

**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 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
Ignition coil cover (on top of valve cover) .....	Remove, reinstall
<b>Primary ignition side connections: (HFM/ME)</b>	
3 cables from primary side adapter (055/1) to ignition coils (T1, T2, T3) .....	Connect, disconnect (between primary connections at coil)
Remaining cable from 055/1 to connector T1/X on the EI adapter (055) .....	Connect, disconnect
Impulse counter scan tool adapter (075) (excluding model 124) to data link connector (X11/4) .....	Connect, disconnect
Cable from TN connector on EI adapter (055) to X11/4 (socket 10 for model 124, socket 17 for model 202, socket 13 for models 129/140/210) .....	Connect, disconnect (for TN signal)
<b>Secondary ignition side connections: (HFM)</b>	
Red trigger clamp from engine analyzer to metal handle on adapter (CD1222) and and conector for kV trigger (061/1) .....	Connect, disconnect
Red trigger clamp from adapter (CD1222) to no. 1 ignition wire .....	Connect, disconnect
Harnesses with kV clamps (nos. 1, 3, 5) to adapter (CD1222) .....	Connect, disconnect
kV clamps (063/1, 063/3, 063/5) to secondary ignition wires for cyls. 1, 3, 5 .....	Connect, disconnect
Harnesses with kV clamps (nos. 2, 4, 6) to adapter (CD1222) .....	Install, remove
kV (coil) pickups (063/2, 063/4, 063/6) on top of coils for cyls. 2, 4, 6 .....	Connect, disconnect
<b>Power supply for EI (distributor-less) adapter (055)</b>	
Black lead (sw) to vehicle ground, red lead to terminal 15 (red) of X11/4 .....	Connect, disconnect

- Note:**
- Ensure that the kV (coil) pickup is properly seated on the ignition coil. Improper readings will be displayed if a large air gap exists between the KV pickup and ignition coil.
  - Ensure that the arrow on the inductive kV (coil) pickup points in the direction of the coil output (for May and Christie coils).

**Connection diagrams – Electronic Ignition (EI) System (distributor-less) HFM-SFI**

**Note:**

Due to the differences in the designs of the Bosch and May and Christie ignition coils; different secondary pickups are required.

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) and EI adapter (055) . . . . .	Set to 6 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).

