

QX COMPONENTS LTD



Technical Data Booklet



We have created this Technical Data Booklet to put the industry jargon into plain English.

There are useful tips in:

Identifying the layout and the hand of a unit.

Handy wiring hints.

Diagnosis of everyday fitment faults.

We hope this booklet acts as a useful tool when you are confronted with a question but please bare in mind we are here to help and only a phone call away.

Kind Regards

Andy, Alan, Dave & Rick

The Sales Team QX Components Ltd

Should you require any technical assistance do not hesitate to give Andy Shevlin or Dave Frost a call on 0161 746 7676.

Great your customer has bought an alternator

They can fit it and forget it, not quite true, 85% of all alternators fitted to cars with a discharged / flat battery will fail within 30 minutes.

He must make sure his battery is fully charged, if it isn't the alternator is not designed to and cannot cope with the demand of handling the vehicles electrics and charging a flat battery.

The likely result is an overloaded alternator which will blow the rectifier, rendering the unit useless.

Common General Faults

Alternators:

- **No charge:** Loose or missing fan belt.
Break in wiring.
Blown / corroded fuse or fuse link.
Blown rectifier diodes, (often caused by jumpstarting a vehicle without first disconnecting the Alternator).
- **Low charge:** Loose fan belt.
Poor wiring connections.
- **Overcharging:** Poor battery condition.
Failed Regulator or Rotor.
- **Noisy:** Loose or damaged fan belt.
Loose pulley.
Worn Alternator bearing, (often caused by an over tightened fan belt).
- **No warning light:** Blown warning light bulb.
Poor Alternator earth connection or broken wire.
Relay problem.
- **Dim warning light:** Loose fan belt.
Loose wiring plug.
- **Continuous light:** Poor wiring connection (common mistake when plugging in the A127 series is the small warning light terminal gets bent over touching earth).
Loose fan belt.
Defective alternator.

Alternators (the jargon)

Internal Fan (Bird cage)

The conventional alternator for many years has been an alternator with both the fan and pulley on the outside of the unit.

The internal fan or “bird cage” has just the pulley on the outside; it also has two fans but these is fitted on the inside of the unit.

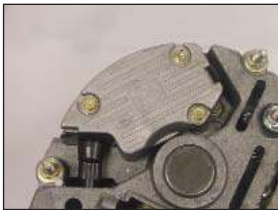
The fan is fitted internally to simply provide cooling to internal components.



INTERNAL FAN

Internal Regulator

98% of vehicles on the road today have an internally regulated alternator; the regulator is either inside the alternator or bolted to the back of the unit.



A127 TYPE



BOSCH TYPE

Slotted Bracket

Some French models have an alternator with what we call a slotted front mounting bracket; this aids in the fitment of the unit it also allows the fixing bolt to be removed from the side.



SLOTTED BRACKET ALTERNATOR

Alternators and Starters with Coolant, Fuel and Oil contamination don't mix

Can you imagine pouring a few pints of oil into your washing machine motor; yes your right it would not last very long.



Alternators and Starter Motors do not like such contamination either.

It gets between the brushes and the slip rings or armature, causing them to shred and turn to paste.

The oil also impregnates the stator or armature and prevents the heat generated from dissipating therefore causing the unit to overheat and fail.



If when you sell a unit and your customer gives you the old unit with evidence of such a leak, please suggest the leak is repaired before fitting the new unit; after all it is in his interests.

The most common vehicles that seem to suffer with this problem are Ford 1.8 diesel engines and Volkswagen petrol engines.

Identifying Lucas A127

One of the most popular types of alternators that we supply is the Lucas A127 an external fan type.

Lucas A127 is supplied as left or right hand and in spade or stud wiring terminals.

The easiest way of identifying the hand of this series of alternator is by following the simple guide below.

If you place the alternator with the pulley end facing you and with all three mounting brackets on a flat surface (the alternator will not sit completely flat it will rock on its brackets) the side with the two fixing brackets determines the unit's hand.

