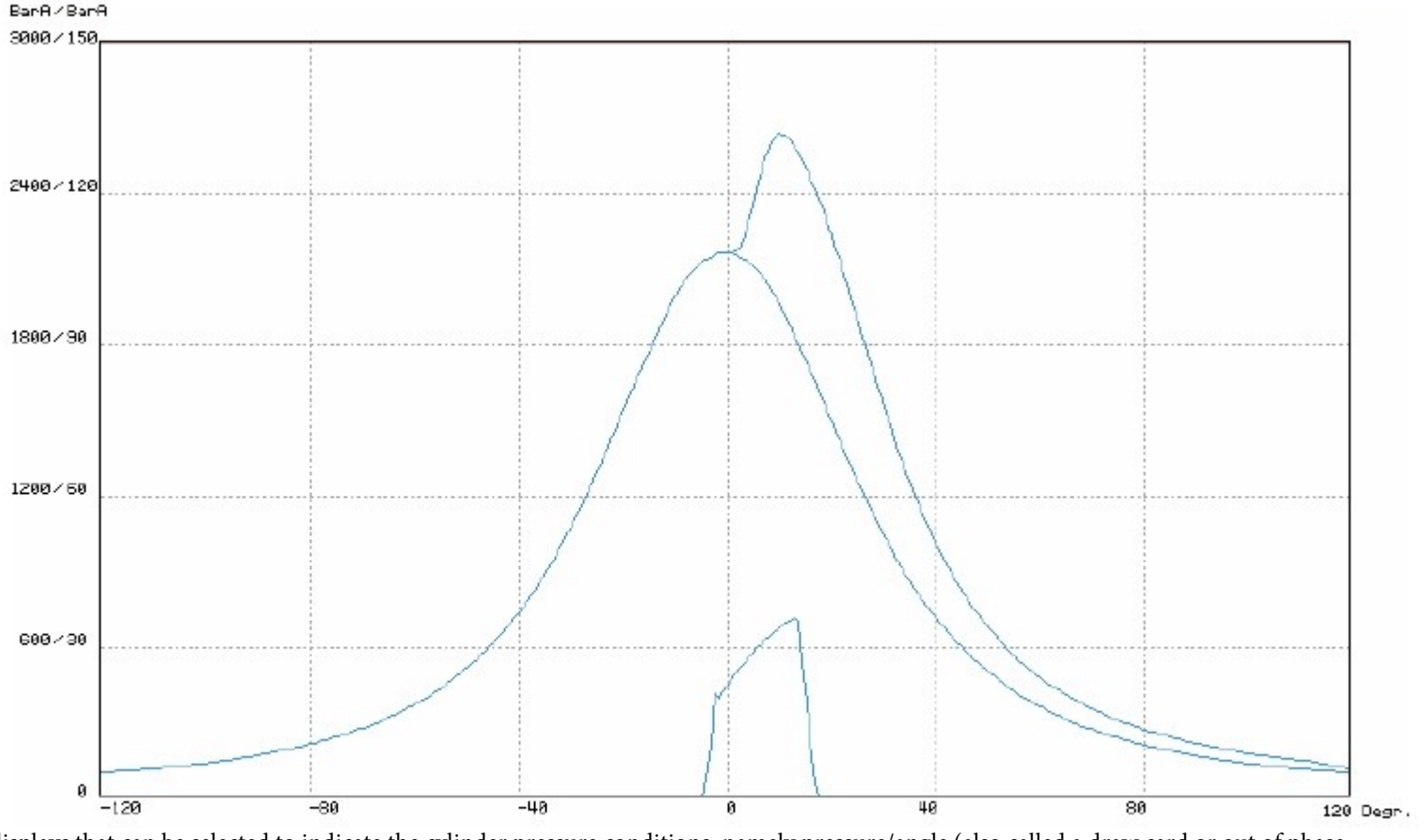
Cylinder Indication Press/Angle

GENERAL			
SPEED	:	74.0	RPM
INDEX	:	56.6	%
MIP	:	16.0	BAR
IKW	:	3655.	KW
COMBUSTION			
TIGN	:	3.2	DGR
PMAX	:	132.1	BAR
TMAX	:	10.8	DGR
PCOMPR	:	108.2	BAR
INJECTION			
PINJO	:	420.0	BAR
PINJM	:	718.1	BAR
TINJO	:	-1.9	DGR
LINJ	:	15.3	DGR



