

A. Ignition systems with series resistors

"Go" image - Display

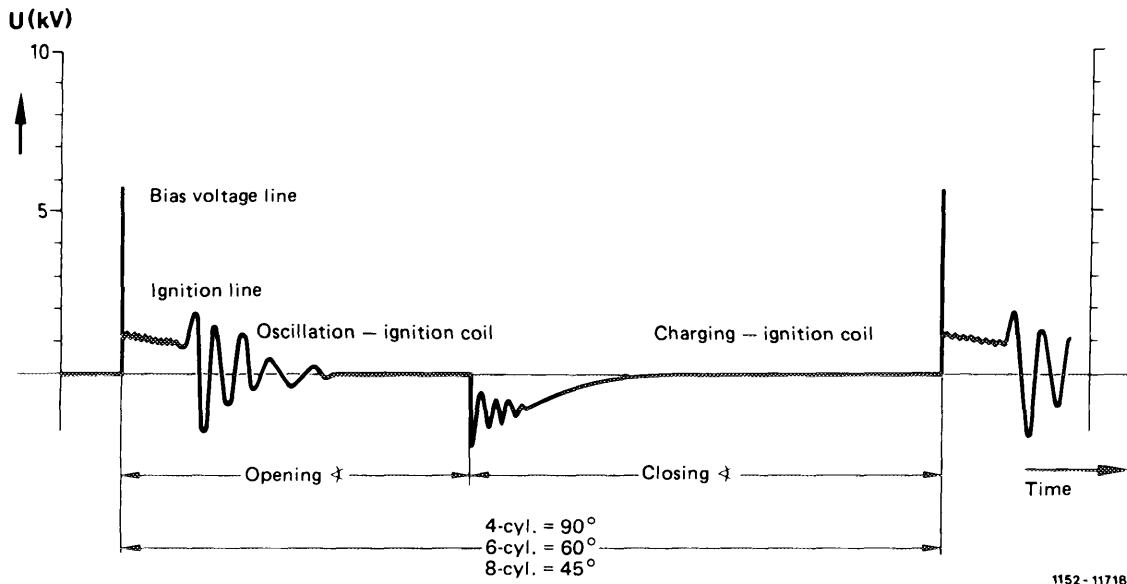


Image selection Display. Image is elongated in horizontal direction

"Go" image - Superposition

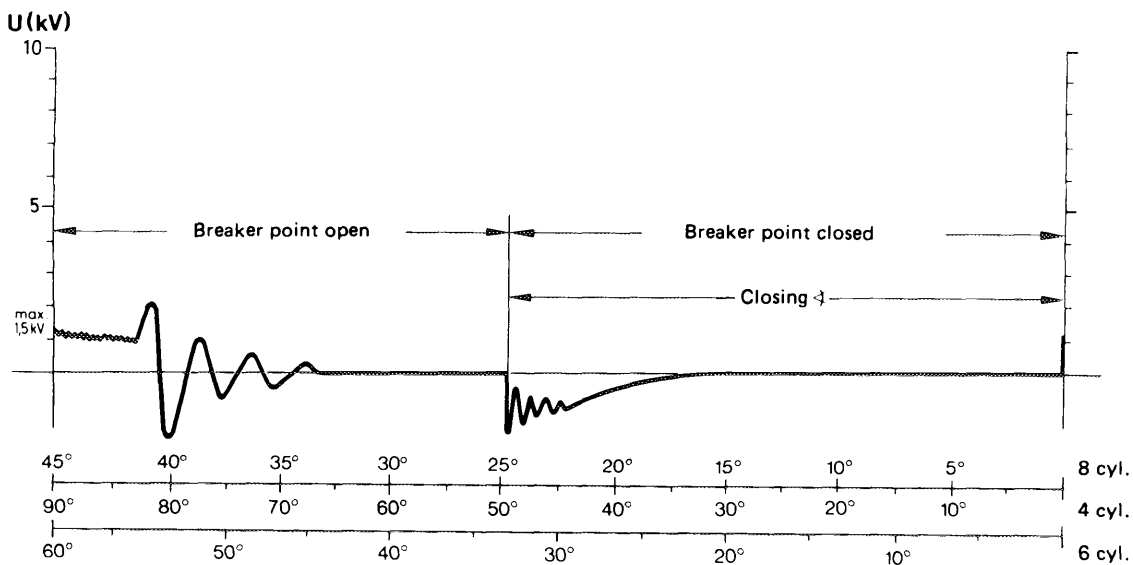


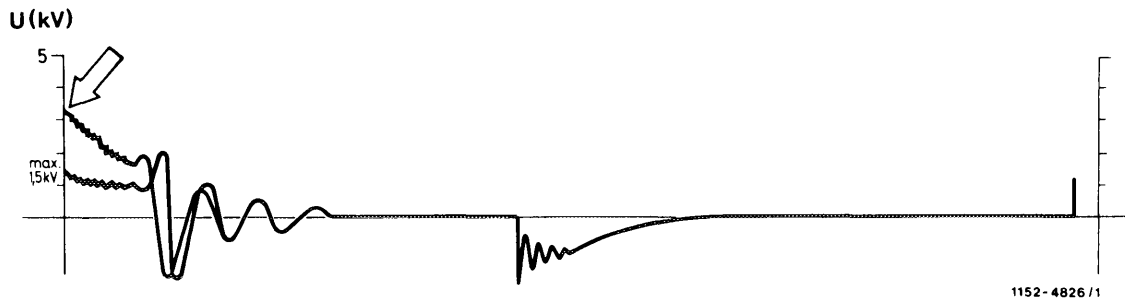
Image selection Superposition. For this purpose set begin and end of ignition procedure at left and right on calibration line

