INSTRUCTION MANUAL FOR STROBOTESTER MOD. DG83-D

Informazioni

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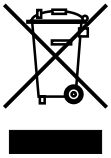


Disposal (Directive 2002/96/CE (WEEE))

– When you wish to break up the unit, detach the electrical, electronic, plastic and iron parts.
– Proceed to the separated disposal foreseen by the regulations in force.

1.0 FOREWORD

The strobotester DG83 D was conceived by SINCRO for checking stroboscopic advance and diagnostic checks on conventional and Gdi petrol engines
RPM and advance measurements can be switched on the display by a key in the handgrip, they are independent from the number of cylinders and can be carried out on distributor ignition systems, DIS and coil per plug systems.
Through a key in the rear side of the strobotester it is possible to measure time and duty cycle of actuators in percentage, direct and peak voltages of sensors and actuators, battery voltage at cranking, alternator's charging voltage and RPM by stroboscope without applying any reflectors.
The present features satisfy the requirements of technicians and workshops which require high quality.

1.1 TECHNICAL FEATURES

MEASUREMENTS	READINGS	RESOLUTION
– RPM	400 ÷19999 revs/min.	10 revs
– RPM by stroboscope	60 ÷ 6000 revs/min.	10 revs
– Ignition advance	0÷78° up to 480 RPM	
– Ignition advance	0÷90° from 465 to 19990 RPM	0.1°.
– Dwell in milliseconds	0÷262 ms	0.1 ms
– Dwell in percentage	0÷100%	0.1%
– Dwell in degrees (each cam)	0÷360° (> 460 RPM)	0.1°
– DC Voltage	1÷70 Volt	0.1 Volt
– Peak Voltage	1÷70 Volt	0.1 Volt
– Memory of reading	6 sec. from key D release	
– Power supply	9.5÷15 Volt (9.5÷35 V optional)	

1.2 WARNINGS

- Do not wind cables around the unit.
- Do not drop the unit or the inductive clamp.
- Do not use solvents or gasoline to clean plastic parts.
- During use keep cables away from exhaust pipes or rotating parts.
- To set different engines, systems or measurements, follow the instructions of the relevant chapters.
- Lack of signals from the inductive clamp or from the **TL220** cable are shown by a blinking zero on **display 1** and **3** (Fig. 1).

2.0 PRELIMINARY INFORMATION

- For the right use of the strobotester, it is necessary to become familiar with commands and to know some preliminary instructions.
  The following chapters contain detailed instructions, while the yellow sheets contain short form instructions.

- Fig. 1 shows the displays and the keys for selecting measurements.
  Special LEDs show the default setting after connecting the unit to battery as well as the type of measurement selected by the operator.

- **Blinking zero shows lack of electrical signal**

- The keys in the handle of Fig. 2 are normally used to adjust advance, activate flash, switch and store measurements.
  They can also have different functions, described in the relevant chapters.

- RPM and ignition advance measurements are carried out by connecting the inductive clamp to the spark cable of cylinder No. 1 and are independent from the number of cylinders.

- Readings of injection time, ignition coil charging time, Duty Cycle of actuators and Dwell in degrees in points systems, are displayed on **display 3** (chap. 4,5,6). See par. ATTENTION on page 7 for checking the wear of each cam.

- Select the number of sparks per revolution, really existing (**Table 1**) to have correct readings.