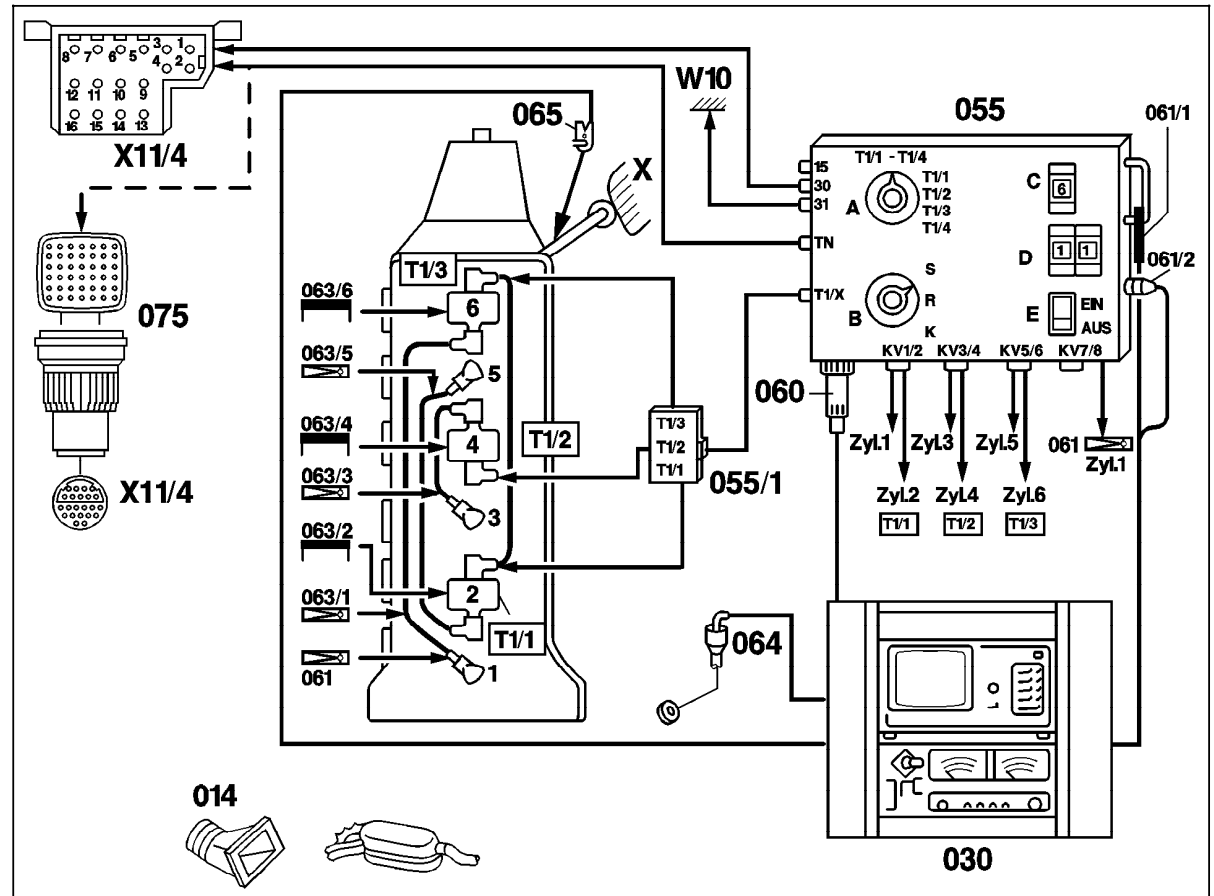
Connect D.C. inductive (pickup) clamp (065) to battery ground cable (model 124) or to ground strap between the transmission and chassis on left side of vehicle (models 129/140/202/210) . . . . .	Connect, disconnect
Exhaust vent hose (014) . . . . .	Insert, remove
Engine coolant temperature approx. (80 °C) . . . . .	Engine at operating temperature

Figure 1

- T1/1 Ignition coil 1 (cylinder no. 2 and 5)
- T1/2 Ignition coil 2 (cylinder no. 3 and 4)
- T1/3 Ignition coil 3 (cylinder no. 1 and 6)
- W10 Battery ground
- X11/4 Data link connector (DTC readout) 16 or 38 pole
- X Ground wire between transmission and chassis
- 014 Exhaust vent hose
- 030 Engine analyzer with oscilloscope
- 055 EI (distributor-less) adapter (CD1222)
- 055/1 Primary ignition adapter
- 060 Diagnostic connector from engine analyzer
- 061 Trigger clamp for 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 (coil) pickup no. 2 cylinder
- 063/3 Kilovolt clamp no. 3 cylinder
- 063/4 Kilovolt (coil) pickup no. 4 cylinder
- 063/5 Kilovolt clamp no. 5 cylinder
- 063/6 Kilovolt (coil) pickup no. 6 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)