**Jumping activation point of ignition line**

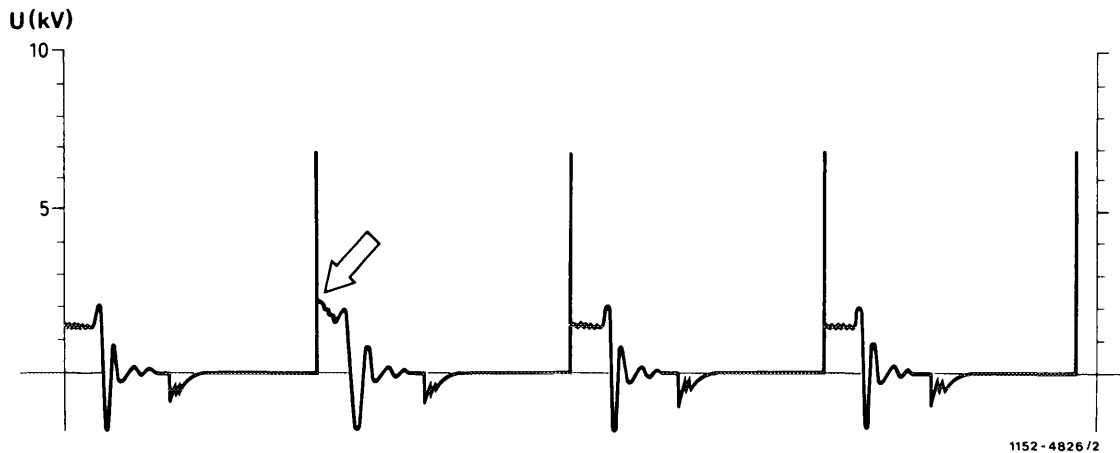


- Image selection*      Display
- Image fault*        Activation point of ignition line changes, jumps
- Visible*              Liable to occur at all speeds with or without engine load
- Cause*                Spark plug sooted, oiled up, lead-coated (lead or soot are conductive, ignition line is therefore jumping up and down)
- Remedy*              Clean or renew spark plug

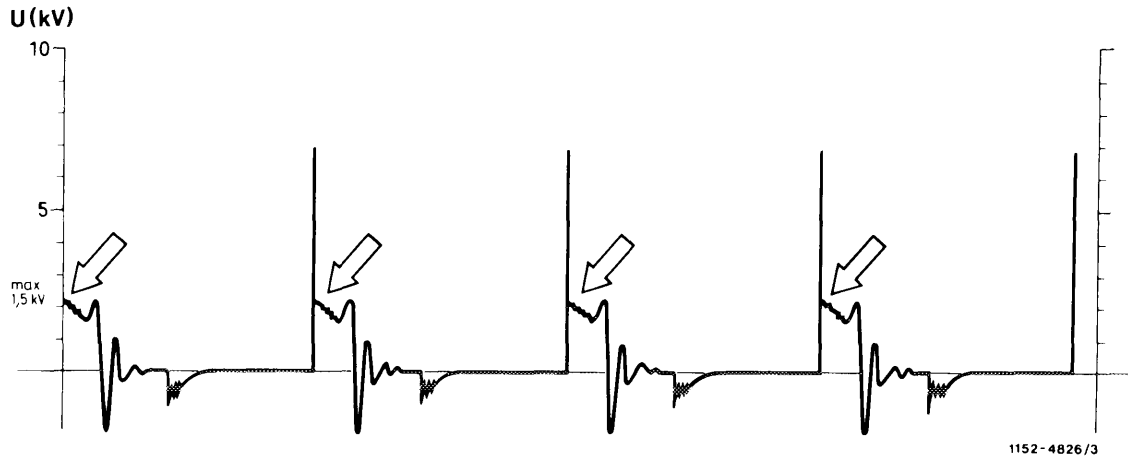
**Activation point of ignition line too high, but remaining constant**



- Image selection*      Superposition
- Visible*                Idle speed, on one or several cylinders



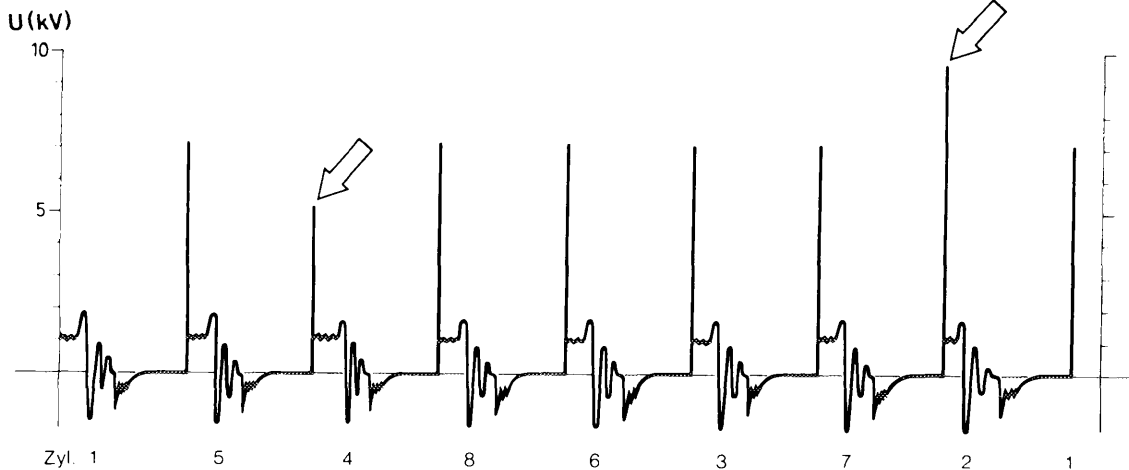
- Image selection*      Display
- Image fault*        Activation point of ignition line above 1.5 kV
- Visible*              Idle speed on one or several cylinders
- Cause*                Ohmic resistance too high at secondary end, caused by suppressor plug on spark plug or distributor cap, ignition cable, distributor rotor, spark plug
- Remedy*              Renew parts where ohmic resistance is too high (use ohmmeter)



1152-4826/3

<b>Image selection</b>	Display
<b>Image fault</b>	Activation points of ignition lines above 1.5 kV
<b>Visible</b>	Idle speed on all cylinders
<b>Cause</b>	Ohmic resistance too high at secondary end caused by distributor rotor, distributor cap or high voltage cable No. 4 with plug
<b>Remedy</b>	Renew parts where ohmic resistance is too high (use ohmmeter)

