  • John Deere added Edison Splitdorf as a supplier
    – Champion 2Com or Edison Splitdorf X-46 7/25/38 – 1/40
• Champion introduced commercial version of 2
  – Champion 2ComL or E-S X-46 1/40 – 2/42
• John Deere began producing GM and changed to 18mm plugs
  – Champion 8ComC or E-S Z-19 2/42 – 3/47
Plugs: Model G, continued

• John Deere introduced the new G, retained all-fuel engine
  – Champion 8ComC or E-S Z-19  
    3/47 – 12/50

• Edison-Splitdorf stopped producing plugs in 12/50
  – Champion 8ComC  
    12/50 – 1/53

• John Deere did introduce the AC 86-Com in 12/52 to replace the Edison plugs; however, since production ended in 1/53, it is possible some of the last Gs came with AC 86-Com plugs.
Plugs: Model H

• Production started 1/39 and ended 2/47
• The Model H was the first John Deere to use an 18mm plug, hence the plug part numbers have H in their prefix. The earliest H’s used plugs with part number AH652R, a plug presently unknown. That part number shows up only in the Instruction and Parts List dated 11/38 (prior to production). It is possible it was a Champion plug.
• Production of the Model H begins. Champion 8ComC is not in 1/1/40 catalog, but is in 1/40 IPL for Model A
  – Edison-Splitdorf Z-19 1/39 – 1/40
• Champion introduces 8ComC
  – Champion 8ComC or E-S Z-19 1/40 – 2/47
• Champion 8ComC Plug
  – **NOT** to be confused with more easily found 8Com
    • 8ComC is 2-piece plug, 8Com not
  – Has fully glazed insulator nose
    • Retards adherence of combustion products
    • Designed for kerosene, distillate, non-leaded fuels
    • Glaze susceptible to attack by lead oxides
  – Used chiefly in John Deere tractors
Plugs: Model M Series

• Production began 3/47 and ended 9/52

• Early
  – Champion H-10  3/47 – Mid-1951 Gasoline

• Production of all-fuel version starts between 3/50 and 1/52
  – Champion J-14  Mid-1951 – 9/52 All-Fuel
  – Champion H-10  Mid-1951 – 9/52 Gasoline

• AC and AutoLite were not yet suppliers of spark plugs for Dubuque tractors
Plugs: Model 40 Series

- Production began 10/52 and ended 10/55
- AC and AutoLite (A-L) were both suppliers by 5/1/53
  - Champion H10, AC45L, or A-L A(N)7
  - Champion J14 4/53 – 10/55 All-Fuel
  - 10/52 – 10/55 Gasoline
Plugs: Model 50

- Produced from 7/52 (LP 1/55) to 5/56
  - Champion 8ComC: 7/52 – 2/54 (est) All-Fuel
  - Champion 8Com: 2/54 (est) – 5/56 All-Fuel
  - AC 86-Com: 7/52 – 5/56 All-Fuel
  - AutoLite BD9 (?): 9/54 – 5/56 All-Fuel
  - AutoLite BT-8(J): 1/56 – 5/56 All-Fuel
  - Champion 8Com, AC 86Com: 7/52 – 5/56 Gasoline
  - AutoLite BT-8: 1/56 – 5/56 Gasoline
  - Champion 6Com, AC 85Com, A-L BT-4: 1/55 – 5/56 LP
Plugs: Model 60

- Produced from 3/52 (LP 9/53) to 11/56
  - Champion 8ComC 3/52 – 2/54 (est) All-Fuel
  - Champion 8Com 2/54 (est) – 11/56 All-Fuel
  - AC 86-Com 3/52 – 11/56 All-Fuel
  - AutoLite BD9 (?) 9/54 – 11/56 All-Fuel
  - AutoLite BT-8(J) 1/56 – 11/56 All-Fuel
  - Champion 8Com, AC 86Com 3/52 – 11/56 Gasoline
  - AutoLite BT-8 1/56 – 11/56 Gasoline
  - Champion 6Com, AC 85Com, A-L BT-4 9/53 – 11/56 LP
Plugs: Model 70