2.1 DISPLAY

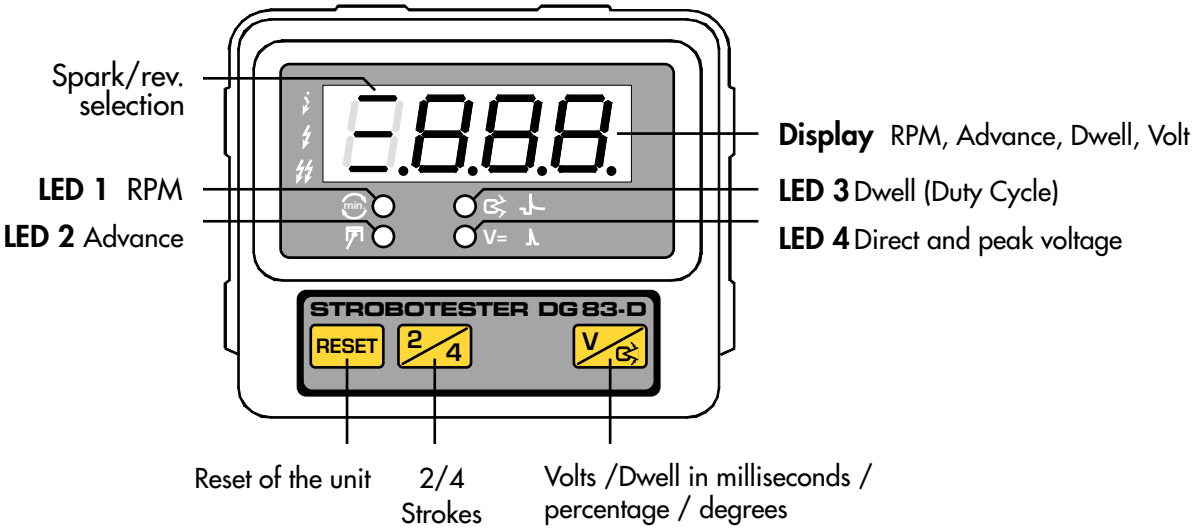


Fig.1

2.2 COMMANDS POSITION

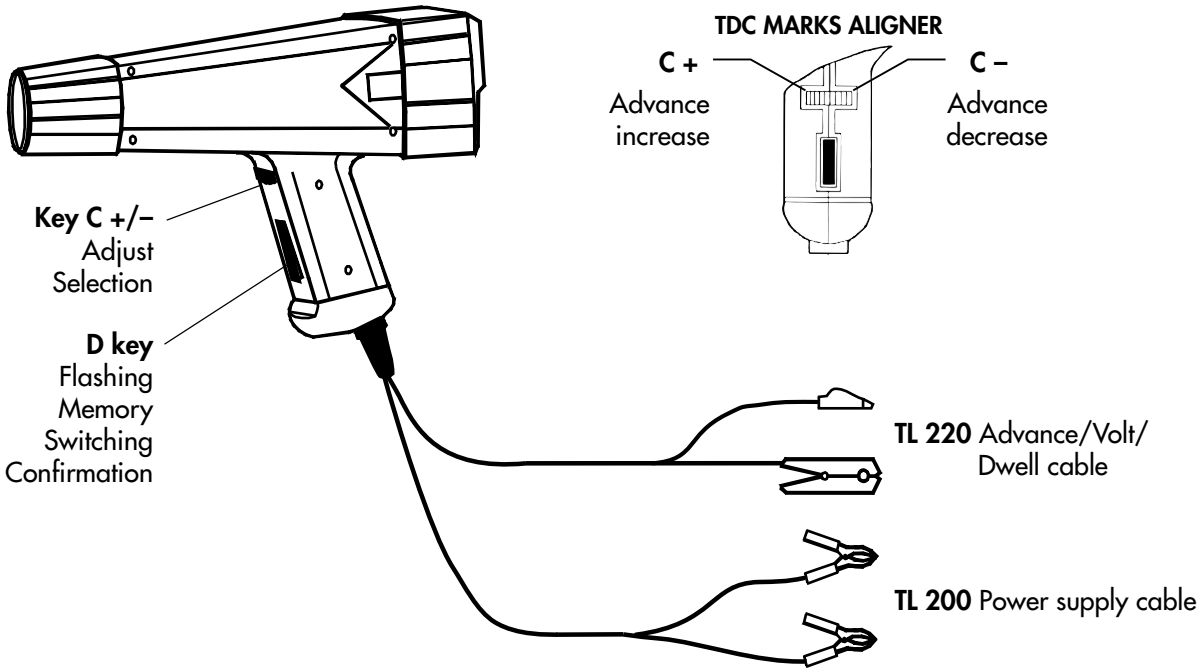


Fig.2

2.3 OPTIONAL ADAPTERS

TL17 Cables for ground connections

AD 33A Needle for picking up signals

3.0 ADVANCE MEASUREMENTS

Connect the unit as shown in Fig. 5. After connection to battery, the unit automatically sets for measurement: Advance, RPM, Dwell in milliseconds. See chapt. 4 for Dwell measurements in percentage or degrees.
Press key [2/4] to select 1spark per revolution on DIS systems.
Follow the instruction aside to select 2 sparks per revolution.
A blinking zero shows a lack of electrical signal.

3.1 In distributor systems, fit the clamp on the spark cable of Cylinder N.1 with the **arrow pointing towards the spark plug; in DIS systems it could be necessary to reverse it.** In coil per plug systems, that include the return cable to ground of the secondary, connect the clamp with the **arrow pointing to the opposite direction of the spark-plug** (Fig.4).
Should the return cable not be included, connect the inductive clamp to the cable connected to the coil's negative (–) pole.
The **TL 220** cable in Fig.5, measures Dwell and performance of the ignition system described in chapter 4.

3.2 Stabilize idle speed by bringing the engine to the normal operating temperature. Disconnect the tube of the vacuum cap if foreseen by the Data Manual. Press **key D**, point the flash towards the TDC marks, align them by pressing **keys C + / –** and read the advance. By releasing **key D**, RPM and advance readings will be stored for about 6 seconds, then the unit goes back to measurement.

3.3 Increase engine speed,realign TDC marks and compare the advance increase to the manufacturer's data. By reconnecting the cap tube, advance should increase. If advance does not increase, check the cap.

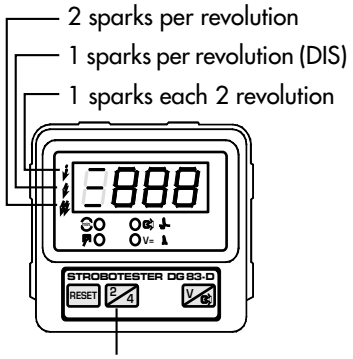


Fig. 3

ATTENTION
Some motorbikes have 2 sparks per revolution

CONNECTION OF THE INDUCTIVE CLAMP ON COIL PER PLUG SYSTEMS

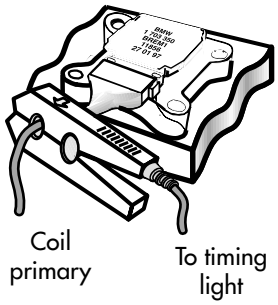


Fig. 4

ATTENTION
The coil primary cables' bundle must have 3 wires: + 15, coil negative and return to ground of secondary.

