

**Connection diagrams – Electronic Ignition (EI) system (distributor-less)**

**Note:**

- **The following section applies to Hermann engine analyzers, tests and connections for Bear DACE engine analyzers are similar, please refer to instruction manual supplied with the EI (distributor-less) test adapters.**
- When diagnosing starting or warm up complaints, do not check engine at operating temperature, instead proceed according to specific complaint.

Air intake hose at intake air temperature sensor (IAT) .....	Remove, reinstall
Spark plug covering (on top of valve cover) .....	Remove, reinstall
<b>Primary ignition side connections:</b>	
Unplug connector X26/24 <b>from</b> engine harness and install 2 - pole "piggyback" connector <b>from</b> primary adapter cable (055/2) <b>in between</b> connector X26/24 and engine harness .....	Connect, disconnect
Primary adapter cable (055/2) <b>to</b> EI adapter (055) connector T1X .....	Connect, disconnect
Impulse counter scan tool adapter (075) <b>to</b> data link connector (X11/4) .....	Connect, disconnect
Cable from TN connector on EI adapter (055) to X11/4 socket 17 .....	Connect, disconnect (for TN signal)
<b>Secondary ignition side connections: (HFM)</b>	
Trigger clamp (061/1) <b>from</b> engine analyzer <b>to</b> metal handle on EI (distributor-less) adapter (055) .....	Connect, disconnect
Kilovolt clamp connector (061/2) <b>from</b> engine analyzer <b>to</b> EI adapter (055) for kV recognition ( <b>Note:</b> kV clamp must first be removed from connector 061/2) .....	Connect, disconnect
Trigger clamp (061) <b>from</b> EI adapter (055) <b>to</b> no. 1 ignition wire .....	Connect, disconnect
Harness connector <b>from</b> kV clamps (no. 1 and 2) <b>to</b> EI adapter (055) connector (KV 1/2) .....	Connect, disconnect
KV clamps (063/1, 063/2) <b>to</b> secondary ignition wires for cylinders 1, 2 .....	Connect, disconnect
Harness connector <b>from</b> kV clamps (no. 3 and 4) <b>to</b> EI adapter (055) connector (KV 3/4) .....	Connect, disconnect
KV clamps (063/3, 063/4) <b>to</b> secondary ignition wires for cylinders 3, 4 .....	Connect, disconnect
<b>Power supply for distributorless ignition adapter (055)</b>	
Black lead to vehicle ground, red lead to terminal 30 at connector X12/3, yellow lead to terminal 15 at connector X12/3 .....	Connect, disconnect

**Connection diagrams – Electronic Ignition (EI) system (HFM - SFI)**

Diagnostic connector (060) from engine analyzer (030) to 9 pin diagnostic socket on EI (distributor-less) adapter (055) .....	Connect, disconnect
Vehicle information .....	Input
Engine analyzer (030) .....	Set to 4 cyl. (refer to following pages)
EI (distributor-less) adapter (055) .....	Set according to table (refer to following pages)

**Note:**

If the the oscilloscope pattern is upside-down (displays 2 ignition voltage lines at the bottom of the screen) or shows no pattern (with engine running), select a different firing order selection at switch D on the EI (distributor-less) adapter 055 (the base setting is 11; select 12, 13, etc. until correct pattern is displayed)