- Produced from 3/53 (LP 8/53) to 6/56
  - Champion 8ComC 3/53 – 2/54 (est) All-Fuel
  - Champion 8Com 2/54 (est) – 6/56 All-Fuel
  - AC 86-Com 3/53 – 6/56 All-Fuel
  - AutoLite BD9 (?) 9/54 – 6/56 All-Fuel
  - AutoLite BT-8(J) 1/56 – 6/56 All-Fuel
  - Champion 8Com, AC 86Com 3/53 – 6/56 Gasoline
  - AutoLite BT-8 1/56 – 6/56 Gasoline
  - Champion 6Com, AC 85Com, A-L BT-4 8/53 – 6/56 LP
Plugs: Model 320 Series

• Production began 6/56 and ended 7/58
  – Champion J14 6/56 – 7/58 All-Fuel
Plugs: Model 420 Series

- Production began 10/55 (LP 8/57) and ended 7/58
  - Champion H10, AC 45L, A-L AL7
  - Champion J14

10/55 – 7/58
Gasoline, LP

10/55 – 7/58 All-Fuel
Plugs: Model 330 Series

- Production began 7/58 and ended 2/60
  - Champion H10, AC 45L, A-L AL7 7/58 – 2/60 Gasoline
  - Champion J14 7/58 – 2/60 All-Fuel
Plugs: Model 430 Series

- Production began 7/58 and ended 2/60
  - Champion H10, AC 45L, A-L AL7 7/58 – 2/60 Gasoline, LP
  - Champion J14 7/58 – 2/60 All-Fuel
Plugs: Models 520-30, 620-30, and 720-30

• All used same plugs! This was easy-
  – Champion 8Com, AC 86Com, A-L BT-8
    All-Fuel and Gasoline
  – Champion 6Com, AC 85Com, A-L BT-4
    LP
Plugs: R Starting Engine

• Production started 1/49 and ended 4/55
  – Champion 6Com or Edison Z142  1/49 – 12/50
  – Champion 6Com  12/50 – 11/54
  – Champion 8Com or AC 86Com  11/54 – 4/55
Plugs: All V4 Starting Engines

- 70D, 80D, 720-30D, 820-30D
  - Champion J8 or AC 45M 10/54 – end of production
Recommended plugs for special situations

• Normal Service
  – Production plugs
  – Application chart information

• Mid-50’s John Deere provided lists of plugs for
  – Heavy Service (plowing, threshing, hot weather, …)
  – Light Service (mostly what we do, cold weather, …)

• FSB-71 (3/37) admonished dealers to sell plugs via part number
  – Fouling plugs due to cheap plugs, improper shutter use
• FSB-144 (4/43) – recognition of classes of use
  – Deere did not provide plugs for heavy and light service
  – “Purchase locally from a supply house”
• FSB-156 (10/46) assigned part numbers to three hot plugs
• Introduction of gasoline engines for A and B resulted in plug trouble
  – Started with Champion 6Com – a cold plug
  – Next came 8Com – a hotter plug
  – Finally went to AC-88L – a plug so hot Champion did not have a comparable one until 12-52 when the Champion 10Com-64 became available
Recommended plugs, continued

• FSB-205 (7/53) includes Table listing Champion and AC plugs for Light, Normal, and Heavy Service

• Updated in FSB-223 (11/54) and FSB-258 (10/57) (in handout)

• Important for our use to get proper heat range plugs

Handouts from the Gathering of the Green workshops are among the information included on the CD available through this web site.
Plug Usage Issues

• Plug Selection
• Cleaning & Installation
• Coil connection with distributor ignition
• Plug wires / Spark intensifiers
Issues: Plug Selection

• Decide if you want to use a NOS plug or a “modern” plug
  – NOS
    • NOS plugs are available for most applications
    • Handout lists several NOS plug suppliers
    • Prices are higher, plugs may have surface rust
    • Old NOS plugs were designed for tractor use
    • NOS AC, Auto-Lite and Champion plugs around
    • Edison-Splitdorf harder to find
  – Modern
    • AC, Autolite, Champion, Motorcraft, Bosch, NGK, Denso are primary present suppliers
    • Champion Master Catalogs are wealth of info
      – List many old plugs, conversions, heat range