STROBOSCOPIC IGNITION ADVANCE AND DWELL MEASUREMENT

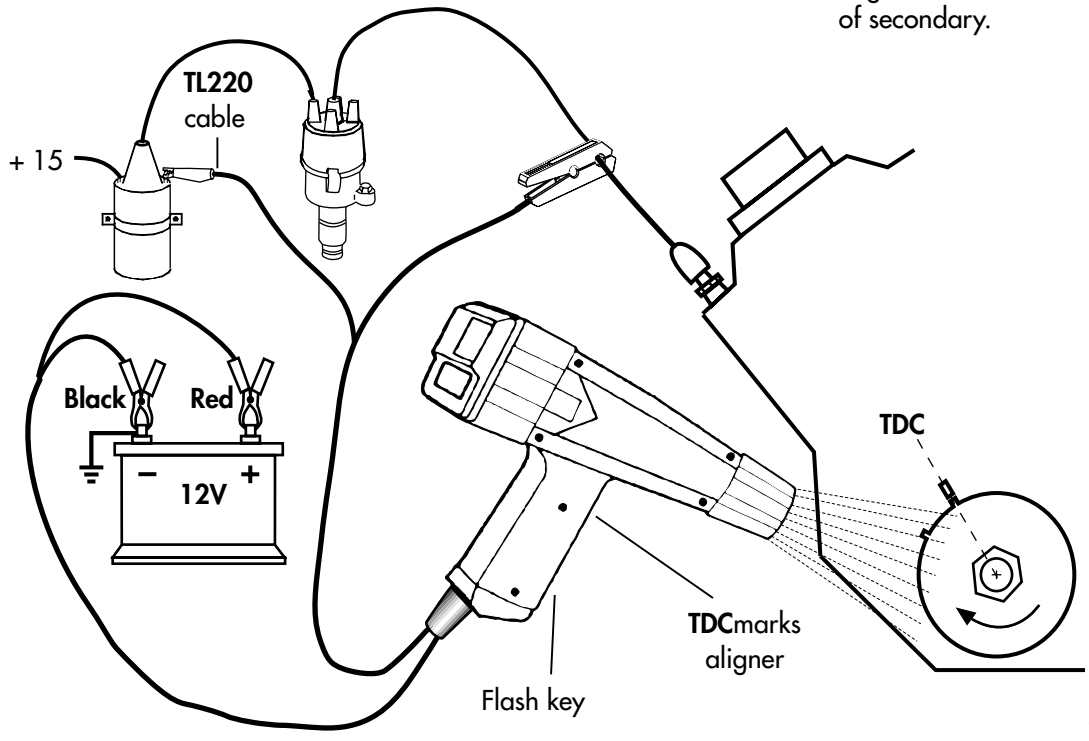


Fig. 5

NOTE

In case the unit should not blink regularly, check:

- Against the light that the inductive clamp's cores match; remove possible dirtiness with a clean wiper.
- That the clamp's arrow is pointing towards the opposite direction of the spark-plug in points systems.
- That coil leads are not reversed
- Reversed polarity voltage in DIS systems (reverse the clamp with the arrow poiting to the opposite direction of the spark-plug).
- Discharges between cap poles or to ground due to dirtiness or moisture
- Leakages to earth or between cables due to ageing or cracks in the cable covering.
- Wear or excessive gap between central contact and rotor arm or between rotor arm and poles or the distributor cap.
- Too low voltage on the spark-plug due to faults in the ignition system.
- Timing light too near to spark cables, distributor or ignition coil.
- Cable or interference suppressor with a too high or interrupted resistance.

ATTENTION

- Some engines seem equipped with coil per plug system but they actually are DIS systems (eg.: Peugeot 206, 306, ecc.). In this case connect the inductive clamp to the cable connected to the coil's negative (–) pole relevant to cyl. 1 - 2 (Fig. 9) and select 1 spark per revolution.
- Some motorbikes have special ignition systems with two sparks per revolution. Doubled reading values appear if setting is not correct.
- Malfunctions in IAW MARELLI systems can be due to wrong distributor's position.
- For correct advance readings in points sytems, adjust the distributor's position. If the centrifugal advance does not correspond, check the centrifugal expansion mechanism and the diaphragm of the vacuum cap.
  In case no advance variation is verified when connecting the cap tube, check the diaphragm and the pivot of the baseplate.
- In points systems, advance differences between cylinders can be caused by a different cam wear. Check that Dwell differences are within 3 degrees by connecting the inductive clamp to the spark cable of each cylinder.
- Advance on vehicles equipped with engine management ECUs depends on the processing of signals from different sensors.
  It is possible to make advance checks in different conditions only if comparison data are available.
  In case differences should be found, it is necessary to check engine temperature sensors or other causes that can influence advance mapping.
- Should the initial advance correspond to the value stated by the Manufacturer, and should the engine have cranking problems, check that the distribution belt has not jumped a cog.
- Should you use a separate battery, connect the negative pole to the engine ground.

Table.1:

Strokes	System	Spark/rev
4	Distrib.	1 every 2 revs
4	Coil per plug	1 every 2 revs
4	D.I.S.	1 per rev.
2	Coil per plug	1 per rev.
2	D.I.S.	2 per rev. *

*) Special systems. Set the Strobotester as described in chapt. 8.2

NOTE
After connection to battery, the Strobotester sets for 1 spark per 2 revs (distributor or coil per spark plug ignition systems).

Some engines seem to be equipped with coil per plug systems but they are actually DIS systems (eg.: Peugeot 206, 306, etc.).

On engines equipped with Twin Spark DIS systems (eg.: Alfa Romeo), select 1spark per rev.

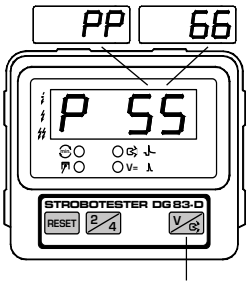
Wrong settings cause wrong readings of RPM, Advance and Dwell.

4.0 CHECKING IGNITION SYSTEM PERFORMANCE

Checking the ignition coil's charging time allows to diagnose some system's operating faults. See NOTE on page 9. A blinking zero appears in case the signal is not present.