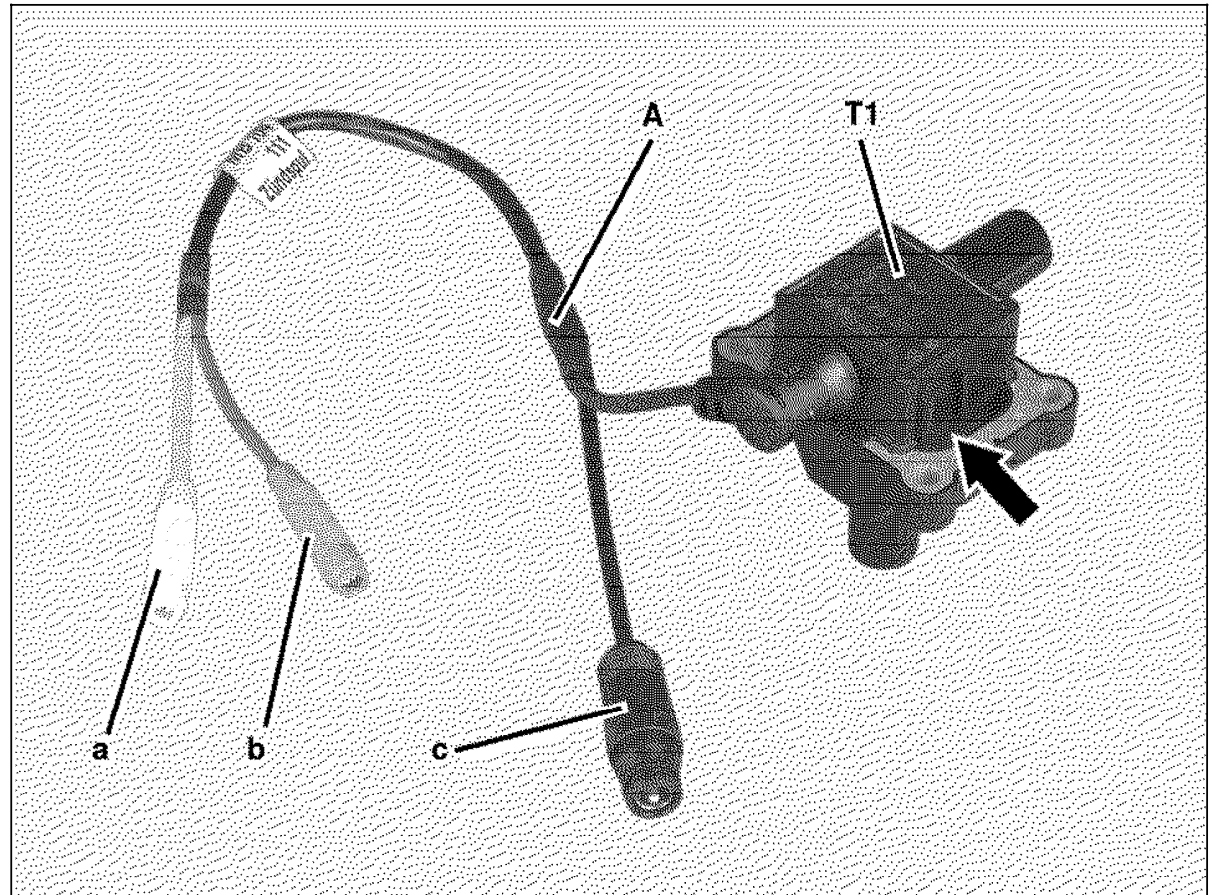


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Figure 2

Primary ignition adapter cable

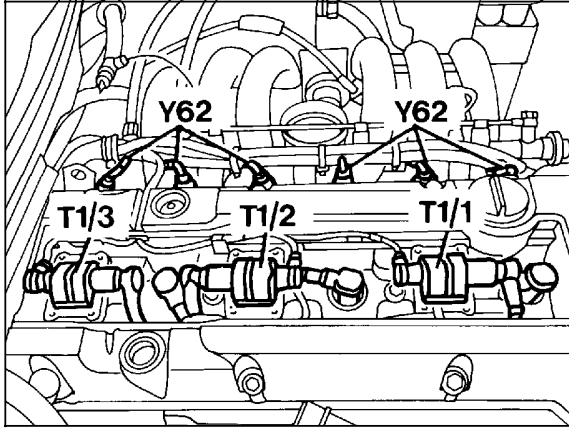
Note:  
The ability to measure secondary ignition voltage is not possible on this coil. Only the primary ignition voltage can be measured using the primary ignition adapter cable A.