Examples of this below:

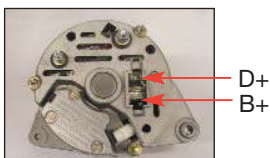


Left hand

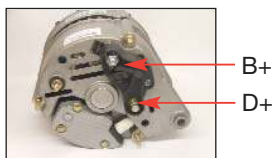


Right hand

As previously mentioned both hands are available in Spade and Stud wiring:



Spade wiring (Up to 65 amps)



Stud wiring (From 70 amps)

Below a chart to identify the unit you require.

QX Part number	Hand, Wiring & Amp's
QA0476	Right hand, Spade terminals, 55 amps
QA0475	Left hand, Spade terminals, 55 amps
QA0561	Right hand, Spade terminals, 55 amps
QA0563	Left hand, Spade terminals, 55 amps
QA0705	Right hand, Stud terminals, 70 amps
QA1147	Left hand, Stud terminals, 70 amps
QA1432	Right hand, Spade terminals, 65 amps
QA1502	Left hand, Stud terminals, 70 amps
QA1514	Left hand, Spade terminals, 65 amps
QA1515	Right hand, Spade terminals, 55 amps

Warning;

When fitting the pulley from the old unit to a new unit it is important NOT to drag the bearing.

This is caused by over tightening the main nut on the rotor shaft, where possible it is advised to use an air tool for this procedure.

We still have the odd unit returned with damaged regulator brushes, the normal cause of this is when a customer attempts to change the hand of a unit from left to right hand or vice versa.

If you do try this procedure please first remove the regulator from the back by undoing the three 6mm bolts, you are then free to undo the through bolts and turn the front bracket **ONLY** 180 degrees before reassembling.

Lucas A115i and A127i

The Lucas A127 alternator was up dated around 1992 with two new series of alternators the A127i and the A115i; these are both the internal fan type.

These two newer series of alternators were designed as a higher output option ranging from 70 to 120 amps.

Again they are available in left and right hand and also with the introduction of four mounting brackets. The hand of these units **can not** be changed.



Left hand 3 brkt



Right hand 3 brkt



Picture of 4 brkt

A common complaint we encounter when either an A127i or an A115i alternator has been replaced is the warning light on the dash board staying on.

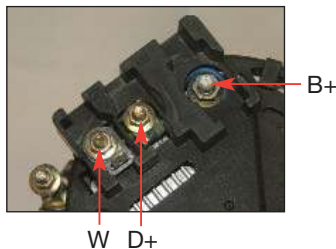
This is due to a mix up when connecting the wiring, the terminals are marked.

B+ Main battery feed.

D+ Warning light

W Phase terminal (12 volt output)

The mistake made is connecting the warning light to the W terminal not the D+ as it should be, this mistake causes the warning light to stay on.



Warning:

Although these units are the later version of the A127 and they don't easily interchange.

Chrysler Alternators

The Chrysler alternators normally fitted to most Neon and Voyager models have unusual wiring, it comprises of a main 8mm stud terminal and a round or oval plug with only 1 or 2 pins.

These alternators continuously overcharge in excess of 17 volts; the normal charge rate of between 13.5 and 14.5 volts is then regulated by the vehicles ECU (Electronic Control Unit).

This works similar to how an external regulator would regulate the charge rate, before the introduction of units with an internal regulator.

Our past experience of these units is the alternator is very rarely at fault and any poor charge rate is due to an ECU or vehicle fault.

Chrysler Voyager / Jeep Cherokee 2.5 diesel TD Starter Motors

These vehicles have inherent problems with Ring Gears and Starter Motors. If there is any uncertainty whether the Ring Gear has been changed please do not fit any replacement Starter Motor without unit clarification.

The two units affected are QS1828 and QS2536.

To correctly identify the new unit we require original BOSCH body numbers, nose cone casting numbers and number of teeth must taken from the old unit. Only then can a new unit be supplied.

WARNING, The above information is a must.

THIS UNIT IS A VERY DIFFICULT UNIT TO FIT AND THE TIME INVOLVED IN REPLACING IS APPROXIMATELY FIVE HOURS.

FITTING AN INCORRECT UNIT CAN ALSO DAMAGE THE STARTER MOTOR NOSE CONE.

My replacement Alternator is fitted with a standard pulley, where the original had a clutch pulley

The Clutch Alternator Pulley was pioneered by Audi, BMW, Mercedes, Seat and Volkswagen.