4.1 In points systems, measurement is carried out in percentage or degrees. Connect the unit to the negative pole of the ignition coil (see Fig. 8). Press and release **key** [V/α]. Dwell measurements in milliseconds will be displayed. Keep key [V/α] pressed until P 55 is displayed. Press **keys C + /–** until PP (percentage) or GG (degrees) is displayed (Fig. 6). Press and release **key D,** P 1 will appear. For percentage measurements select the cylinder number through **keys C + /–** (Fig.7). For single cylinder engines or coil per plug systems **select 1** cylinder and confirm by pressing **key D.** Press key [2/4] to select 1 spark per revolution on DIS systems. For 2 sparks selection follow the instructions in chapt.3. Press **key D** to proceed with measurements.

Setting percentage or degrees



Volt/Duty Cycle

Fig. 6

4.2 In systems with electronic ignition module, possible lacks of command signal from the reluctor sensor, Hall sensor or from the ECU, can be due to faults in connection or in the module. Carry out checks described in par. 6.3.

4.3 Fig. 8 shows a connection of a **DIS** system. By connecting the **TL220** cable through the **AD33A** needle, or the **AD17** adapter (optional) to the **A** or **B** primary wire and the clamp to one of the cylinders 1-4 or 2-3, the strobotester will check the performance of ignition modules. Module **C** in 6-cylinder engines (Fig. 9) can be checked by connecting the **TL 220** cable to the terminal of the **AD18** adapter and the inductive clamp to the spark cable of one of the cylinders 5-6.

Setting the number of cylinders

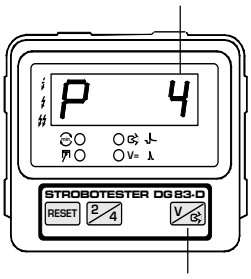


Fig. 7

CHECKING CHARGING TIME OF DIS IGNITION COILS OR DWELL

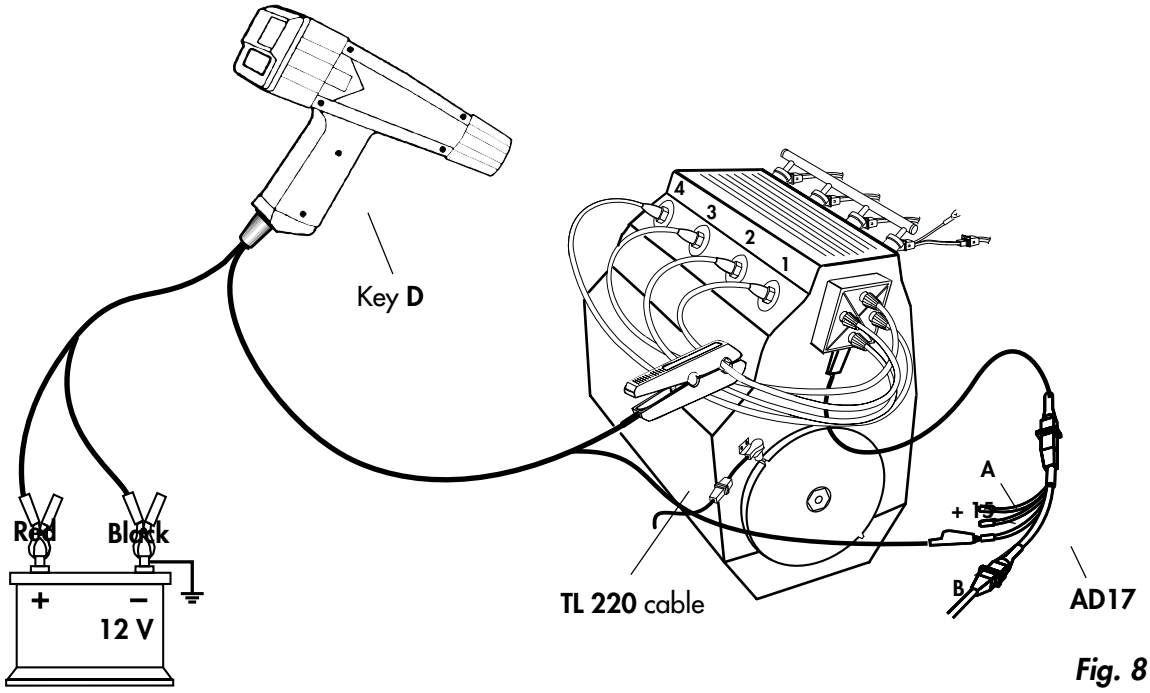


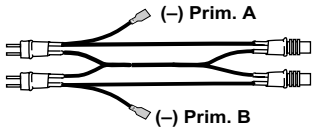
Fig. 8

NOTE

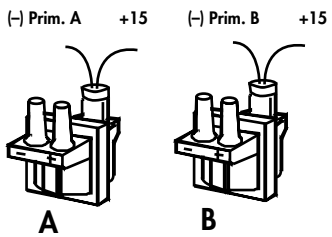
- Measurement of the ignition coil charging time allows to identify the cause of various faults.
- A charging time below 3 milliseconds can cause a poor ignition energy with high resistance spark cables and a decrease in engine power, misfires during acceleration, possible damages to carburettors of LPG fuel systems and to catalysts due to fire return, increase in fuel consumption and gas emissions.
- Reduced charging time can be due to a faulty inductive sensor or Hall sensor, not suitable ignition coil or faulty module. If time is within the limits, check the resistance of connection to ground of the module.
- Other faults can be due to connection cables that go from the sensor to the power module, connections to the module with too much resistance due to contacts' oxidation, etc.
- In distributor systems a reduced energy can be caused by a poor Dwell or faulty contacts. An early burning of contacts can be caused by a too high Dwell or faults in the damping capacitor mounted between contacts and ground.
  Possible differences of Dwell between cams have to be checked by connecting the inductive clamp to the spark plug cable of each cylinder. Differences should remain within 3 degrees.
- An excessive advance variation, when reconnecting the vacuum tube, could be caused by the wear of the baseplate pivot.