The cylinder indicator is used as a teaching aid and investigative system to enable regular monitoring of the engine cylinders to be undertaken. Faults within the combustion system can be located, and cleared using the malfunction editor function.

There are four different displays that can be selected to indicate the cylinder pressure conditions, namely pressure/angle (also called a draw card or out of phase diagram), pressure/volume (also called a power card, or in-phase diagram), the weak spring diagram, and the delta pressure/angle diagram. Each diagram can be used to illustrate differing combustion traits.

The pressure/angle diagram would be used for:

- Display the compression pressure curve, for comparisons with the other cylinders, to indicate cylinder sealing efficiency
- Display the approximate timing of the fuel ignition
- Display the fuel pressure trace (using the alternate pressure measurements of 0-3000bar.

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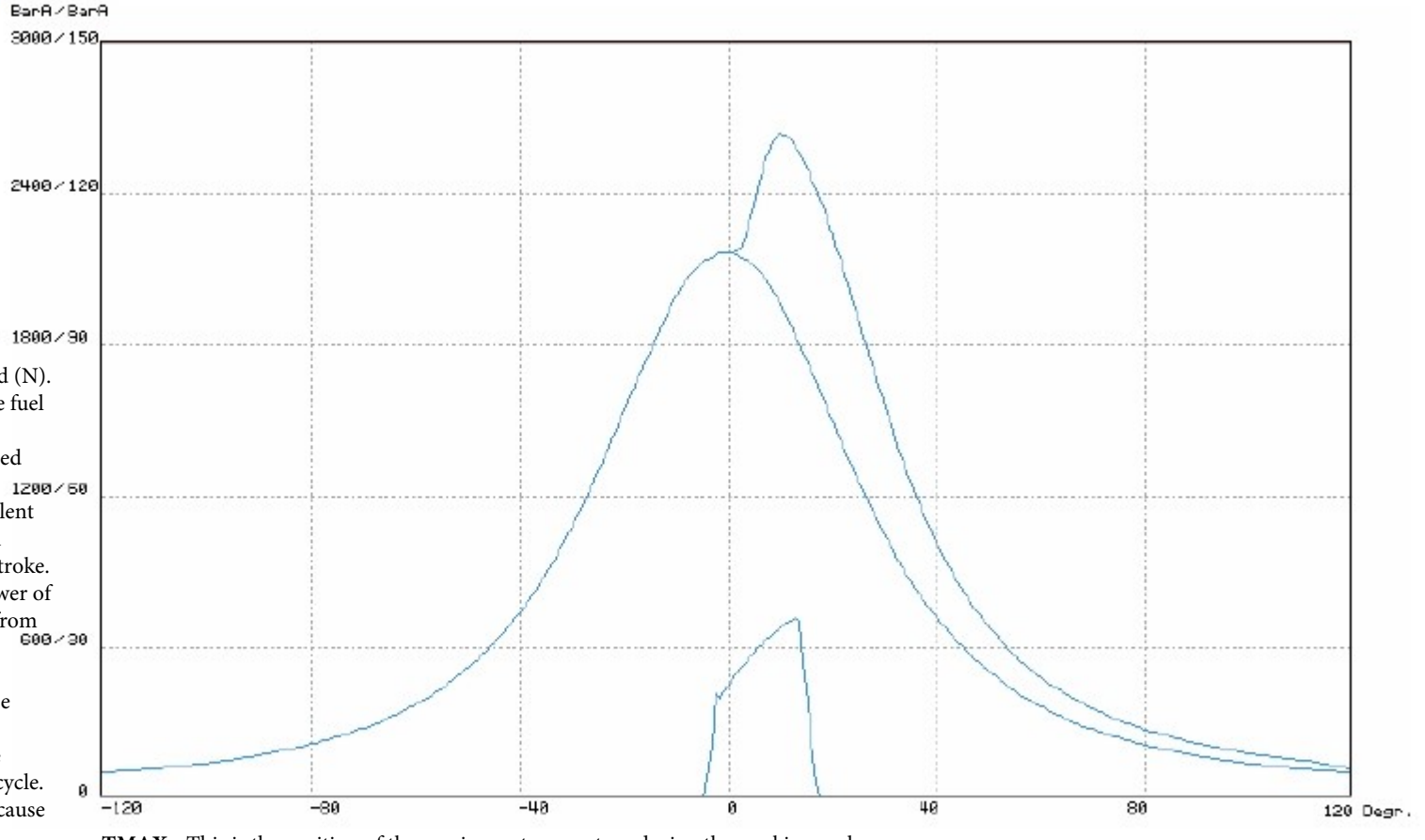