- A Primary adapter cable
- T1 Ignition coil:
- a Yellow (female) lead = terminal 15
- b Green (female) lead = terminal 1
- c to ignition harness

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Component Locations

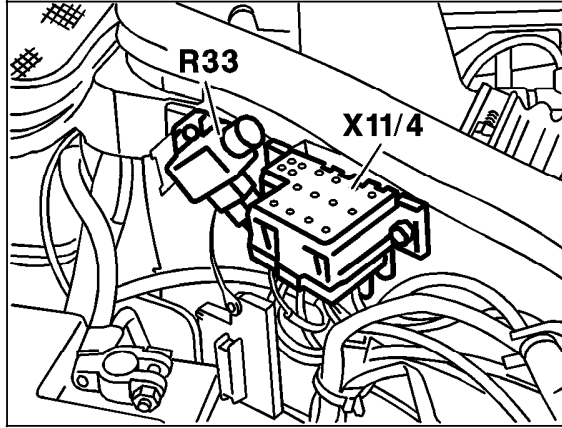


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Figure 3

Model 202

- T1/1 Ignition coil for no. 2 and 5 cylinders
- T1/2 Ignition coil for no. 3 and 4 cylinders
- T1/3 Ignition coil for no. 1 and 6 cylinders

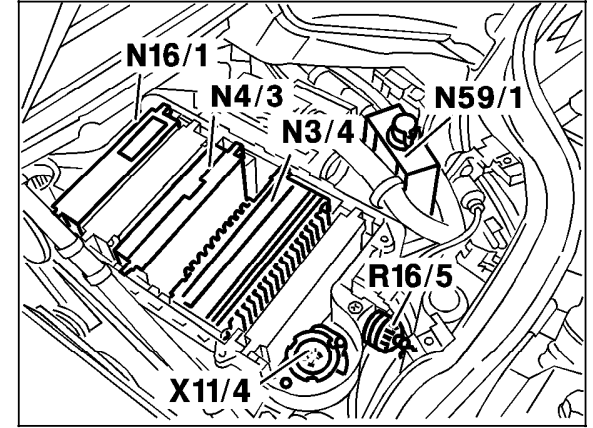


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Figure 4

Model 124

- X11/4 Data link connector (DTC readout)



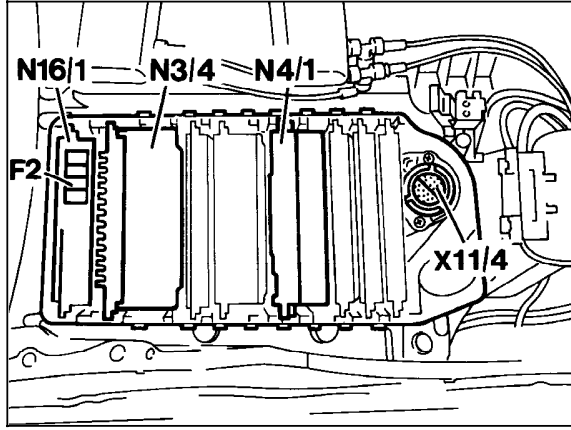
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Figure 5

Model 129 with HFM

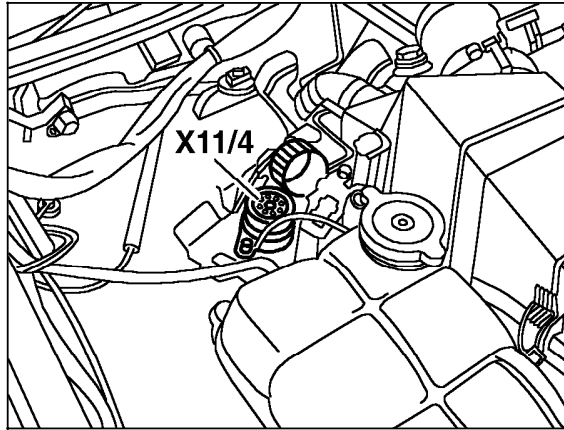
- X11/4 Data link connector (DTC readout)