The idea of which was to reduce possibility of sudden snatch when coming down from high revs such as motorway driving to a standing stop thus prolonging the life of expensive automatic tensioners.

Unfortunately the pulley design was such that they failed after a relatively short period of time and that they are a costly service item.

QX Components has looked into the fitment of these pulleys in great detail and we now fit a standard non clutch correctly spaced pulley in place of the prone for failing clutch pulley.

This is of no detriment to the performance of the unit and if anything extends the life of a regularly replaced OE item.

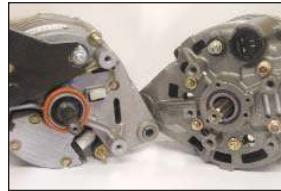
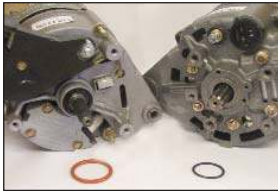


Diesel Alternators with a vacuum pump fitted

All diesel alternators fitted with a brake vacuum pump have a seal fitted in the pump or into a recess in the rear bracket.

When refitting the old pump to the new alternator, please check the condition of this seal and if necessary replace it when changing the pump.

Failure to do this is likely to cause an oil leak and damage to the new unit.



Part numbers affected.

QA0881, QA1086, QA1561, QA1685, QA1720, QA1722, QA1910, QA1913, QA1922, QA2026, QA2339, QA2982, QA2986, QA3189, QA3190, QA4126, QA4127, QA4128, QA4211.

Another problem we occasionally come across on this type of diesel units is where the old Vacuum Pump will not fit the replacement unit.

All QX units are OE remanufactured units; you tend to encounter this problem when replacing a spurious previously changed alternator.

The spurious units are manufactured and sold as new units complete with a vacuum pump the problem you then get is the new units are built with a non standard rotor (main shaft) which can vary in length and splines where the OE remanufactured units are all one length and number of splines on the rotor.

If when replacing the pump a unit locks up or is a different number of splines QX Components can supply a replacement pump to suit.

Full list of all vacuum pumps available are towards the front of our current catalogue.

A common problem with Fiat Marelli Alternators

Most Fiat Marelli alternators suffer from a slipping fan belt; this is incorrectly diagnosed as an alternator fault when correct tension or a replacement fan belt is required.



The above photo shows heat marks on the alternator pulley. A slipping fan belt has caused the pulley to become hot and causing the pulley to become red rusty.

Contrary to a popular misconception not all slipping fan belts squeal. Most slip quietly.

Part numbers affected are:

QA0370
QA0371
QA0374
QA0796
QA0933
QA1092
QA1097
QA1100

Ford common faults

Ford Escort, Fiesta and Orion models from 1992-2000 when fitted with a Mitsubishi OE alternator have all shown the same overcharging problem, by replacing the alternator it will not cure the problem.

The vehicle is fitted with a fuse link that in most cases breaks down and goes open circuit, this then tricks the alternator in to thinking the battery is low and demands full out-put to compensate.

Replacing the fuse link normally cures the problem.

Affected part numbers QA1150, QA1155, QA2090, QA2233 and QA2334.

A common fault on Ford models is with the Mondeo 1.8 TD 1993-2000, due to the positioning of the alternator leaking oil pipe connections to the turbo allow oil to drip onto the alternator causing the alternator to fail.

You must check all pipes and seals to the turbo and if necessary replace before refitting a new alternator.

Affected part number QA1540

For further information see section headed “Alternators and Starters with Coolant, Fuel and Oil contamination don’t mix”.

A common Ford fault is with the Cougar 2.0 & 2.5 V6 and Mondeo 2.0 & 2.5 V6 1994-2000.

The battery cable (B+) can be misrouted and tends to work loose, this obviously carries a risk of electrical short.

Ford raised a recall issue in 2001 to Check B + terminal torque and cable routing, replace any damaged cable if necessary.

Affected part number QA1721, QA2619 & QA3113.