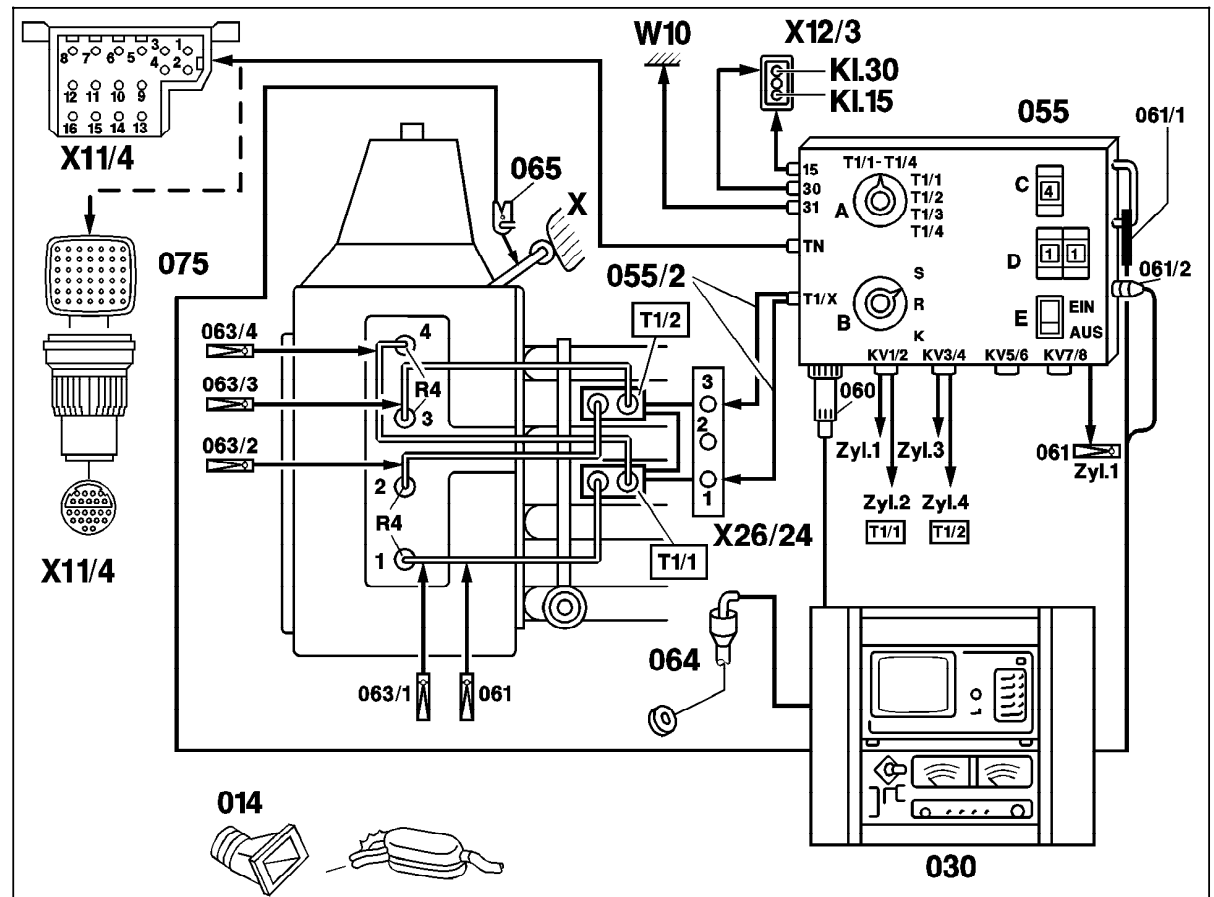
Connect D.C. inductive (pickup) clamp (065) to battery ground cable (model 170) or to ground strap between the transmission and chassis on left side of vehicle (models 202/210) .....	Connect, disconnect
Exhaust vent hose (014) .....	Insert, remove
Engine coolant temperature approx. (80 °C) .....	Engine at operating temperature

Figure 1  
Ignition coils located on intake manifold

- R4 Spark plugs (cylinder nos. 1 through 4)
- T1/1 Ignition coil 1 (cylinder nos. 1 and 4)
- T1/2 Ignition coil 2 (cylinder nos. 2 and 3)
- W10 Battery ground
- X11/4 Data link connector (DTC readout) 16 or 38 pole
- X12/3 Terminal block (circuit 30, 15, 61, 3-pole)
- X26/24 Engine/ignition coil connector (3-pole)
- X Ground wire between transmission and chassis
- 014 Exhaust vent hose
- 030 Engine analyzer with oscilloscope
- 055 EI (distributor-less) adapter (CD1222)
- 055/2 Primary adapter lead (coil terminal 1)
- 060 Diagnostic connector from engine analyzer
- 061 Trigger clamp no. 1 cylinder
- 061/1 Trigger clamp (from engine analyzer)
- 061/2 Kilovolt clamp connector plug (with kV clamp removed)
- 063/1 Kilovolt clamp no. 1 cylinder
- 063/2 Kilovolt clamp no. 2 cylinder
- 063/3 Kilovolt clamp no. 3 cylinder
- 063/4 Kilovolt clamp no. 4 cylinder
- 064 Oil temperature sensor
- 065 D.C. inductive clamp
- 075 Impulse counter scan tool adapter