EXAMPLES OF ADAPTERS FOR DWELL TESTS (optional)

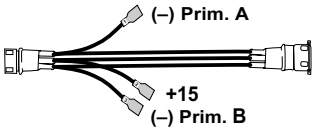
AD23:
-FIAT
-LANCIA



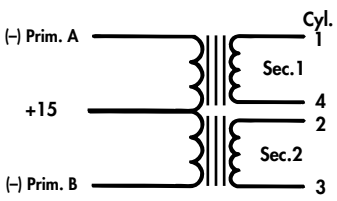
DIS Coils - Marelli
FIAT - LANCIA



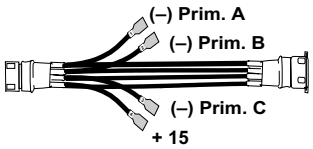
AD17:
-FORD
-BOSCH



FIAT Punto and others



AD18 :
-OPEL
-PEUGEOT



ALFA ROMEO Super 164 V6
OPEL Calibra V6 Kat and others

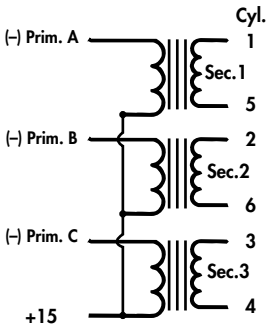


Fig. 9

5.0 MEASUREMENT OF INJECTION TIME

After connection to battery, the unit is set for reading injection time. Injection time can be measured at progressive preset engine speeds. This possibility allows to check the correct relationship between the most important parameters of petrol and LPG fuelled engines.
Select different functions through key [V/G].
A blinking zero shows a lack of electrical signal.

5.1 Perform the measurement by picking up the injection signal through the **TL 220** cable connected to the **AD16** adapter (fig. 11) or to the **AD33A** needle (fig. 13). Fig. 11 shows an engine with DIS system, in this case select 1spark per revolution through key [2/4].
Select 2 sparks per revolution where necessary, press key [V/G] until P1 is displayed. Press **key D** twice, P3 and 15 will be displayed (fig. 6 in the yellow sheet). By pressing **C+ /–**, 25 will be displayed.
Press **key D** once and proceed with reading.

5.2 Fig. 10 shows the signals of two types of injectors:
Type A with an internal resistance of 16 Ω, driven from the beginning to the end of injection by a current without intermittances.
Type B with an internal resistance of 2 Ω, driven by an initial opening current and a series of maintenance current pulses during opening.
The unit automatically recognizes the type and gives the total injection time measurement.
In timed injection systems (ex. IAW Marelli) the check can be carried out by connecting the **TL220** cable in sequence to each injector.