Speed - This is the engine speed (N).
Index - This is a measure of the fuel index
MIP - This is the Mean Indicated Pressure (MIP) measured in bar. This pressure is the equivalent pressure that acts on the piston throughout its vertical power stroke.
IkW - This is the Indicated Power of the cylinder, and is calculated from MIP × volume of working piston × N
TIGN - This is the timing of the ignition. The time between the TINJO and TIGN indicates the ignition delay present for that cycle. Increasing ignition delays will cause increased
PMAX and large delta pressure/ angle ($\delta P/\delta\alpha$)
PMAX - This is the maximum pressure present during the working cycle. This will be affected by the quantity and timing of the fuel admission.

TMAX - This is the position of the maximum temperature during the working cycle.
PCOMPR - This is the pressure due to compression alone after the compression stroke. It provides valuable information to the efficiency of the compression stroke, and the sealing efficiency of the piston rings, liner, and cylinder cover valves.
PINJO - This is the fuel pressure when the fuel injector opens. It provides useful information that the fuel injector is correctly adjusted.
PINJM - This is the maximum fuel pressure generated by the fuel pump. This indicates the internal sealing properties of the pump, and whether internal wear is present.
TINJO - This is the timing of the fuel injection. The fuelpump timing will change when the VIT operation is selected.
LINJ - This is the length of the fuel injection period, and isdependant on the setting of the fuel control lever.