**Designations on EI (distributor-less) adapter (CD 1222)**

- A Ignition circuit selection switches
- B Diagnostic test selection switches:
  - S Scope pattern
  - R Idle quality
  - K Compression
- C Cylinder selection
- D Firing order selection
- E Scope pattern compensation (EIN = ON, AUS = OFF)



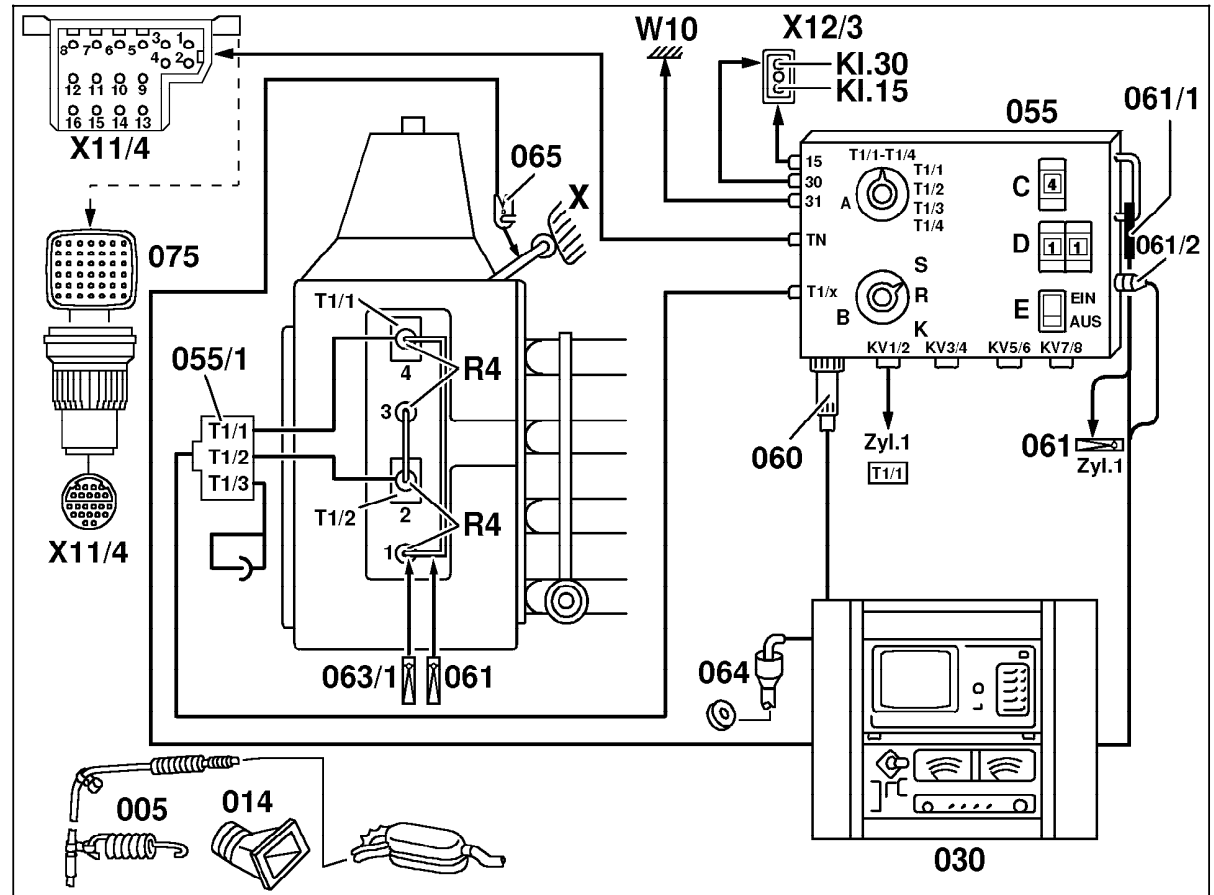
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Figure2  
Ignition coils located on cylinder head