INJECTOR OPENING

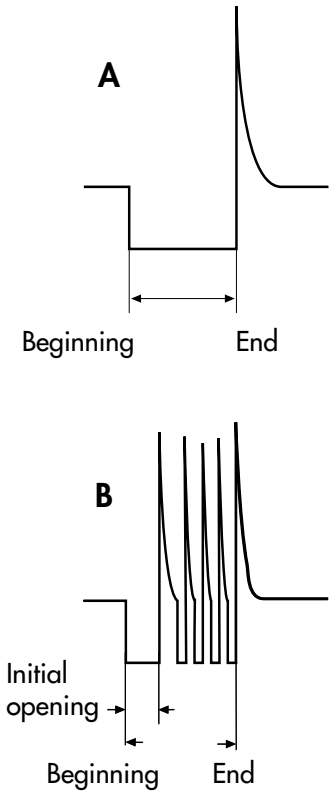


Fig. 10

INJECTION TIME MEASUREMENT

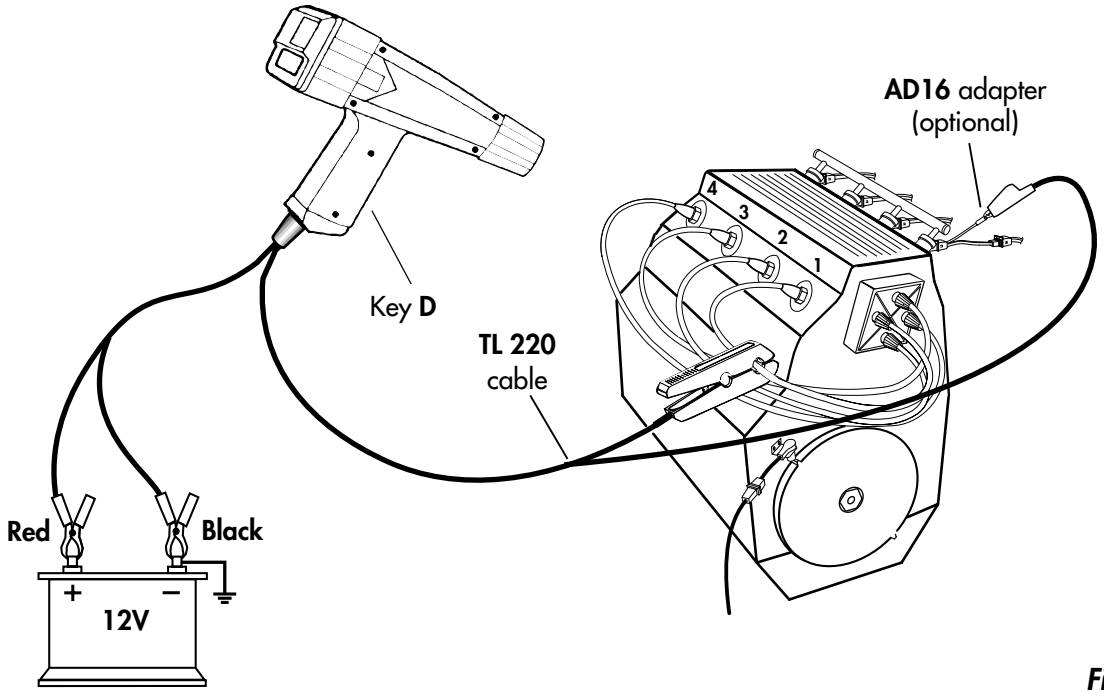


Fig. 11

6.0 VOLTAGE MEASUREMENTS

Continuous voltage or peak measurements allow to diagnose various faults, such as: low battery voltage, sensors' power supply, throttle potentiometer, air flow meters, knock sensors, peak voltage of RPM sensors, reluctance sensors of ignition modules, etc.
Press key [V/Ω], LED 4 will light up (Fig. 1).
Signals can be picked up by piercing the wire (Fig. 13), through the **AD33A** needle (Fig. 12) or by using the special adapter (Fig. 15 -16).
A blinking zero shows a lack of electrical signal.

6.1 Voltage on the air flow meter and throttle potentiometer

Connect the **AD33A** needle as shown in Fig. 12, turn ignition on and check that power supply voltage is within the limits foreseen by the Manufacturer (usually 5 V).

Shift the connection to the sliding contact of the air flow meter, slowly rotate the acceleration mechanism and check that voltage variation is regular and within the limits foreseen by the manufacturer.
Eg.: on ALFA 75 Turbo with LE2 JETRONIC ECU, the voltage variation on the sliding contact goes from 0.2 to 7.5 Volts.

If power supply voltage is missing, the cause could be an interruption in the power supply cables, contacts'oxidation, etc.
Voltage variation instabilities are due to sliding contacts or worn potentiometer tracks.
A high voltage residue cause an increase in RPM while the accelerator pedal is released. Check that resistance of the ground return (battery negative pole) is not higher than 0,2 V; higher resistances can be due to interruptions in the connection from the engine to the chassis, oxidized contacts, etc.

6.2 Peak voltage measurement on inductive sensors

Figs. 12 - 15 - 16. show the connection to inductive and RPM sensors.
A correct voltage of the RPM sensor ensures the engine start even at low engine speeds (discharged battery, low temperature, etc.).
Output voltage of this type of sensor is about 4 Volts with the engine at idle. Otherwise check: distance from teeth, presence of iron filings on the sensor, filed teeth, contacts'oxidation.

NOTE

Faulty TDC sensors or an excessive gap can cause a wrong operation of the injection ECU. Faulty RPM sensors usually make it stop.
If peak voltage goes below the values foreseen by the manufacturer (about 1 V at 800 RPM) with the engine at 80°C, replace the sensor. Problems at next cranking at a low temperatures could otherwise occur.

ADAPTERS FOR PEAK VOLTAGE MEASUREMENTS

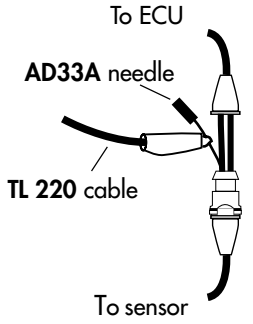


Fig. 12

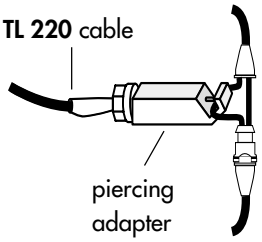


Fig. 13

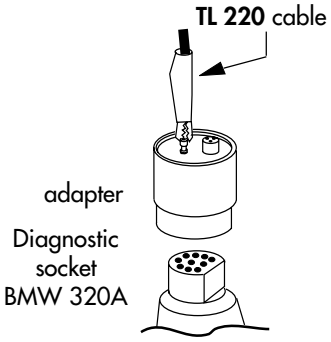


Fig. 14

6.3 Peak voltage of reluctance sensors

Peak voltage of reluctance sensors can be found on some types of ignition modules. Disconnect it from the module and put one end to ground, connect the other end to the **TL 220** cable.
Peak voltage at cranking is about 4 peak Volts and Dwell of 3 ÷ 4 milliseconds. Voltage can decrease if the distance beween the shaft teeth and the sensor increases.

6.6 Hall effect sensors

Some transistorized ignition modules are driven by a HALL effect sensor that supplies a square wave voltage to the module, with a fixed or variable dwell according to the engine speed.
There are three contacts on the sensor's connector: ground, power supply and 0 (output signal). For a complete test, check the peak output voltage and the signal's Dwell on **contact 0** of the connector. Voltage is usually 5 V. In some systems it is 12 V.