Cylinder Indication Press/Vol

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COMBUSTION		
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INJECTION		
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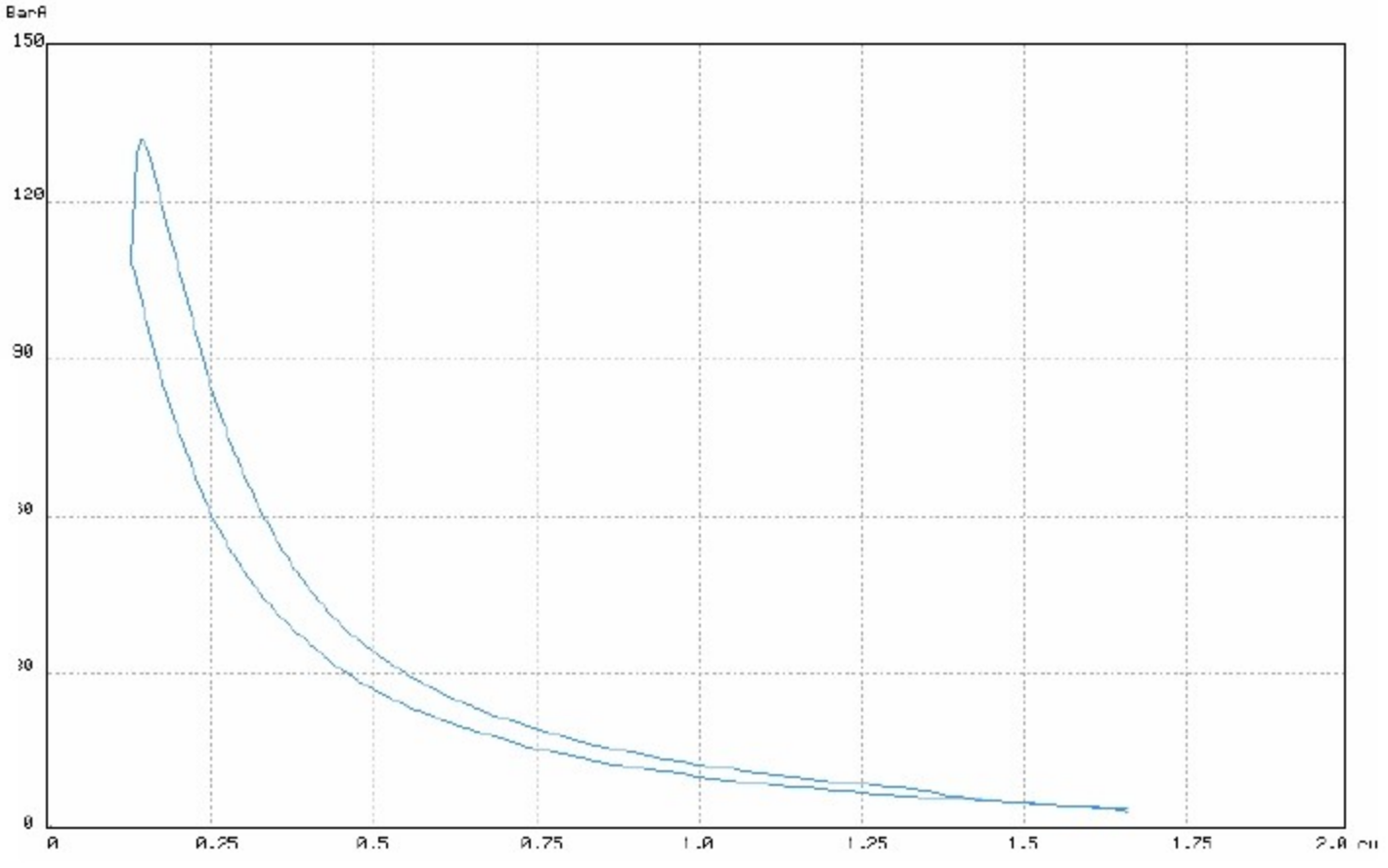

The pressure/volume diagram displays the classical p~V diagram used in thermodynamic calculations to measure the power produced within a cylinder. The x –axis displays the swept volume of the piston.

The pressure/volume diagram would be used for:

- Display the classical power diagram, where the area within the diagram equates to the power developed by that power stroke.
- Display the maximum pressure
- Display the expansion curve and thus indicating whether there is slow burning fuel or afterburning of the cylinder combustion products present.