- R4 Spark plugs (cylinder nos. 1 through 4)
- T1/1 Ignition coil 1 (cylinder nos. 1 and 4)
- T1/2 Ignition coil 2 (cylinder nos. 2 and 3)
- W10 Battery ground
- X11/4 Data link connector (DTC readout) 16 or 38 pole
- X12/3 Terminal block (circuit 30, 15, 61, 3-pole)
- X26/24 Engine/ignition coil connector (3-pole)
- X Ground wire between transmission and chassis
- 014 Exhaust vent hose
- 005 Exhaust gas analyzer (not required)
- 030 Engine analyzer with oscilloscope
- 055 EI (distributor-less) adapter (CD1222)
- 055/1 Primary adapter lead (circuits T1/3 combined)
- 060 Diagnostic connector from engine analyzer
- 061 Trigger clamp no. 1 cylinder
- 061/1 Trigger clamp (from engine analyzer)
- 061/2 Kilovolt clamp connector plug (with kV clamp removed)
- 063/1 Kilovolt clamp no. 1 cylinder
- 064 Oil temperature sensor
- 065 D.C. inductive clamp
- 075 Impulse counter scan tool adapter

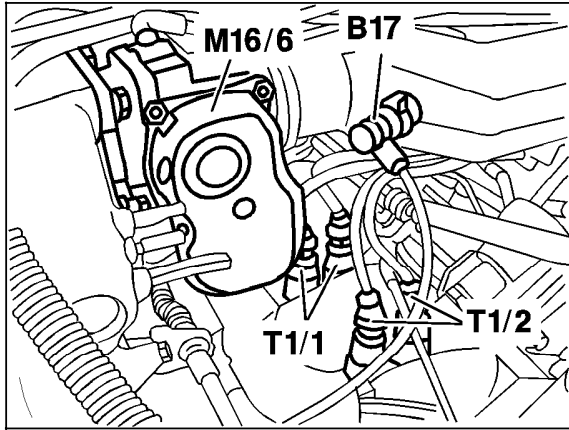
**Designations on EI (distributor-less) adapter (CD 1222)**

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(EIN = ON, AUS = OFF)



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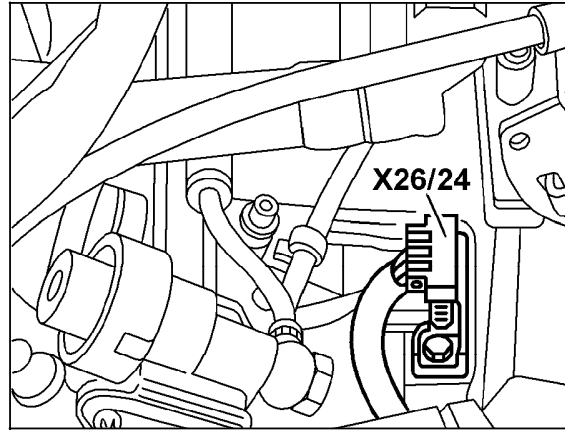
**Component Locations**



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**Figure 3**  
**Model 202**