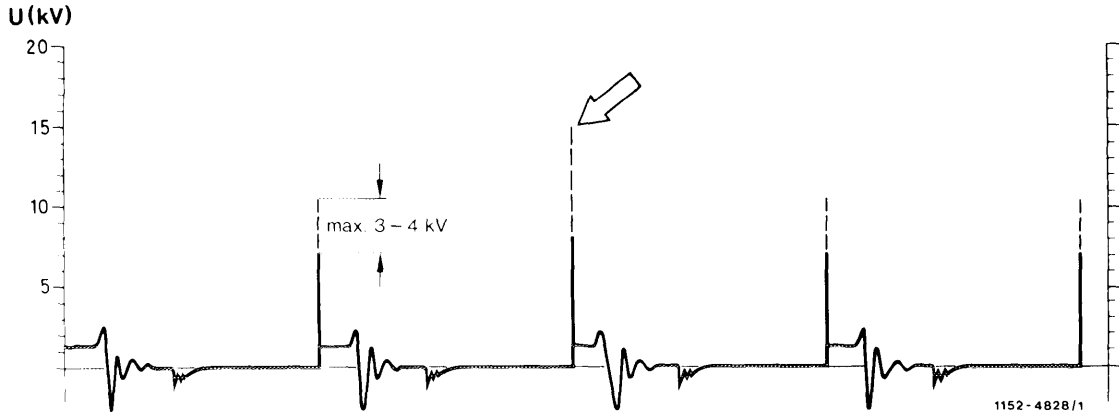
### Required ignition voltage



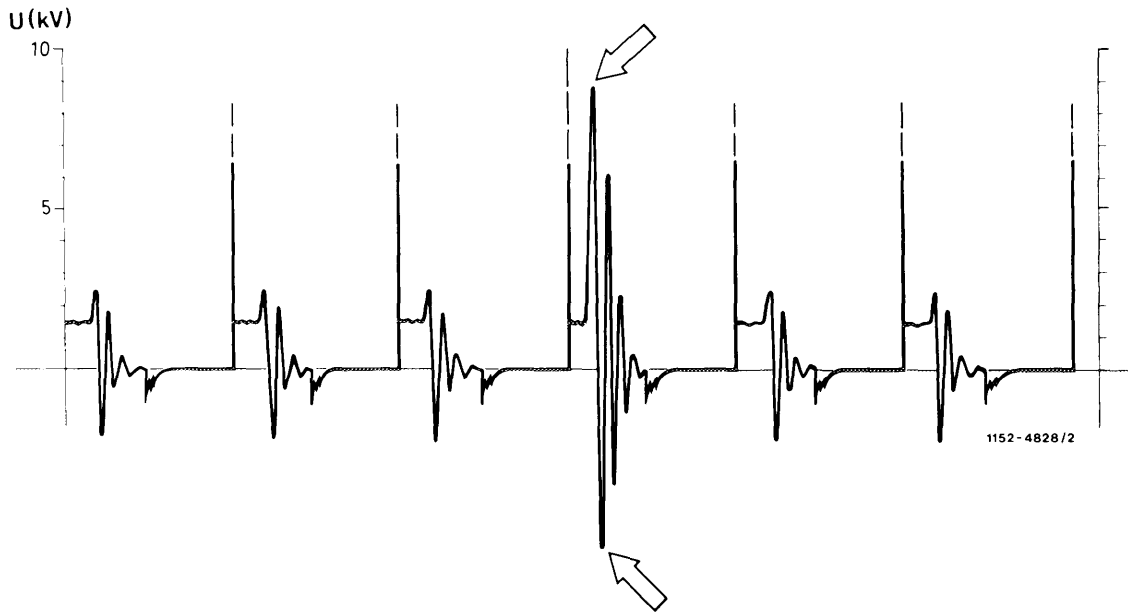
1152-4827/2

<b>Image selection</b>	Display
<b>Image fault</b>	Cylinder 4 bias voltage line too low – ignition line longer Cylinder 2 bias voltage line too high – ignition line shorter
<b>Visible</b>	Liable to occur at all speeds with or without engine load
<b>Cause</b>	Cylinder 4 spark plug – electrode gap too small, fuel-air mixture too rich, compression losses Cylinder 2 spark plug – electrode gap too large, fuel-air mixture too lean, additional sparking gap at secondary end
<b>Remedy</b>	Bias voltage line too low: Adjust spark plug – electrode gap, check cylinder for leaks Bias voltage line too high: Adjust spark plug – electrode gap, check distributor cap, ignition cable and spark plug for interruption (use ohmmeter)

**Required ignition voltage, sudden, short acceleration**



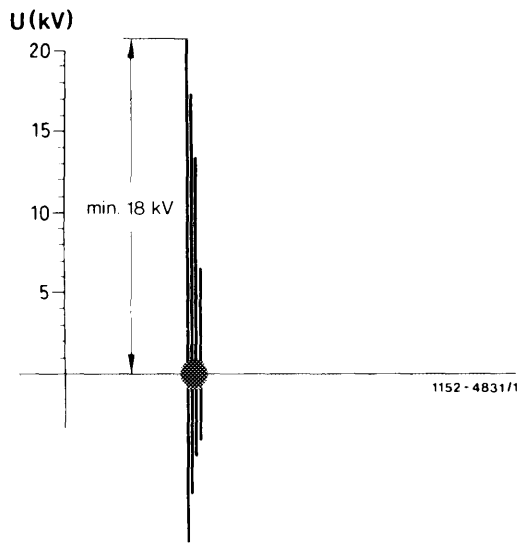
*Image selection*    Display  
*Image fault*        Required ignition voltage increases by more than 4 kV  
*Visible*              Accelerate engine repeatedly and suddenly to approx. 3000/min  
*Cause*                 Spark plug – electrode gap too large  
*Remedy*                Adjust spark plug – electrode gap, renew spark plug, if applicable



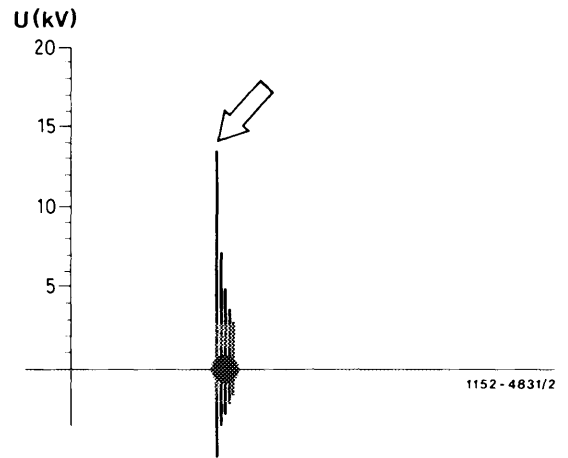
*Image selection*    Display  
*Image fault*        Required ignition voltage increases by more than 4 kV, shortened ignition line, excessive increase of oscillations in opening section above and below zero line  
*Visible*              After an extended stationary period, start engine with oscilloscope connected, accelerate engine repeatedly and suddenly to approx. 3000/min  
*Cause*                 Fuel-air mixture too lean  
*Remedy*                Check injection valve and renew, if applicable