Component Locations



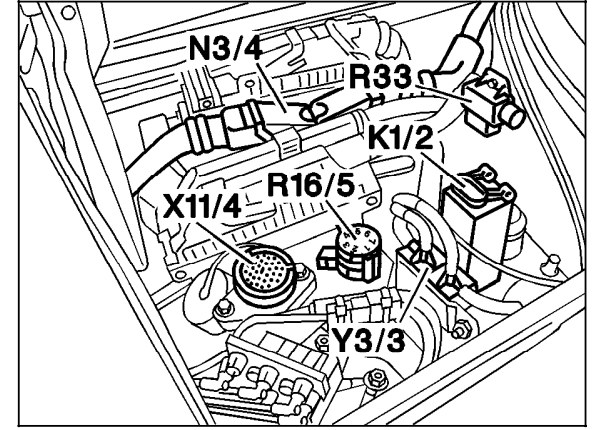
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Figure 6  
Model 140 With HFM  
X11/4 Data link connector (DTC readout)



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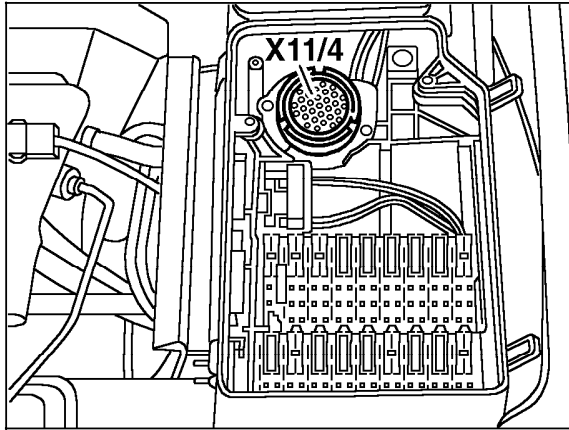
Figure 7  
Model 140 With ME  
X11/4 Data link connector (DTC readout)



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Figure 8  
Model 202  
X11/4 Data link connector (DTC readout)

Component Locations



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Figure 9  
Model 210  
X11/4 Data link connector (DTC readout)

Overview of the Electronic Ignition (EI) System (distributor-less) 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. 2 and 5.