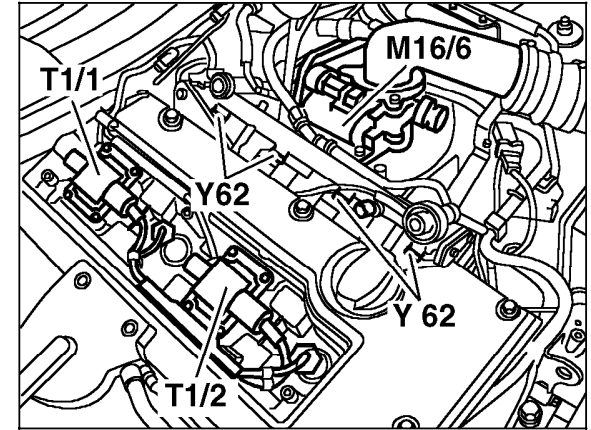
- T1/1 Ignition coil 1, cylinders 1 and 4
- T1/2 Ignition coil 2, cylinders 2 and 3



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**Figure 4**  
**Engine 111 HFM-SFI**

- X26/24 Engine /ignition coils connectors (3-pole)

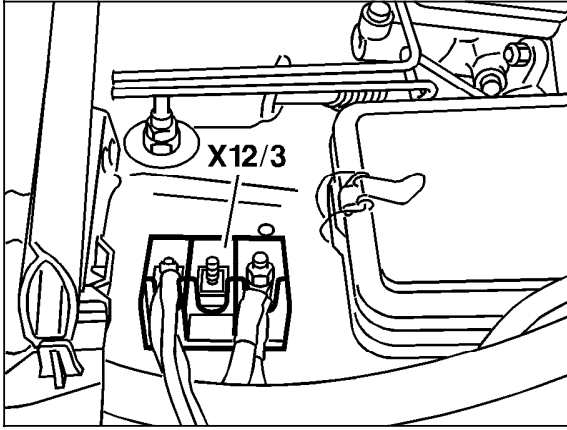


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**Figure 5**  
**Engine 111 ME**

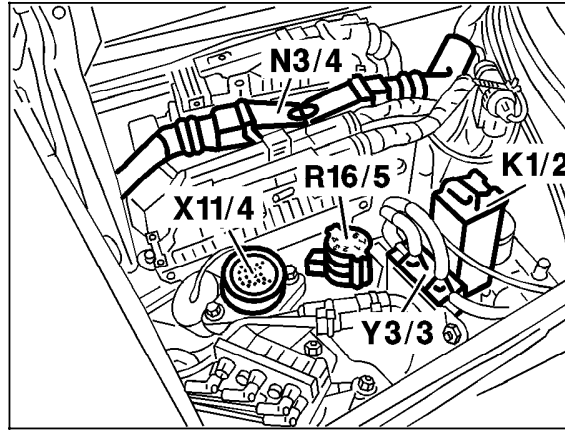
- T1/1 Ignition coil 1, cylinders 1 and 4
- T1/2 Ignition coil 2, cylinders 2 and 3

Component Locations



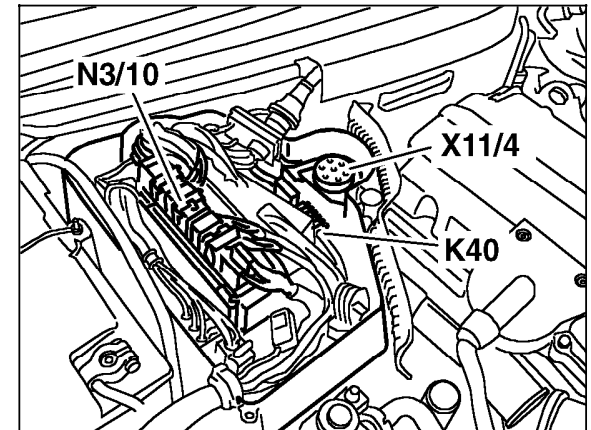
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Figure 6  
Model 202  
X12/3 Terminal block (circuit 30/15 unfused) (3-pole)



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Figure 7  
Model 202  
X11/4 Data link connector (DTC readout)



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Figure 8  
Model 170  
X11/4 Data link connector (DTC readout)

Overview of the Electronic Ignition (EI) system adapter (CD 1222)