Cylinder Indication Press/Vol

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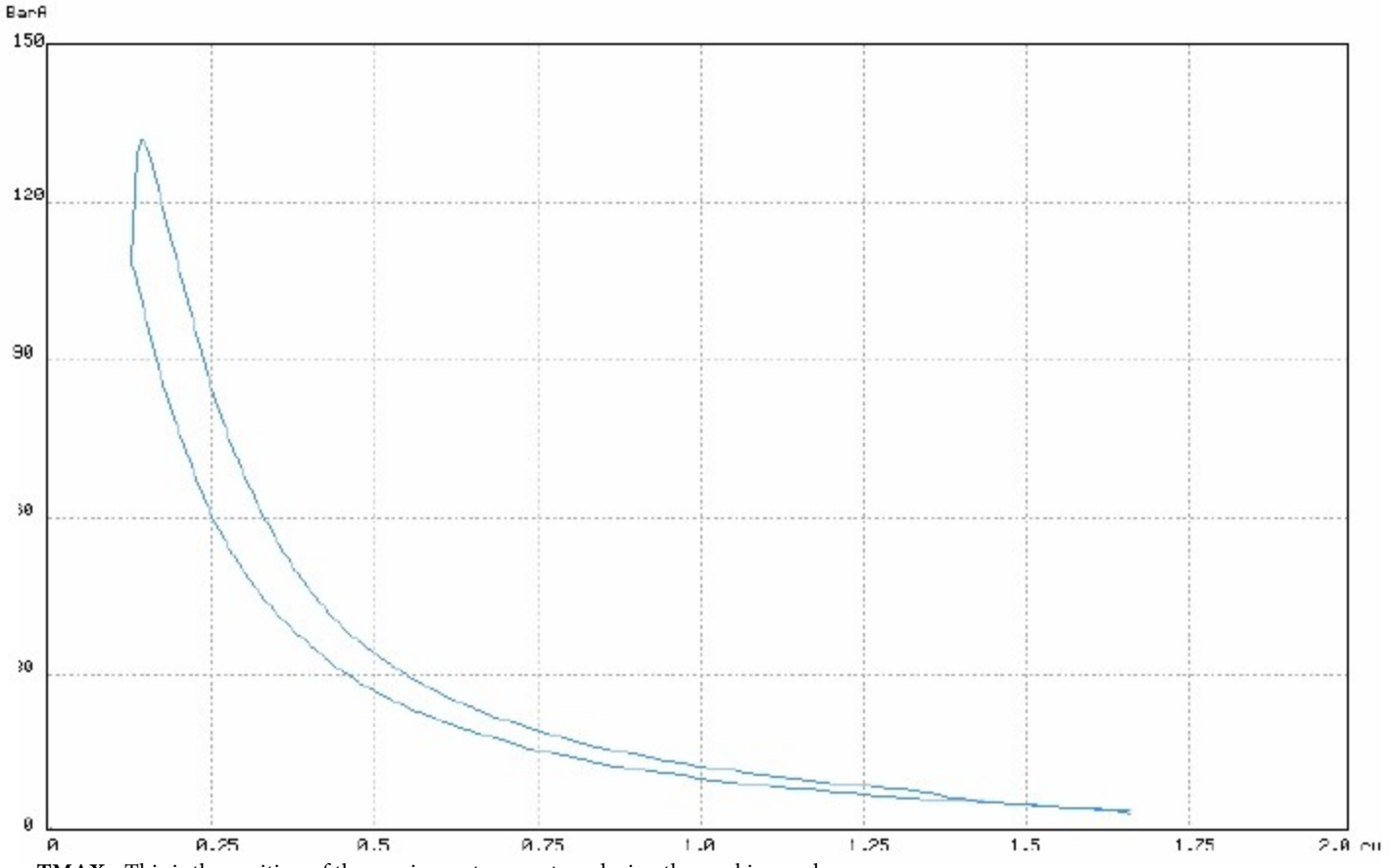