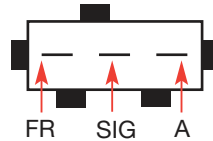
Ford Focus, Mondeo, Transit, wiring and testing

Ford Focus 1.4 1.6 1.8 1.8D 2.0 99-
Ford Mondeo Late 2.0 2.0TD 2000-
Ford Transit 2.0 2.4TD 2000-

QA2236, QA2242, QA2243
QA2746, QA3193
QA2747, QA2750

Late 3-pin regulator Alternators (Terminals Fr Sig A)

ECU pulse feed from Alternator (Sig Terminal)



Picture of late style plug

The accelerator unlike earlier cable models is electronically controlled (fly by wire) and therefore has a sensor and switch on the pedal box underneath the accelerator pedal.

This switch is prone to failure and once failed results in the battery warning light staying on permanently.

In most cases this is diagnosed as an alternator fault **NOT** a switch fault, replacing the alternator will not cure that fault.

These alternators have an in built setting which will read around 14.4 volts with just the battery connected and without any input to the 3 pin wiring plug.

Therefore if you were to test it by conventional means your reading would be static and not fluctuate.

Specialist testing equipment is needed to test these types of alternator efficiently.



Land Rover common faults

Most Land Rover Defender, Discovery and Range Rover 2.5 diesel models regardless of year of manufacture all seem to suffer from the same problem **BAD EARTHS** on both Alternators and Starter Motors.

Before installing the replacement unit on a vehicle with a discharged (flat) battery, non-start or non-charging please check the condition of all earth connections within the engine bay and if corroded replace.

Affected part numbers are QA1502, QA2097, QS1461, and QS1693.

Another Land Rover fault is quite an unusual one:

On the Defender and Discovery TD5 models the alternator is fused through the brake / stop light circuit.

Should the fuse for the brake lights blow the alternator will not charge, always check this fuse before replacing what appears to be a faulty alternator.

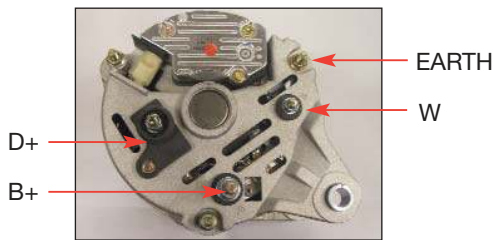
Affected part number is QA4120.

Wiring warning on Nissan Primera Alternator (QA1452)

The wiring on this alternator can be confusing.

When connecting the wiring on this type of alternator our QA1452 please ensure the earth terminal is connected to the tagged through bolt, do not connect to the W (phase) terminal.

Connection of earth to the W (phase) terminal will short circuit the unit and render it useless.



wiring of QA1452

Three popular Vauxhall Diesel alternator faults answered

One of the most popular units ever fitted to Vauxhall Isuzu diesels is the **QA2026**, this was fitted to pre 1996 cars and had a brake vacuum pump fitted, it suffers from three main faults.

One

A query we receive on Vauxhalls with the 1.7 Isuzu diesel engine is when the QA2026 will fit but the wiring is different.

General Motors / Vauxhall used two types of OE alternator:

The most common one is an Hitachi OE type, this type has a main battery feed of an 8mm stud and a round three or four pin plug.

The rotor shaft to take the brake vacuum pump is 8 spline.

The second is a very rare and unusual Mazda OE type, this type also has a main battery feed of an 8mm stud, a separate spade terminal and also a two pin (T) shaped plug.

The rotor shaft to take the brake vacuum pump is normally 16 spline

Two

Due to the OE specification the original 70 amp unit is inadequate and unable to cope with prolonged cold start conditions of a winter morning along with a vacuum pump being fitted there is impaired airflow not allowing the unit to cool efficiently.

These factors all caused the OE unit to fail; this has been over come mainly by remanufactures using heavy duty parts.

Three

Another fault on vehicles fitted with this alternator is the charging circuit comprises of a charge light relay.

One of the functions of this relay is to control the vehicles charge warning lamp and it is recommended this relay is replaced when replacing a faulty alternator, failure to replace the relay can cause the warning light to stay on with a the newly fitted alternator.

This relay is a grey five pin type normally located in the near side or off side kick panels or to the rear of the glove box depending on age of vehicle.