**A: IGNITION CIRCUIT SELECTION SWITCH**

**T1/1, T1/2, T1/3, T1/4: Primary and secondary**

Superimposed pattern of the individual circuits

**Primary Circuit:**

**T1/1:** Single circuit display of ignition circuit T1/1, cyl. 1 and 4.

**T1/2:** Single circuit display of ignition circuit T1/2, cyl. 2 and 3.

**T1/3/4:** Not used for engine 111

**B. DIAGNOSTIC TEST SELECTION SWITCH**

**S- Scope pattern:** For scope pattern display of the primary/secondary and single circuit testing.

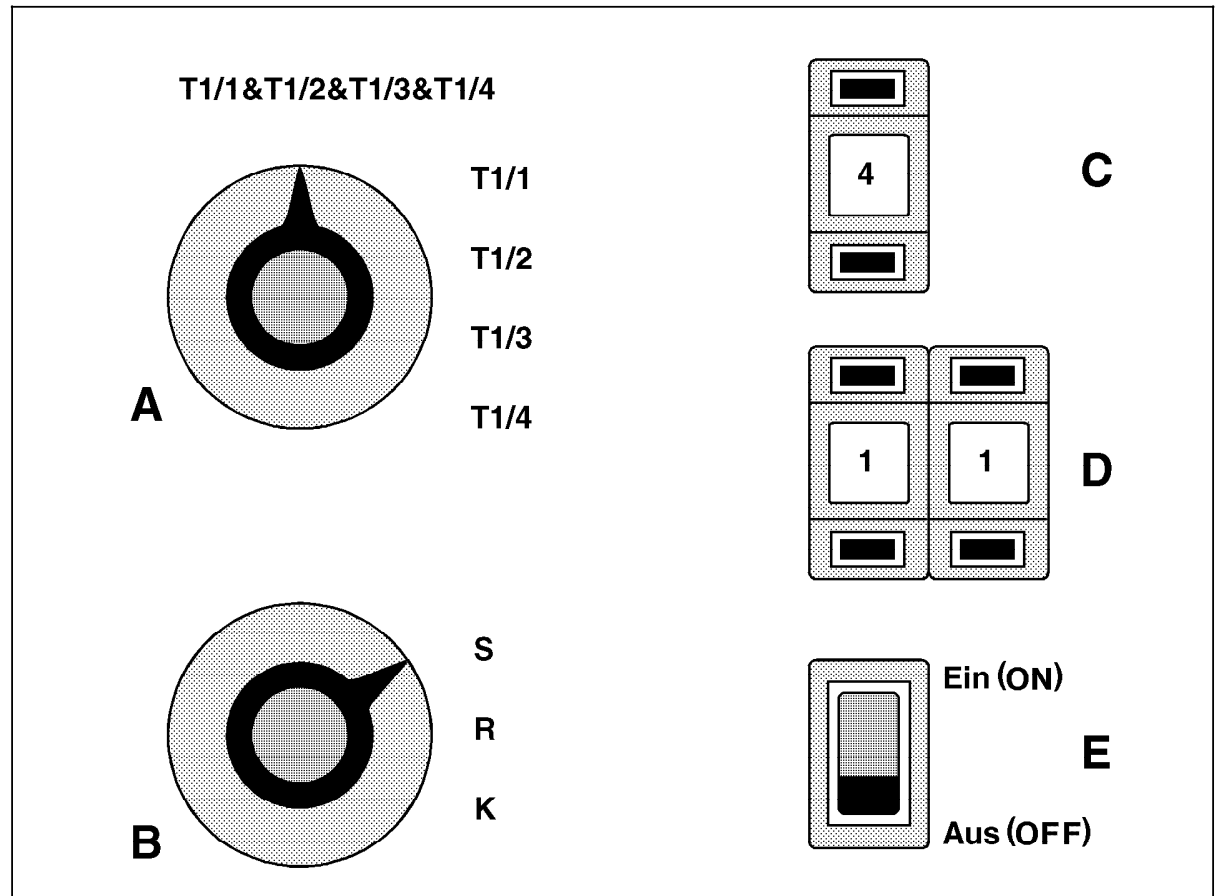
**R- Idle quality:** For idle quality tests

**K- Compression:** For dynamic compression test

**C- Number of cylinders:** Set to number of cylinders in engine being tested.

**D- Firing order:** In the event of an upside down scope pattern (due to one of the two secondary ignition wires being switched at one of the coils) a different firing order must be selected. To select a different firing order, press the button until all of the spark lines are pointing up.