PEAK VOLTAGE OF INDUCTIVE SENSORS

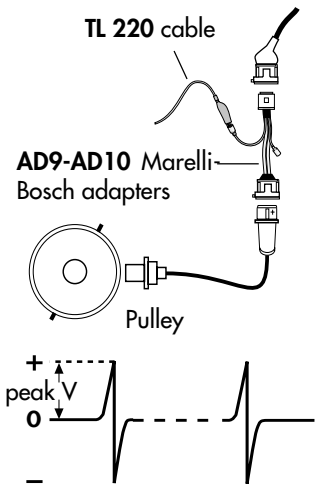


Fig. 15

6.7 Voltage drop at cranking

Connect first the **Black** and then the **Red** power clip, then connect the **TL 220** cable to the car battery positive pole (Fig. 17). Press **key D**, crank the engine and release the key one second after engine dragging. If the key is pressed too late or after the engine is cranked, voltage drop at cranking will not be displayed. Voltages below 9,6 Volts can cause fault codes in the ECU. Check the performance of battery, cranking motor and alternator's charging system.

6.8 Battery charging voltage

Bring the engine to about 3000 RPM for a few seconds, battery voltage will increase to 14.0 Volts. If voltage does not increase, check the voltage regulator and the alternator.

VOLTAGE DROP AT CRANKING AND BATTERY CHARGING VOLTAGE

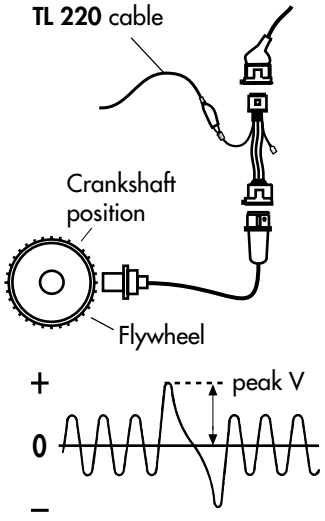


Fig. 16

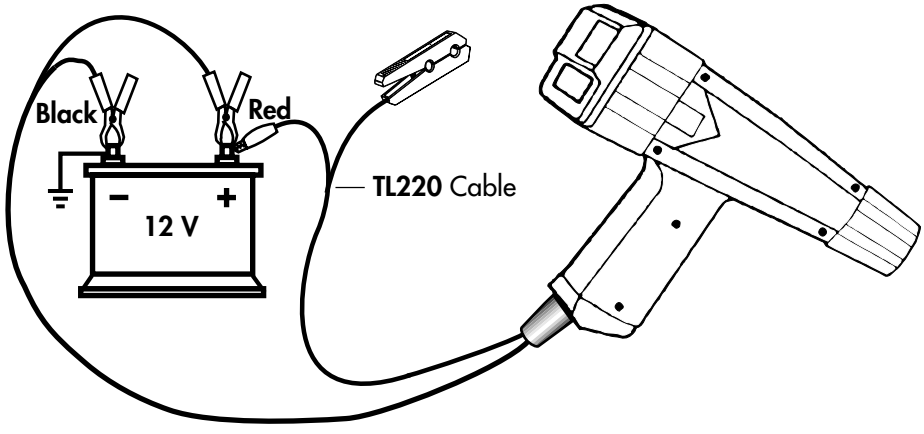


Fig. 17

7.0 STROBOSCOPIC RPM COUNTER

The unit can be used as a stroboscopic RPM counter for measuring at a distance and without any reflectors, RPM on Diesel and petrol engines and of any rotating parts, where it is not possible to pick up any synchronizing signals.

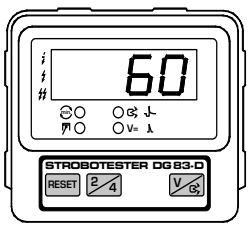


Fig. 18

7.1 With the engine stopped, trace with a white chalk a reference line on the pulley or other rotating parts. Press key RESET to set the RPM measurement and immediately after press key 2/4. Release key RESET and keep key 2/4 pressed until number 60 appears on **display 1.** The timing light will flash automatically.

7.2 Through **key C + /–** set the RPM number on **display 1** as close as possible to the engine speed estimated. Direct the flash towards the pulley and increase or decrease the RPM number displayed until the pulley rotation seems progressively slowing. The correct RPM is reached when the pulley appears still.

NOTE

The pulley could appear still even when the flash frequency is half, double or triple of the real RPM. In these latest 2 cases, the traced line would appear as shown in Fig. 19.
A halved frequency would cause a wrong rotation speed.
At engine speeds between 4500 ÷ 6000 RPM, use the stroboscope for 3 ÷ 5 minutes with 1 minute interval to avoid overheating.