## Ignition coil — starting voltage

good



poor



*Image selection*

Display, superposition

*Image fault*

Starting ignition voltage below 18 kV

*Visible*

Starter speed

*Cause*

Weak battery, resistance in primary circuit, primary resistance is not bridged, ignition coil defective

*Remedy*

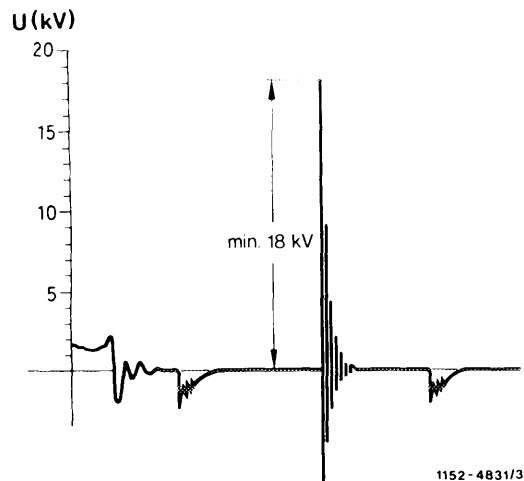
Test battery, charge, test voltage drop battery — ignition coil, perform separate ignition coil and capacitor test

*Note*

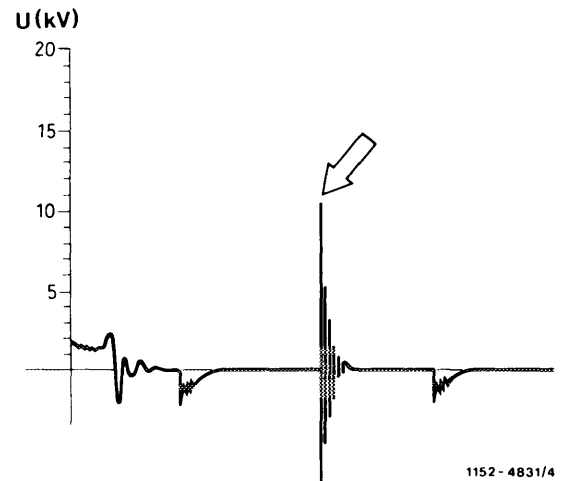
Pull high voltage ignition cable No. 4 from distributor cap

## Ignition coil — reserve voltage

good



poor



*Image selection*

Display

*Image fault*

Ignition coil — reserve voltage below 18 kV

*Visible*

Idle speed, spark plug connector pulled off

*Cause*

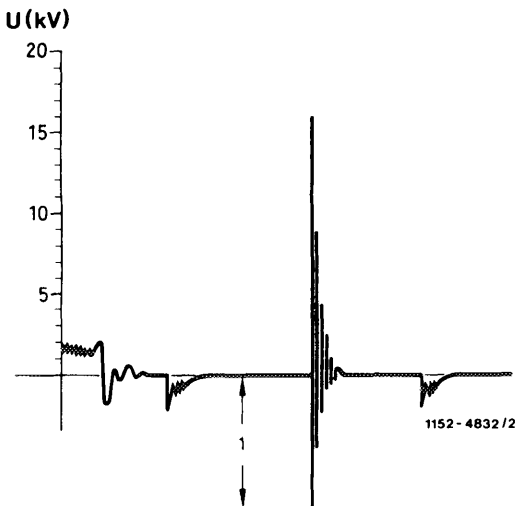
Resistance in primary circuit too high, dwell angle too small, ignition coil or capacitor defective

*Remedy*

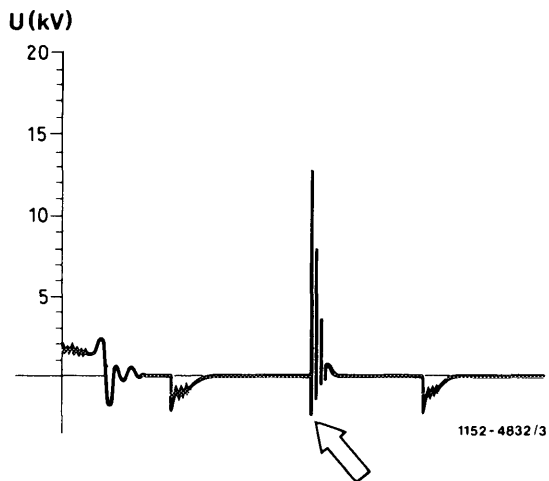
Test voltage drop battery — ignition coil, perform separate ignition coil and capacitor test

## Secondary insulation

good



poor



**Image selection**

Display

**Image fault**

Insulation line too short or completely missing

**Visible**

Idle speed, spark plug connector pulled off

**Cause**

Sparkover caused by cracks, moisture on ignition coil, ignition cable, distributor cap

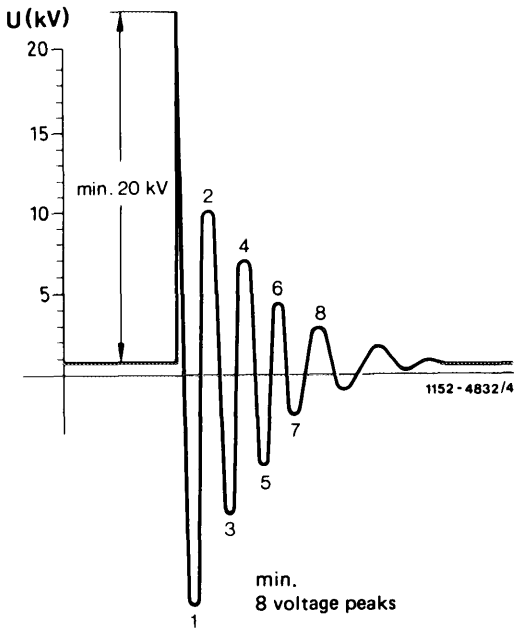
**Remedy**

Clean moist and dirty parts, renew torn parts

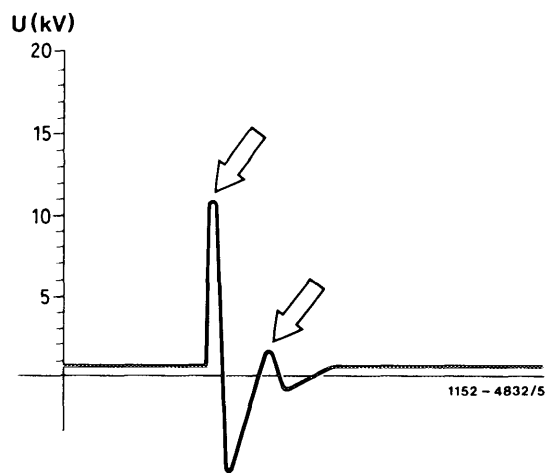
1) Deflection under zero line min. 1/3 of ignition coil reserve voltage