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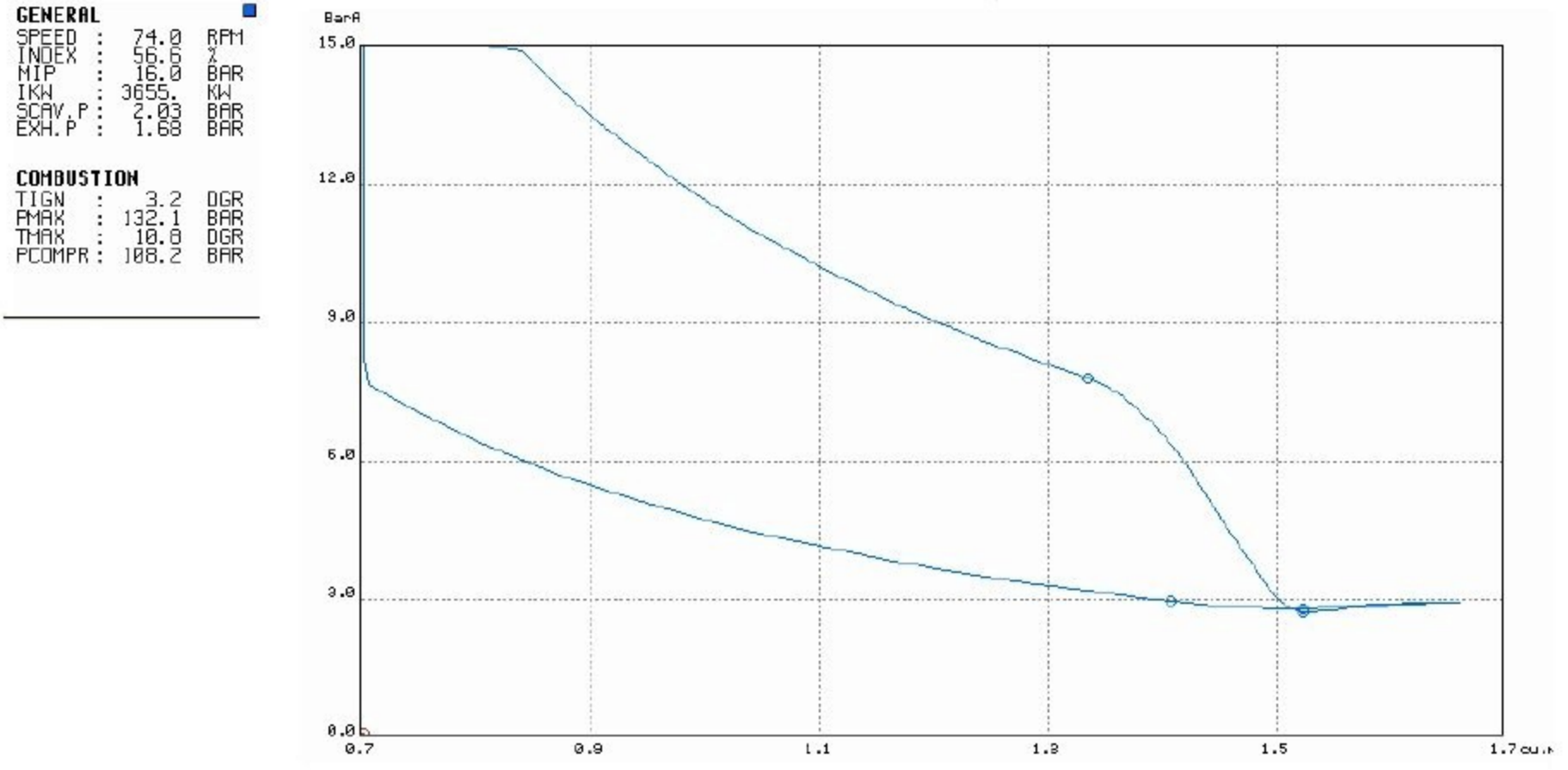
Weak Spring Diagram