**T1/2:** Single circuit display of ignition circuit T1/2, cyl. 3 and 4.

**T1/3:** Single circuit display of ignition circuit T1/3, cyl. 1 and 6.

**T1/4:** Not used for engine 104

**B. DIAGNOSTIC TEST SELECTION SWITCH**

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

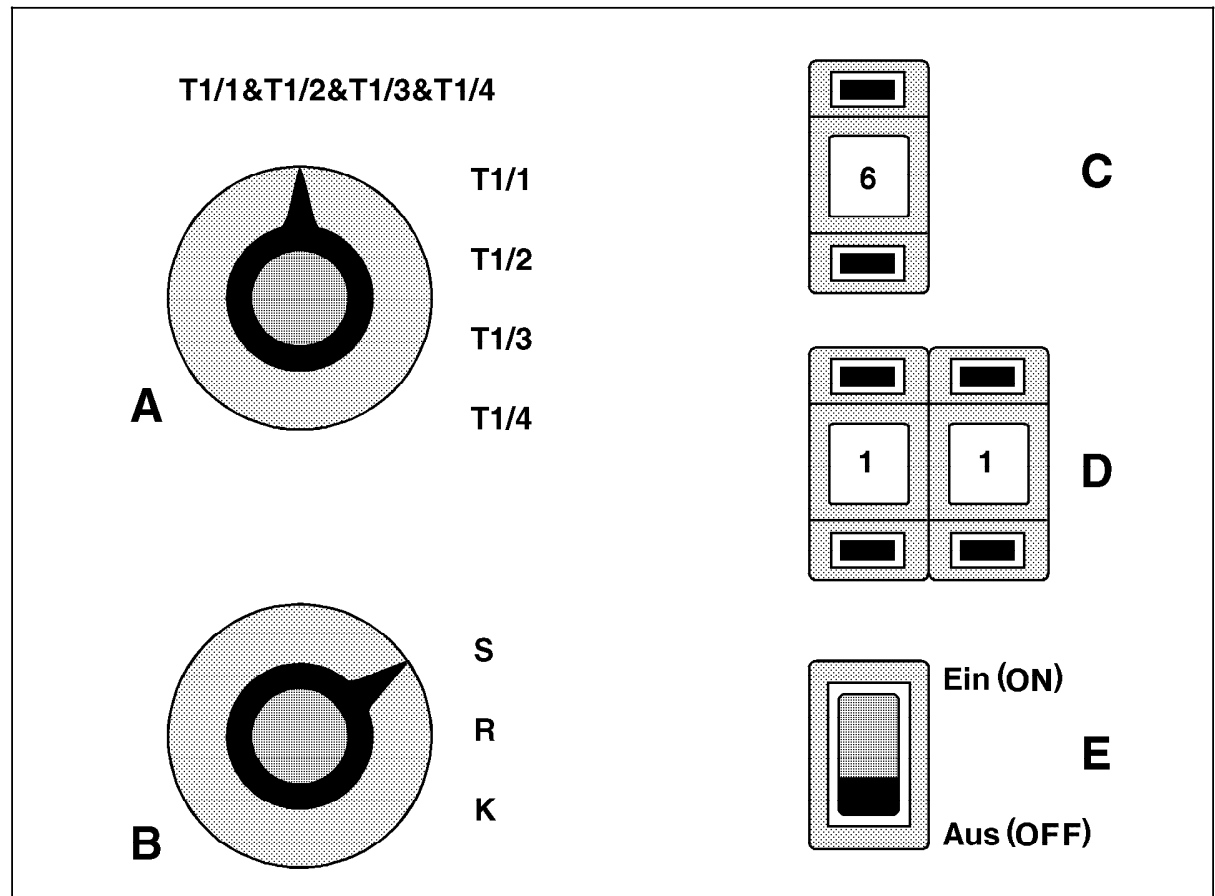
**R- Idle quality:** For idle quality tests

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

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

**D- Firing order:** For engine 104 set to no. 11.

**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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## C Diagnostic Equipment

### Test Settings - Engine Analyzer and Electronic Ignition (EI) System (distributor-less) Adapter

Switch A	Engine Analyzer Settings	Test
T1/1&T1/2&T1/3&T1/4	6 Cyl	<b>Superimposed display</b> <b>Cyl. 1-5-3-6-2-4:</b> Primary/secondary oscilloscope patterns Idle quality Dynamic compression
T1/1	2 Cyl <b>primary</b>	<b>Single circuit display T1/1</b> <b>Cyl. 2+5</b> <b>Primary</b> oscilloscope pattern only Transistor on (dwell) Transistor off (circuit off) Voltage drop at terminal 1 <sup>1)</sup>
T1/2	2 Cyl <b>primary</b>	<b>Single circuit display T1/2</b> <b>Cyl. 3+4</b> <b>Primary</b> oscilloscope pattern only Transistor on (dwell) Transistor off (circuit off) Voltage drop at terminal 1 <sup>1)</sup>
T1/3	2 Cyl <b>primary</b>	<b>Single circuit display T1/3</b> <b>Cyl. 1+6</b> <b>Primary</b> oscilloscope pattern only Transistor on (dwell) Transistor off (circuit off) Voltage drop at terminal 1 <sup>1)</sup>
T1/4	—	Not used at this time

Switch B	Engine Analyzer Settings	Test
<b>S – Scope pattern</b>	6 Cyl	<b>Oscilloscope Display – Ignition</b> Switch "A" select: • T1/1&T1/2&T1/3&T1/4
	2 Cyl <b>primary</b>	<b>Oscilloscope Display – Ignition</b> Switch "A" select: • T1/1 • T1/2 • T1/3
<b>R – Idle quality</b>	6 Cyl	<b>Idle Quality</b> Switch "A" select: • T1/1&T1/2&T1/3&T1/4
<b>K – Compression</b>	6 Cyl	<b>Dynamic Compression Test</b> Switch "A" select: • T1/1&T1/2&T1/3&T1/4

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

## 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.