## Ignition coil – separate test

good



poor



**Image selection**

Display

**Image fault**

Voltage below 20 kV, less than 8 voltage peaks

**Cause**

Interturn interruption, interturn short or insulation damage against ground

**Remedy**

Renew ignition coil

## B. Ignition systems without series resistors

“Go” image — Display (engine speeds up to approx. 2000/min)

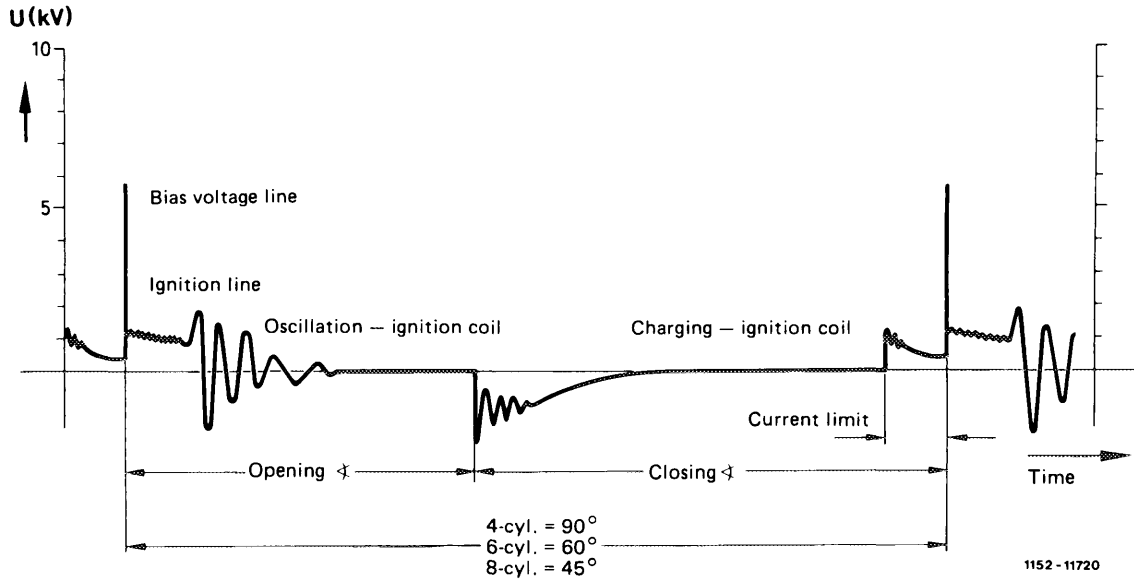


Image selection    Display. Image is elongated in horizontal direction

“Go” image — Superposition (engine speeds up to approx. 2000/min)

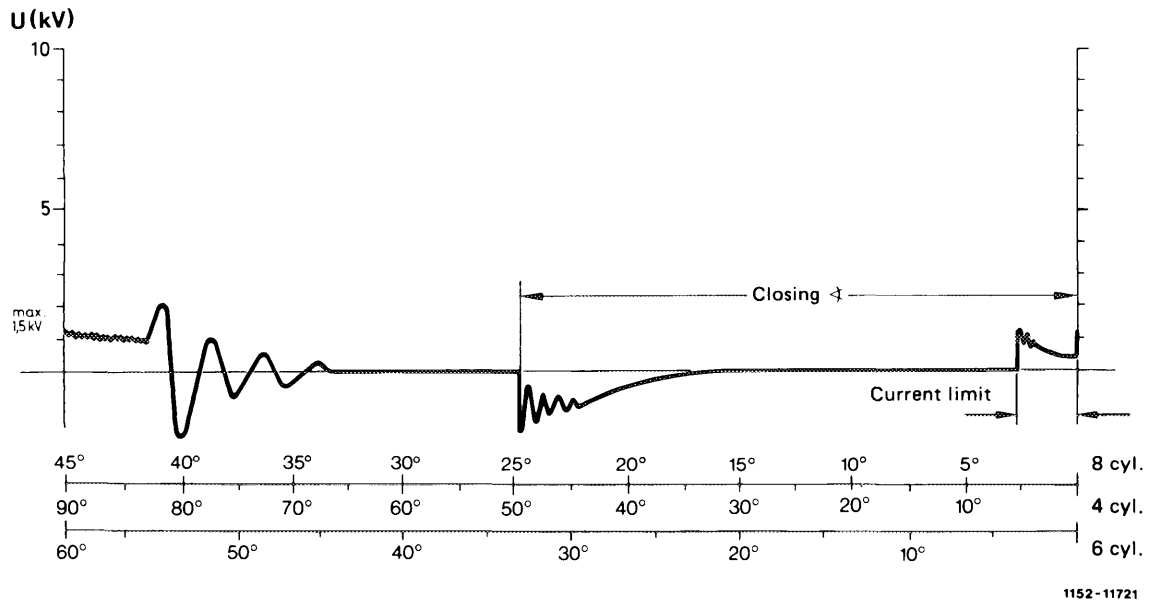
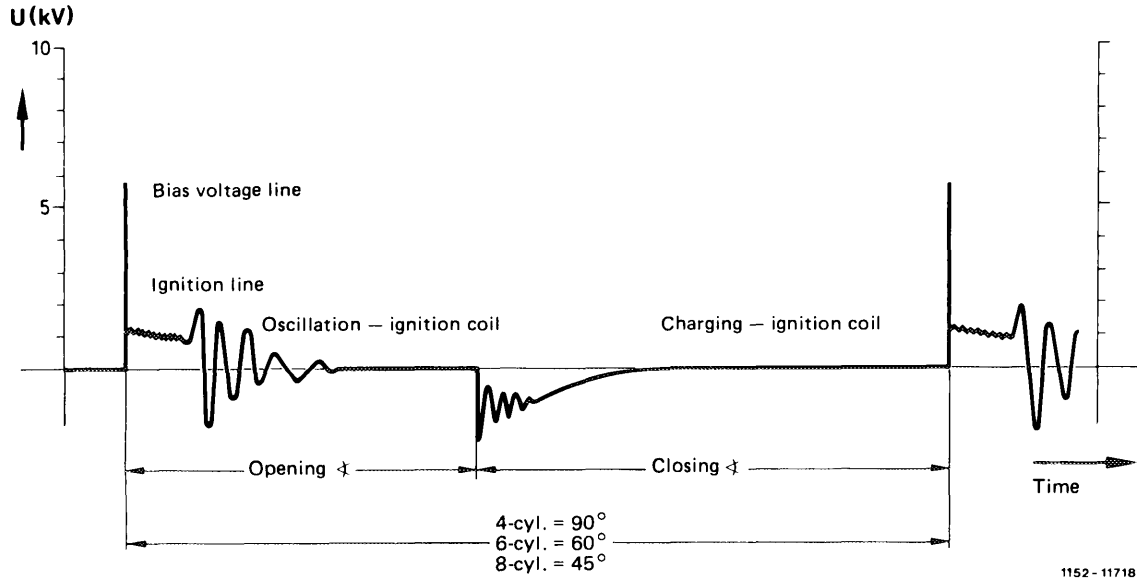