Wiring differences on late Audi, Ford, Skoda and VW Alternators

We are regularly asked the difference between the types of wiring on all the late Audi, Ford, Skoda and Volkswagen models fitted with the three and four bracket Volkswagen alternators.



3 bracket VW



4 bracket VW

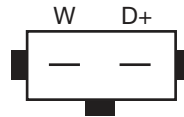
There are basically three different types of wiring:

Type 1 W / D+

This is the earliest type of wiring used from 1992 to 1997; the terminals are very straight forward.

The **W** is the phase terminal this operates the rev counter or a glow plug relay on diesel vehicles.

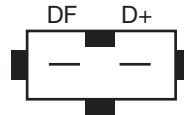
The **D+** is the battery warning light terminal.



Type 2 DF / D+

This type of wiring is also used from 1992 to 1997, unlike the W / D+ it is very rare. The **DF** terminal is a **Digital Field** terminal that cannot be tested without correct knowledge and equipment.

The **D+** as in the earlier type is the battery warning light terminal.



Type 3 L / DFM

This wiring is the later type used from 1997 onwards, and is widely used across other manufactures.

The **DFM** terminal is a **Digital Field Monitor** terminal that cannot be tested without correct knowledge and equipment.

The **L** terminal is the later version of a **D+** terminal and as in the earlier version is the battery warning light terminal.

All the above also have a main battery stud marked B+.



Common General Faults

Starter Motors:

- Clicks only: Poor wiring connections.
Defective solenoid.
Defective ignition switch.
Defective Starter Motor.
Poor earth connection.
- Turns slowly: Poor battery condition.
Poor wiring connections.
Corroded battery cables.
Generally worn Starter Motor.
- Running in mesh: Defective ignition switch.
Sticking solenoid.
Sticking pinion.
- Noisy in operation: Loose mountings.
Locating dowel (if applicable) not fitted, or fitted askew.
Ring gear damage (although this is extremely rare the ring gear is made of hardened steel and the drive pinion is made of mild steel)
Defective pinion.

This Starter Motor looks completely different

Another common complaint is with Japanese and Skoda fitment starter motors.

There are two body styles:

Japanes

A conventional looking type with a nose cone and open nose geared type



Skoda

A small body open nose geared type.

A large body conventional looking type with a nose cone

Although these different types do look completely different they do interchange



This Starter Motor has a different number of teeth

A common complaint we receive is again with the Citroen, Peugeot & Renault models especially the diesel engines and a popular Mazda & Kia petrol engine.

There are a number of different OE units that all look slightly different and have a different number of teeth.

Despite any uncertainty on whether these units do interchange they all do, the important part is the actual pitch of the drive **NOT** the size or number of teeth.



Part numbers affected.

QS0516, QS1327

QS1335, QS1543.

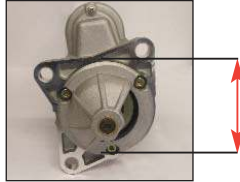
QS1800

This Starter Motor I bought from you is noisy

The distance between the starter motor drive teeth and the ring gear is critical.

Starter Motors locate in to the gear box housing in two different ways in order to maintain this correct positioning.

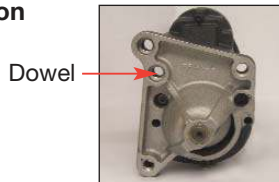
Conventional mounting:



QS1221 showing diameter of bolt face

This unit has a raised circle of a precise diameter which locates in to the gear box.

Dowel mounting, found on most Citroen, Fiat, and Peugeot & Renault models:



QS1800 showing dowel

This unit has a locating dowel situated between the gearbox and the starter, this dowel ensures correct alignment of the unit.

When the old starter is removed the dowel either stays in the gear box or in the nose cone of the old unit, to ensure correct alignment the dowel must be removed and refitted in to the new unit.(You will be surprised at the amount of old units returned to us with the dowel still in the bracket)

Failure to do this will make the unit noisy in operation and could cause premature failure.

Some of the part numbers affected:

QS0537, QS1231, QS1335, QS1341, QS1343, QS1386, QS1398, QS1540, QS1541, QS1542, QS1543, QS1781, QS1800, QS1802, QS1805, QS1806, QS1807, QS1982, QS2286, QS2301, QS2402, QS2409, QS2504, QS2540, QS2542, QS2550, QS2557, QS2572, QS2700, QS2711, QS3010, QS3011, QS3012, QS3013, QS3014, QS3059, QS3060, QS3063.

