SIDESCREEN TRIUMPHS: THE INSIDE STORY

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Disclaimer – I am a teacher, not a mechanic. The information presented here is accurate to the best of my knowledge. The cut away chassis used in this book is a combination of TR2, TR3, and TR4 parts, which are often very similar. Your car may be different in some details.

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Digging deeper is not just for English class

Sidescreen TRs (TR2s, TR3s, and the not officially named TR3As, and TR3Bs) are wonderful little cars. By modern standards they are mechanically simple, but they still have thousands of parts that must work properly for the car to drive safely and reliably. Mechanically, TR4s are very similar to TR2s and TR3s, so much of this book applies to them as well.

By seeing how the main systems work, and how they work together, enthusiasts can understand these cars better. This may also help them understand their mechanic better, too.

I will usually introduce terms in more formal language, then use terminology your mechanic might use as the discussion continues. To break up the tediousness of academic reading, sometimes you will have the chance to answer a topic related question. If you don’t want to participate, simply skip the question and continue with the material.

Let’s start our tour by looking into a Sidescreen TR engine bay.

ENGINE

For many people, this is all they’ve seen of an early TR engine.

Picture 1 - Engine bay
To begin our journey, we will identify major parts that are easily seen in the engine bay when we open the bonnet, then we will discuss the engine itself in moderate detail, and then we’ll return to the more easily seen external components (called ancillaries) to see what they do and how they help the engine run.

Pictures 2 and 3 show things like the carburetors, generator, water pump, fuel pump, coil, distributor, and starter. They are not technically part of the engine, but most are required to make it run. Things like the exhaust system are there for people as much as for engine operation.

With the body out of the way, these parts are more easily seen in pictures 2 and 3.

Figure 2 - External engine bay components, right side from driver’s view

Picture 3 - External engine bay components, left side from driver’s view

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Don’t worry about trying to figure out the components in pictures 2 and 3. We will look at them in more detail in the pages that follow. After that, people previously unfamiliar with these parts may be able to figure out those pictures, and a real car.

Now that we have identified the things that we can see easily, let’s go in a layer. That will take us to the engine, which is the heart of a car.

![Engine block and cylinder head](image)

**Picture 4 - Engine block and cylinder head**

Picture 4 is similar to picture 3 with the ancillaries removed. The engine block and cylinder head together, along with the parts in them, are what I mean when I say “the engine”.

The heart of the engine is the cylinders, so let’s go inside the engine and look at the cylinders.

**CYLINDERS**

The first thing we should do is define the term “cylinder”. It turns out that the term can be used in a couple of ways, but the different uses are related, and can be understood by context once you learn the different meanings and get some practice. They both have to do with the part of the engine that makes power. Let’s see what makes a cylinder and where the cylinders are.

The parts of a complete Sidescreeen TR cylinder are the pistons, connecting rods, cylinder liners, and combustion chamber, which we will introduce in this section. Three of those four live in the engine block, so we will look there first.

In picture 5 showing a top view of the block with the cylinder head removed, the tops of two pistons are easily seen at the top of the block, while the other two pistons are partially hidden near the bottom of the center tubes. Also seen are the tops of the four cylinder liners, the name for tubes that the pistons move up and down in.
The holes are called “cylinder bores” (often just “cylinders” or “bores”). The metal tubes that the holes are in are called “cylinder liners”. So the term cylinder can mean the hole, but it can also mean a set of pistons, cylinder liners, connecting rods, and the combustion chamber, the latter being in the cylinder head, that we will look at soon. The term cylinder becomes shorthand for the bore or the set of all four parts, whichever you are working on.

Owners of these cars should be aware of a few things about the cylinder liners. Sidescreen TR engines have a relatively rare design in which the cylinder bores are not cut directly into the block. Instead, a separate sleeve (the “cylinder liner”) fits into block and this liner is the cylinder bore. This design is called a “wet liner” engine.

If you can get the liners out of the block, the wet liner design makes it “easy” to replace worn pistons and liners, or put in bigger pistons with matching liners to get more power. (“Easy” means you don’t have to haul the heavy engine block to a machine shop for costly metal work.) With an old engine, getting the liners out can be a big if. The cars’ designers never intended for these cars to be running longer than a few years, and at that time it was expected that only a few hundred or a few thousand would ever be built. The wet liner design from their old tractor engines worked well enough for the time, so the designers used what they had.