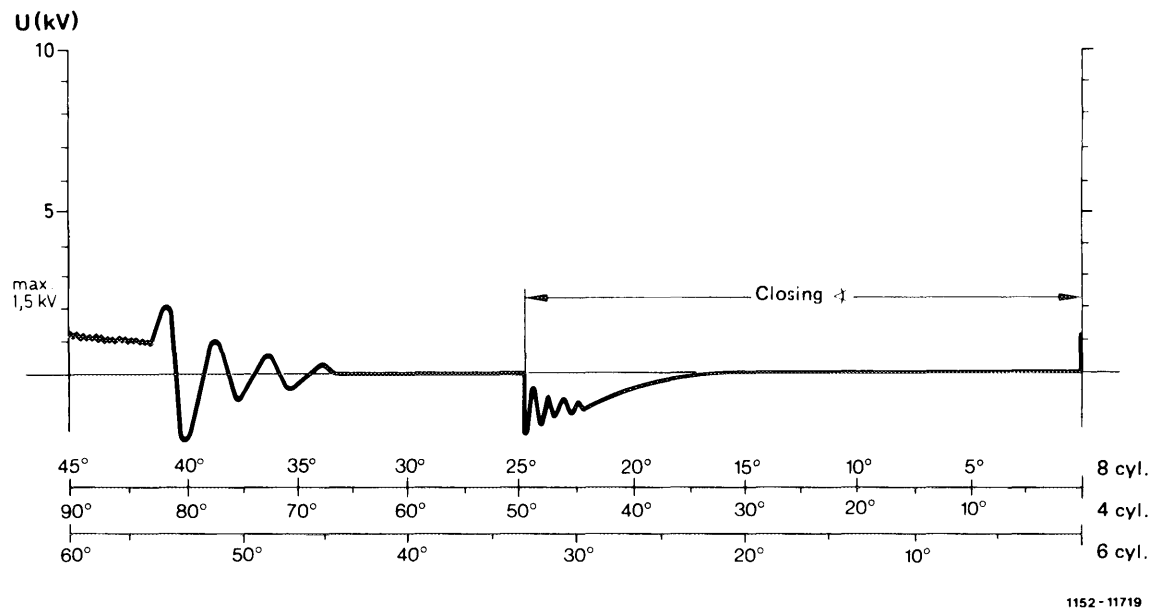
Image selection    Superposition. For this purpose set begin and end of ignition procedure at left and right on calibration line

**"Go" image – Display (engine speeds above approx. 2000/min)**



*Image selection* Display. Image is elongated in horizontal direction

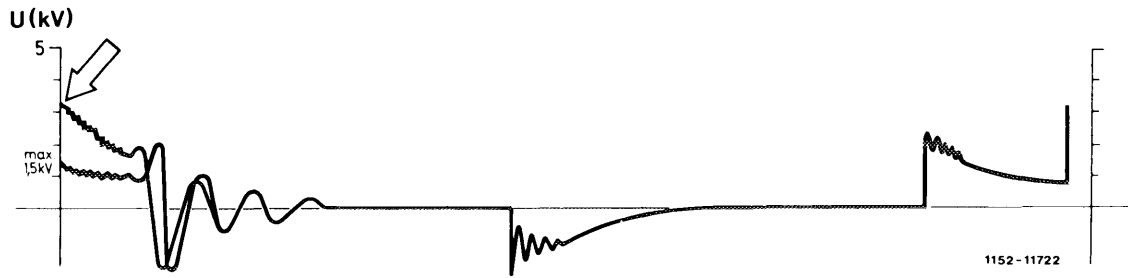
**"Go" image – Superposition (engine speeds above approx. 2000/min)**



*Image selection* Superposition. For this purpose set begin and end of ignition procedure at left and right on calibration line



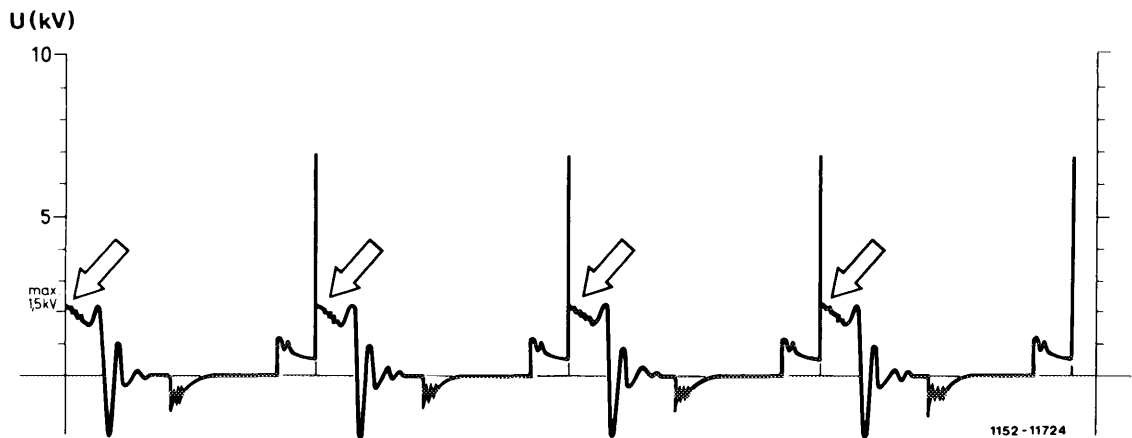
**Activation point of ignition line too high, but remaining constant**