**E- Scope pattern compensation:** Compensation is used for better evaluation of the scope pattern by stabilizing the firing-voltage curve. Without compensation the firing-voltage curve is very unstable jumping above and below the oscilloscope zero line.



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**Operation Settings - Engine Analyzer and EI System  
(distributor-less) Adatpter**

<b>Switch A</b>	<b>Engine Analyzer Input Information</b>	<b>Test</b>
T1/1&T1/2& T1/3&T1/4	4 Cyl	<b>Superimposed display</b> <b>Cyl. 1-3-4-2-:</b> Primary/seconary oscilloscope patterns Idle quality Dymanic compression
T1/1	2 Cyl <b>primary</b>	<b>Single circuit display T1/1</b> <b>Cyl. 1+4</b> <b>Primary</b> oscilloscope pattern only Transistor on (dwell) Transistor off (circuit off) Voltage drop at coil terminal 1 <sup>1)</sup>
T1/2	2 Cyl <b>primary</b>	<b>Single circuit display T1/2</b> <b>Cyl. 2+3</b> <b>Primary</b> oscilloscope pattern only Transistor on (dwell) Transistor off (circuit off) Voltage drop at coil terminal 1 <sup>1)</sup>
T1/3	–	–
T1/4	–	Not used at this time

<sup>1)</sup> Primary ignition switching circuit



<b>Switch B</b>	<b>Engine Analyzer Input Information</b>	<b>Test</b>
<b>S – Scope pattern</b>	4 Cyl	<b>Oscilloscope Display – Ignition</b> Switch "A" select: <ul style="list-style-type: none"> <li>• T1/1&amp;T1/2&amp;T1/3&amp;T1/4</li> </ul>
	2 Cyl <b>primary</b>	<b>Oscilloscope Display – Ignition</b> Switch "A" select: <ul style="list-style-type: none"> <li>• T1/1</li> <li>• T1/2</li> </ul>
<b>R – Idle quality</b>	4 Cyl	<b>Idle Quality</b> Switch "A" select: <ul style="list-style-type: none"> <li>• T1/1&amp;T1/2&amp;T1/3&amp;T1/4</li> </ul>
<b>K – Compression</b>	4 Cyl	<b>Dynamic Compression Test</b> Switch "A" select: <ul style="list-style-type: none"> <li>• T1/1&amp;T1/2&amp;T1/3&amp;T1/4</li> </ul>

## C Diagnostic Equipment

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### Equipment

Hermann Electronics <sup>1)</sup>	Datascope D950 or D960 S
Automotive Diagnostic <sup>1)</sup>	Bear DACE 40-960A
Electronic ignition (EI) System (distributor-less) adapter <sup>1)</sup> Includes: Kilovolt clamp and kilovolt pickup harness with trigger clamp for no. 1 cylinder, TN-adapter harness, primary ignition adapter harness and operating instructions.	Hermann CD 1222 <sup>2)</sup> Bear 43-320 (ref: DACE CD 1222 BA) <sup>2)</sup>
Adatper set ME-SFI 1.0 Includes: Primary adapter cable for one cylinder, primary adapter cable (for DACE) secondary adapter cable, kilovolt (coil) pickup.	Hermann CD 1230 <sup>2)</sup> Bear 43-324 <sup>2)</sup>

<sup>1)</sup> Refer to the MBUSA Standard Equipment Program.

<sup>2)</sup> Equipment supplied with EI (distributor-less) adapter may vary from equipment listed above, refer to MBUSA Standard Equipment Catalog for complete listing.