The most common cause of Starter Motor Failure

The demand for modern day starter motors to be more powerful yet smaller for weight and fitment to suit new engines does come with a problem.

The most popular fault we encounter is where a starter has literally burnt out.



Upon inspection of a burnt out unit there is always obvious tell tale signs:

- A strong smell of burning, often the armature will have exploded and loose metal fragments will be visible in the nose cone.
- Blue armature shaft and drive (again a sign of overheating).
- Drive teeth chewed up by the vehicles ring gear.
- A slipping drive / clutch assembly (easily identified if you can spin the starter drive by hand easily both ways).

All these faults are normally caused by the starter motor getting excessively hot.

There are a number of reasons as to why a unit gets this hot but the most common three reasons are:

A vehicle is generally a poor starter and it has been over cranked.

The vehicle runs out of fuel and again it gets over cranked.

But the final and most common fault is when the vehicle has a faulty ignition switch causing the starter to stick in mesh.

This fault occurs with all late Vauxhall petrol and diesel starter motors and Vauxhall will not change a starter motor without changing the ignition switch.

A few of the part numbers affected:

QS1306, QS1377, QS1464, QS1513, QS1825, QS2100, QS2292, QS2404, QS2504, QS2548, QS2580.

Fitting QS2518 Ford Mondeo Transit 2.0, 2.4 diesel 2000-

We often get a problem where an old unit is replaced due to age and within a matter of days the new unit has failed especially when fitted to the 2.0 & 2.4 Duratorq Ford diesel engines.

Due to the fitment of this unit i.e.; it bolts on to the gearbox face down unlike the more conventional style fitments.

The majority of later Ford models have the Dual Mass Flywheels this causes an excessive build up of clutch dust; the clutch dust will then mix with the grease in the new starter drive and cause the new starter drive to cease.

There is a simple way of testing a starter drive by hand.

A healthy drive will turn with resistance one way and will not turn the other way, a seized drive will not turn either way and a failed drive normally turns freely both ways.



This is the main failing point of this unit and if the gear box aperture where the starter fits is not cleaned thoroughly before fitting the new unit, the new unit is likely to fail.

Jeep Grand Cherokee 4.0i Petrol

An intermittent start condition on the Jeep Grand Cherokee 4.0 petrol engines has been reported on several occasions.

What was thought to have been a starter fault is now realised as a wiring fault on the vehicle.

The cause of the fault has been traced to corrosion of the earth wire to the starter relay; this causes the relay to release slowly or occasionally keeping the starter engaged for a short time.

You should check and replace this connection if necessary.

Identifying VW open nose / semi supported Starter Motors and common faults

There are two types of Starter Motors that are fitted to the majority of VW models.

The traditional open nose type:



Copper bush

Picture of open nose type showing bush

This type of starter motor has a hollow copper bush which presses in to the gear box face and then the armature end of the starter locates in to this bush and supports the armature.

This bush must be removed when removing the old starter motor and replaced with the new one provided.

Failure to fit this bush will cause the starter to be lazy in operation, overheating of the new unit and ultimately premature failure of the unit.

Part numbers affected:

QS1356, QS1448, QS1607, QS1925, QS1926, QS1927.

The second and newer version of the VW starter is the semi supported type or bulbous type as it can also be called.



Bulbous type

This type of Starter does not have the same style of fitment as the earlier type and does not suffer from the same fault, although the most popular failing point that we encounter is the drive pinion is chewed up.

How to polarise a Dynamo

Although old and not a regular sale, we are often asked whether the standard C40 dynamo our QD0100 will be suitable for negative and positive earth vehicles. The answer is yes, the unit simply needs to be polarised to the earth of the vehicle. A simple procedure, bolt the Dynamo to the vehicle, you then have two spade terminals (one large and one small), the cable with the large 35amp connector (battery lead) should then be flashed across the small 15amp spade terminal on the body of the dynamo, this polarises the unit, then simply connect the two spade terminals to the appropriate terminals.





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