FLASHING FREQUENCY AND VIEWING OF MARKS ON THE PULLEY

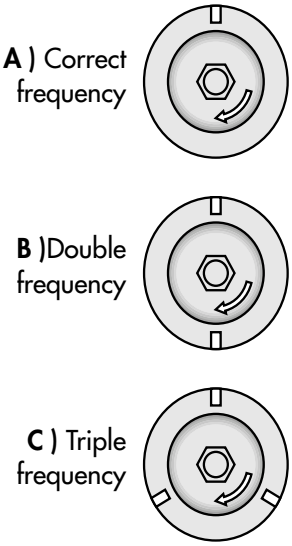


Fig. 19

STROBOSCOPIC RPM MEASUREMENT

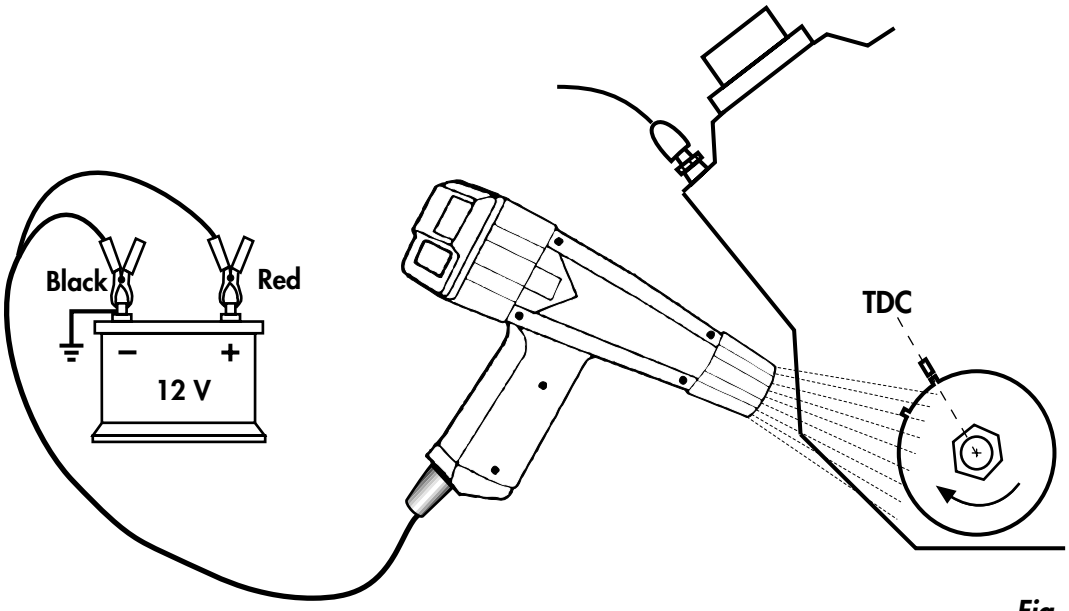


Fig. 20

SETTING FOR MEASUREMENTS

After connection to battery, the unit makes an **autotest** then it will set automatically for measuring RPM on engines with 1 spark per 2 revolutions (4 stroke 4 cylinder engines).
To measure ignition advance press **key D** and make the TDC marks to correspond by pressing **keys C + / –** .

1. **Setting the Duty cycle**
   With **key D** released, press key [V/⏚] for a while, the duty cycle (or Dwell) in mS will appear on display. To measure **Dwell** angle in **Percentage** or **Degrees** (Fig. 21), keep key [V/⏚] pressed until P1 is displayed. Select PP (percentage) or GG (degrees) for points systems through **keys C + /–** . Confirm by pressing **key D** three times and proceed with measurement.

2. **Setting the number of cylinders** (Fig. 22).
   Press key [V/⏚] until P1 is displayed. Press key **D** ; P2 and 4 will be displayed. Select the number of cylinders through **keys C +/–**. Press **key D** twice and proceed to measure.

3. **Setting one or two sparks per revolution** (Fig. 23).
   Press key [2/4] to select one spark per revolution (DIS systems or 2 stroke engines). To select 2 sparks per revolution, press key [V/⏚] until P1 is displayed. Press **key D** twice, P3 and 1S will be displayed. Press key **C + / –**, 2S will be displayed. Press **key D** once and proceed with measurement.

4. **Setting the stroboscopic RPM counter** (Fig. 24).
   Press key [RESET] then key [2/4]. Release key [RESET] and keep key [2/4] pressed until 60 is displayed. The unit will blink automatically. Trace a white line on the rotating part with a white chalk. Through **keys C + /–** it is possible to increase or decrease RPM from 60 up to 6000.
   RPM reading has to be made when the white reference line traced (fig. 25A) is still.

NOTE Follow detailed instructions for each measurement given in the relevant chapters.

Setting percentage or degrees

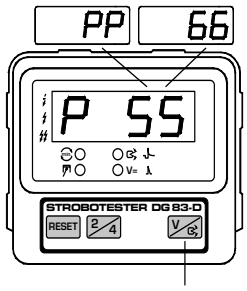


Fig. 21

Setting the number of cylinders

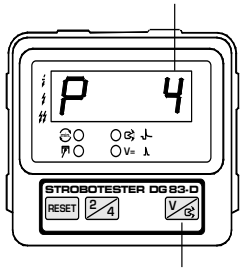


Fig. 22

Setting the number of sparks per revolution

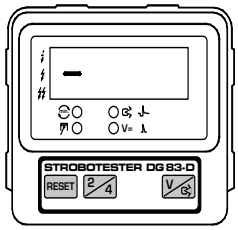


Fig. 23

Setting the stroboscopic RPM counter

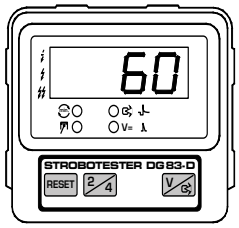


Fig. 24

DG83-D – KEYS FUNCTION

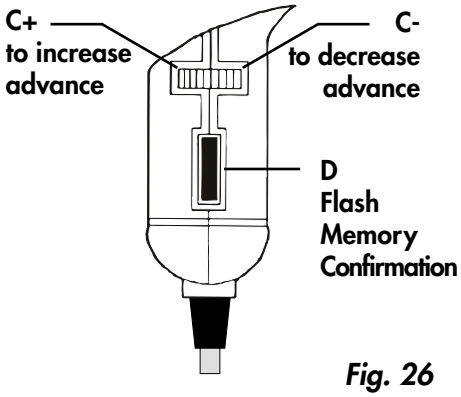


Fig. 26

Reference line

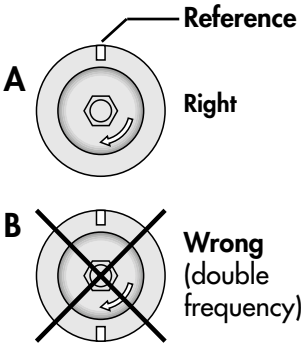


Fig. 25

mod. DG83-D SINCRO August, 08, 2009