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Issues: Plug Selection, continued

• Decide on brand of plug you want to use
  – AC, Autolite most in favor on Bulletin Boards
  – Champion less favored but has its supporters

• Use a heat range chart to locate the original equipment plug
  – Handout includes old chart
  – Spark plug catalogs have charts or tables

Handouts from the Gathering of the Green workshops are among the information included on the CD available through this web site.
Issues: Plug Selection, continued

- **Decide on Service**
  - **Heavy** – plowing, threshing in hot weather
    - Cold plug
  - **Normal** – what John Deere originally assumed
    - Mid-range plug
  - **Light** – parading, idling, light use, winter weather
    - Hot plug

- **Using heat range chart, identify number of desired plug**

- **NAPA carries AC, Autolite, Bosch, Champion, NGK**
Issues: Cleaning and Installation

- Study porcelain – if glazed try not to use abrasive cleaner
- Take-Apart plugs
  - Take plug apart – do not squeeze bushing in vice
  - Make sure internal gaskets are out – don’t loose them
  - Soak in carburetor cleaner
  - Try to clean porcelain without use of abrasive blasting
  - Clean interior of shell and bushing as required
  - Assemble with gaskets in place
  - Tighten (about 30 ft-lbs)
  - Install new crush gasket
  - File end of conductor flat
  - File ground flat (if not a wire)
  - Set gap at 0.030 (if good mag 0.050 improves idle)
Issues: Cleaning and Installation, continued

• One-piece plugs
  – Spray carburetor cleaner up around insulator
  – Try to get insulator clean and white
    • Hardest with hot plug
  – File end of conductor flat
  – File ground flat (if not a wire)
  – Set gap

• Installation
  – Clean around spark plug hole
  – Make sure new crush washers are on plug
  – Tighten plugs
    • 14mm – 30 ft-lbs 3/4 turn after finger tight
    • 18mm – 34 ft-lbs 1/2 to 3/4 “ “
    • 7/8”-18 - 37 ft-lbs or 1/2 to 3/4 “ “
Issues: Coil connection with distributor ignition

• “Coil polarity” affects efficiency of spark plug
  – Want center electrode of plug to be “-“
  – Easy to make correct – by reversing wires to the coil

• Tests to tell if the coil is connected properly
  – Locate neon-bulb tester, note two electrodes in bulb
    • Connect between plug and ground
    • If electrode connected to plug glows, coil is correct
  – Take a wood “lead” pencil, sharpen end
    • Bring wire close to lead until spark jumps from wire to lead to plug terminal
    • Note flare of sparks – if flare is between pencil and plug, coil connection is correct
• Tests, continued
  – Obtain VOM with meter, 100,000 ohm resistor
    • With engine running connect (-) probe to one end of resistor, other end of resistor to plug terminal
    • Connect (+) probe to plug shell
    • If meter moves upscale, coil connection is correct
Issues: Spark Plug Wires

• Use only copper-core wires
• Graphite-core wires designed to reduce RF interference in automobile electronics
Issues: Spark Plug Intensifiers

- Old concept – sold to “eliminate plug fouling”
- Rentz plug had adjustable gap
- Adds an additional gap in series with plug gap
- Required voltage to fire plug higher
- Champion UD-16/555
Modern Plugs

• **Handout** includes a listing of presently available versions of production plugs, as well as the hottest similar plug
  – Be careful with extended-nose plugs – measure!

• **Present spark plug manufacturers include:**
  – Champion – best catalog, includes tractors
  – AC-Delco – no listing for farm tractors(!)
  – Autolite – includes listing for tractors
  – NGK – includes tractor listing but limited plug options
  – Bosch
  – Denso
  – Stitt – old company, mainly oil-field engines

• **Made in USA, Mexico and ??**

Handouts from the Gathering of the Green workshops are among the information included on the CD available through this web site.
Summary

• History and technical details about plugs

• Suppliers of plugs to John Deere

• Plugs used by model and year in tractor production

• Plugs for special tractor use, and modern plug equivalents

• Proper plug usage

• Handout summarizes details

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