*Image selection* Superposition  
*Visible* Idle speed, on one or several cylinders

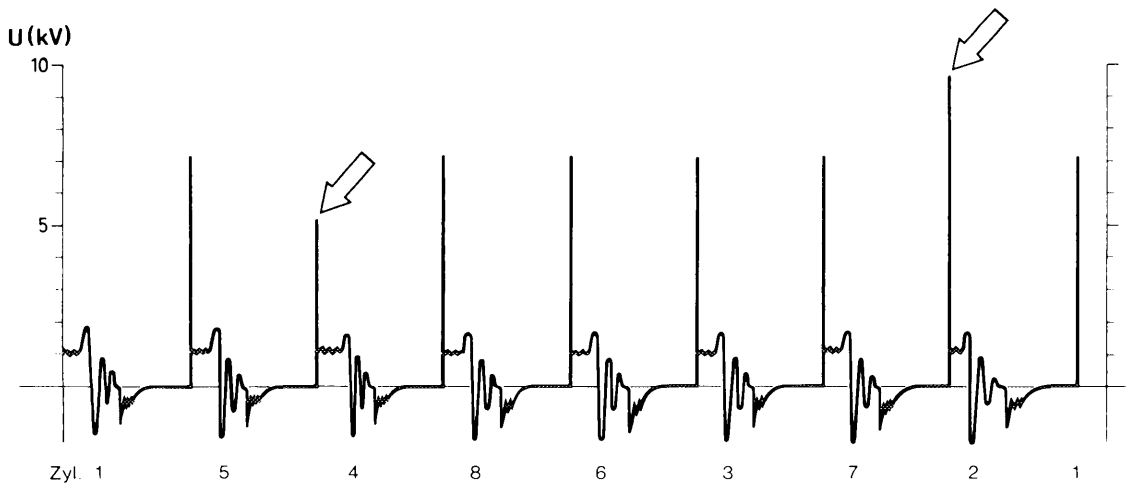


*Image selection* Display  
*Image fault* Activation point of ignition line above 1.5 kV  
*Visible* Idle speed on one or several cylinders  
*Cause* Ohmic resistance too high at secondary end, caused by spark plug connector, distributor cap, ignition cable, distributor rotor, spark plug  
*Remedy* Renew parts on which ohmic resistance is too high (use ohmmeter)



*Image selection* Display  
*Image fault* Activation points of ignition lines above 1.5 kV  
*Visible* Idle speed on all cylinders  
*Cause* Ohmic resistance too high at secondary end, caused by distributor rotor, distributor cap or high voltage cable No. 4 with plug  
*Remedy* Renew parts on which ohmic resistance is too high (use ohmmeter)

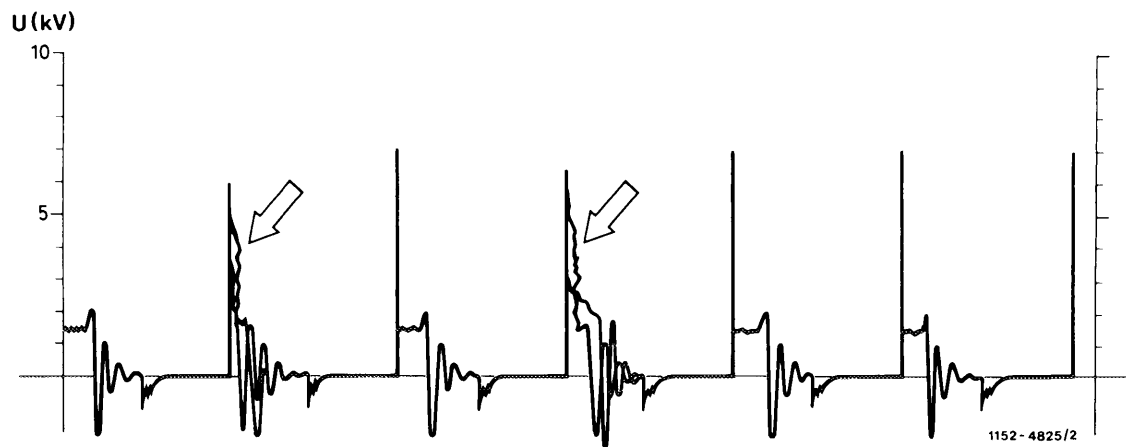
## Required ignition voltage



1152-4827/2

<b>Image selection</b>	Display
<b>Image fault</b>	Cylinder 4 bias voltage line too low – ignition line longer Cylinder 2 bias voltage line too high – ignition line shorter
<b>Visible</b>	Liable to occur at all speeds with or without engine load
<b>Cause</b>	Cylinder 4 spark plug – electrode gap too small, fuel-air mixture too rich, compression losses Cylinder 2 spark plug – electrode gap too large, fuel-air mixture too lean, additional spark gap at secondary end
<b>Remedy</b>	Bias voltage line too low: adjust spark plug – electrode gap, test cylinder for leaks Bias voltage line too high: adjust spark plug – electrode gap, test distributor cap, spark plug connector, ignition cable and spark plug for interruption (use ohmmeter)

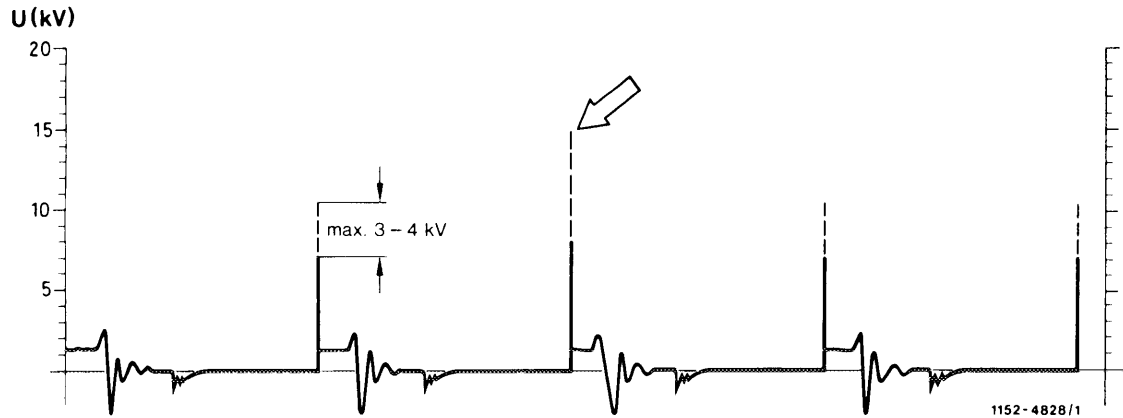
## Jumping activation point of ignition line