The significance of these liners is that they can cause leaks inside the engine if they are not installed properly or if they are moved during engine work with the cylinder head removed. That’s why only people who understand this rare design should work on the inner components of these engines.

TR5 and later engines did not use wet liner engines. In fact, almost no other cars use wet liner engines.
Getting back to the cylinders, they are identified as 1, 2, 3, and 4, with number 1 being at the front of the engine, number 4 at the back. We care about this for things like properly building and tuning an engine, and identifying some types of problems.

![The four cylinders in a Sidescreen Triumph engine identified](image)

Inside the four cylinders is where the power to propel the car is created. It might be hard to visualize where this would actually happen looking at number 1 and number 4 cylinders in picture 6 since it doesn’t look like there is room to do anything. I’ll explain the process soon.

The parts in pictures 5 and 6 look very clean since they are part of a newly rebuilt engine. Other clean parts from this engine will appear later in this chapter. The parts on road-going cars don’t look like that. At least, not for long.

Several used and abused parts appear throughout this book in the form of an old chassis where some parts have been cut open to show what they look like on the inside. Unpainted metal on that chassis often isn’t as shiny as the metal in picture 6. Pictures of the cut away chassis have blue lines indicating areas that were cut open. Picture 7 is an example.
Often called motors, these assemblies are actually engines since they burn gasoline while true motors are powered by electricity. I will stick with “engine” even though your mechanic will probably call it a motor. The fan motor in a TR heater is an example of a true motor.

TR2’s, TR3’s, and TR4’s left the factory with four cylinder, in-line engines. The number of cylinders refers to the sets of pistons and related parts that generate the power to drive the car, as well as the power to do other things like turn the generator.

A few people have replaced their engines or other parts for looks or function, so your engine could look different than the one in the book.

Let’s look at a wet liner TR engine’s main internal components. Picture 8 shows the block in picture 7 with the parts put back in and the cylinder head installed. It shows the left side of the block (from the driver’s seat). The block has been cut open to expose number one cylinder and other parts inside of the block. From this angle, the blue lines that show where metal was cut are more clearly visible than in picture 7. Different directions or sizes of lines show different metal surfaces that were cut.
To learn about cylinders, we will start with the cylinder liner and piston, plus the connecting rod, which is barely visible in picture 8. Also barely visible in picture 8 are part of the crankshaft and camshaft, which we will discuss later. Not visible, in between the head and the block, is a very thin piece called the head gasket, which prevents leaks between the mating surfaces of the block and head. Most engines have head gaskets. All TRs should.

Head gaskets can fail due to engine overheating, corrosion due to age, poor quality, or improper installation. Head gasket failure can result in ruined oil, using coolant, overheating, and compression loss.

In addition to the head gasket which sits above the liners, wet liner engines also have another set of gaskets at the bottom of the liners where they sit on the block. Sidescreen TR engines have two of them; they are called “figure of 8” gaskets because of what they look like. They also can leak,
resulting in water getting into the oil. That is bad. Replacing them means taking apart the entire engine.

In pictures 5 and 6, we saw the tops of the pistons and liners. Picture 10 shows what they look like out of an engine. The left image also shows a connecting rod sticking out below the piston.

The piston and connecting rod are joined together with a wrist pin, which fits into the hole seen on the side of the piston shown above.

The engine produces power when a piston is pushed down its bore (cylinder liner) by burning fuel. The piston pushes its connecting rod, which converts the up and down motion of the piston to a rotating force. That rotating motion ultimately turns the rear wheels.

Each complete trip a piston makes up or down its bore is called a “stroke”.

Picture 10 - Left: piston with connecting rod; right: liners
In picture 11, the piston is at the bottom of its stroke in the left image, in the middle of its stroke in the middle image, and in the right image it is at the top of its stroke, essentially reaching the top of the block. This clearly shows the range of travel of this engine’s stroke.

Picture 11 - Piston stroke

Picture 12 shows the same thing from a different perspective where the cylinder liners are more clearly distinguished. The right image shows the top half of the connecting rod inside the piston. In both picture 11 and picture 12, the right image shows the piston at what we call “top dead center”.

Picture 12 - Piston stroke, alternate view