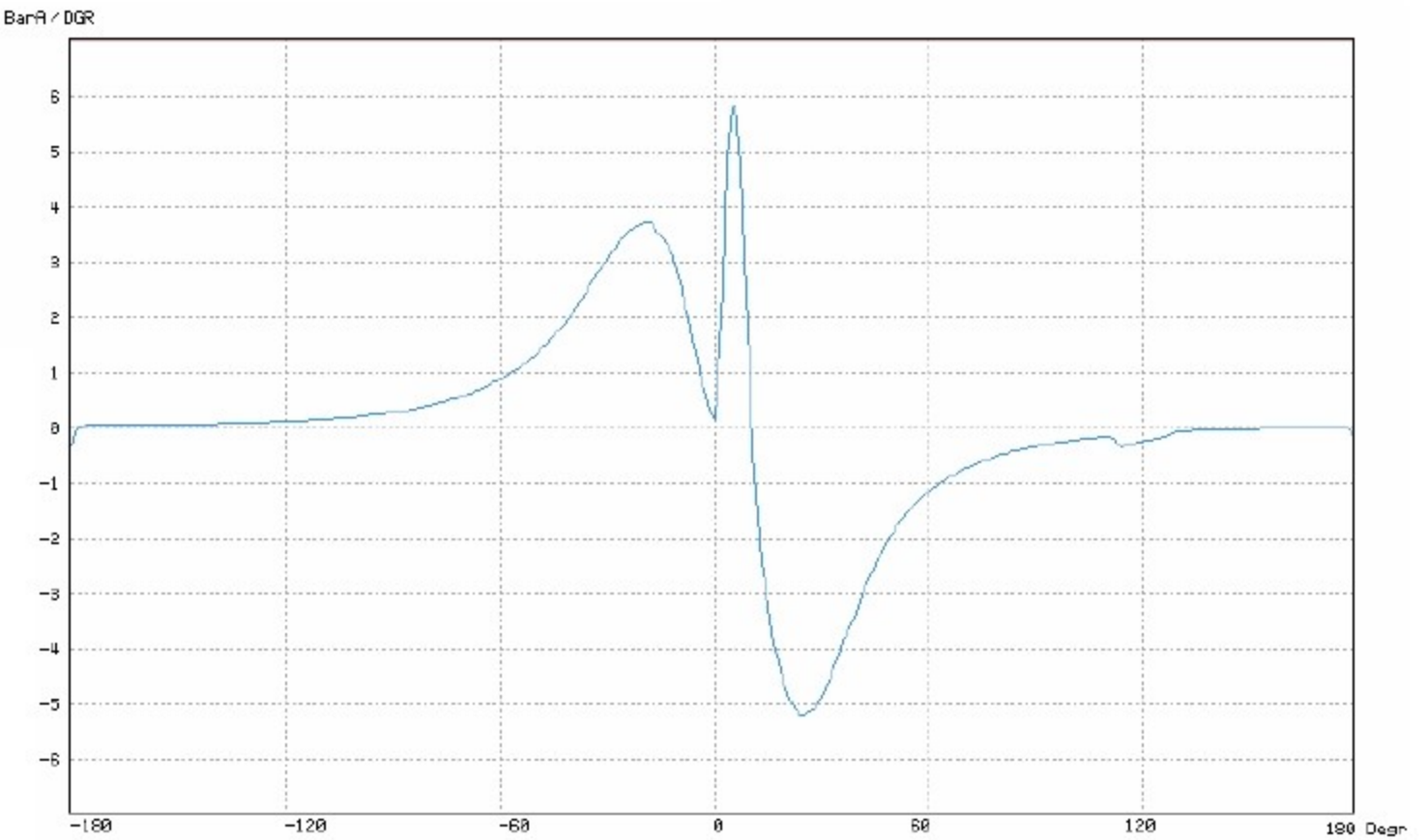
The weak spring diagram displays the scavenging process of the cylinder. The graphical display identifies the position of the opening of the exhaust valve, the opening and closing of the scavenge ports (same point before and after bottom dead centre), and the closing of the exhaust valve.

The weak spring diagram would be used for:

- Display the effects of fouled scavenge ports
- Display the effects of a leaking exhaust valve

Cyl. Indication Delta-Press/Angle

GENERAL		
SPEED	74.0	RPM
INDEX	56.6	%
MIP	16.0	BAR
IKW	3655.	KW
COMBUSTION		
TIGN	3.2	DGR
PMAX	132.1	BAR
TMAX	10.8	DGR
PCOMPR	100.2	BAR
INJECTION		
PINJO	420.0	BAR
PINJM	718.1	BAR
TINJO	-1.9	DGR
LINJ	15.3	DGR



The delta pressure / angle or pressure derivative graph is used to provide additional information about the combustion process by displaying the rate at which the pressure changes within the combustion chamber.

The delta pressure/angle diagram would be used for:

- Display the point when fuel ignition occurs
- Measure the maximum rate of pressure rise within the cylinder, to prevent shock loading damage to the piston rings and crosshead bearings.