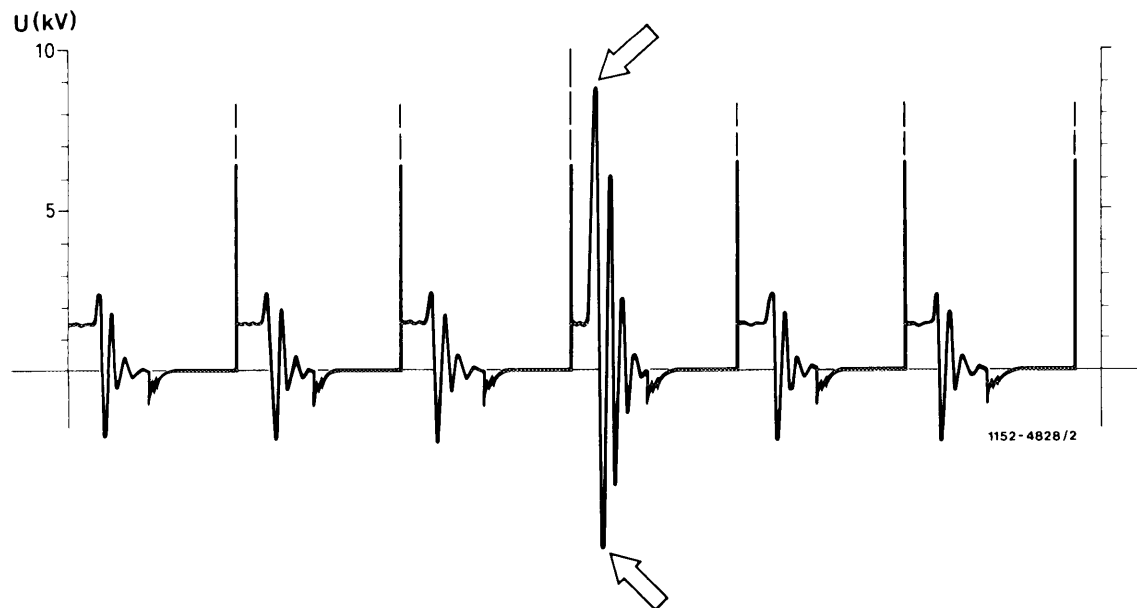
1152-4825/2

<b>Image selection</b>	Display
<b>Image fault</b>	Activation point of ignition line changes, jumps
<b>Visible</b>	Liable to occur at all speeds with or without engine load
<b>Cause</b>	Spark plug sooted, oiled up, burnt down, insulation damage on spark plug connector
<b>Remedy</b>	Clean or renew spark plug, renew spark plug connector

### Required ignition voltage, sudden, short acceleration



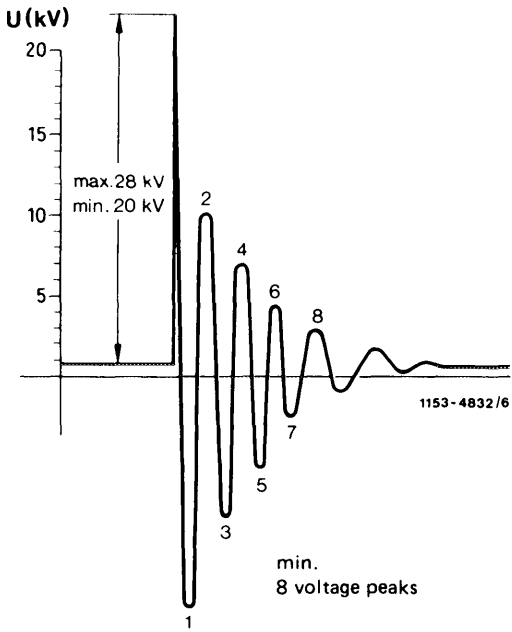
<i>Image selection</i>	Display
<i>Image fault</i>	Required ignition voltage increases by more than 4 kV
<i>Visible</i>	Accelerate engine repeatedly and suddenly to approx. 3000/min
<i>Cause</i>	Spark plug – electrode gap too large
<i>Remedy</i>	Adjust spark plug – electrode gap, renew spark plug, if applicable



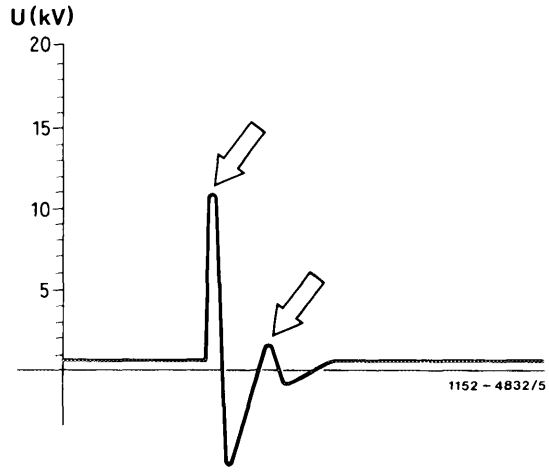
<i>Image selection</i>	Display
<i>Image fault</i>	Required ignition voltage increases by more than 4 kV, shortened ignition line, excessive increase of oscillations in opening section above and below zero line
<i>Visible</i>	After an extended stationary period, start engine with oscilloscope connected, accelerate engine repeatedly and suddenly to approx. 3000/min
<i>Cause</i>	Fuel-air mixture too lean
<i>Remedy</i>	Check injection valve and renew, if applicable

**Ignition coil – separate test**

**good**



**poor**



**Image selection**

**Display**

**Image fault**

Voltage below 20 kV, less than 8 voltage peaks

**Cause**

Interturn interruption, interturn short or insulation damage against ground

**Remedy**

Renew ignition coil

**Note**

Not above 28 kV, since otherwise ignition coil will be initially damaged