airbond

THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION 2019

Airbond Splicers

131 Series Splicers

Splicers for Carpet and Upholstery Yarns

GTW Developments Group Ltd., Unit 1, Pavilion Industrial Estate, Pontypool, NP4 6NF, UK

Tel. +44 1495 755661
Fax. +44 1495 752619

Web: www.airbondsplicer.com
Email: enquiries@airbondsplicer.com

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The new-generation Airbond splicers

Airbond has a well-established reputation for supplying tough, reliable splicers. We have achieved this reliability by developing simple designs, and by the use of rugged components.

We have now moved on; our products are now even simpler, and even stronger. We've done this by investing in cutting-edge new additive-manufacturing (3d printing) technology.

From 2020 onward, all Airbond products will be printed, in materials which are more durable than those used in the past.

The first generation of printed products will be familiar to our customers; they are direct replacements for the existing products - identical in shape and function.

The Model 131 is the printed equivalent of the long-established 101.

Model 131

The successor to the long-established Airbond Model 101

The old Airbond Model 101 was an innovation in splicing, and it became the industry-standard. It which has been used world-wide by carpet manufacturers and spinners since the mid-1990s. Manufactured using completely new techniques, the 131 is similar in size and shape to the 101, but is a radical advance.

Like the Model 101, the 131 can join a vast range of yarns. It can join high- or low-twist, S-twist or Z-twist without changing chambers. It can even splice S-twist to Z-twist, wool to cotton, glass to tyre cord.

What distinguishes the Model 131 from the 101 is its built-in adaptability, thanks to its 3d printed technology. In its base form, it's a splicer with a handle, but it can be fitted with a smaller handles, or with a hanging device to be used in a fixed position, or with a carriage for sliding along a rail. It can have flow control, so that line the air blast can be adjusted without altering the factory line pressure. So 131s are available a number of forms – and Airbond's manufacturing methods even permit the production of bespoke versions, if users have special requirements.

Splice format:	Ends together
Applications:	Carpet weaving, carpet tufting, upholstery yarns, fancy yarns
Yarns:	Synthetic C.F., synthetic staple, woollen spun, worsted spun, all blends.
Yarn counts:	Nm 0.7 to 200, 5 to 1500 tex.
Twist:	Any twist direction and level. S twist to Z twist. No modification needed.

Getting started

Model 131 – getting started

Please read this section before you start operating the splicer. The rest of the manual deals with maintenance, and with details of products; those sections will not be needed immediately.

Remove all packaging. For each splicer, you will have the appropriate splicing chamber – which will usually already be fitted.
Depending on what you have ordered, you may have some or all of the following:

- Additional splicing chamber(s)
- Optional hanger
- Optional hanging clip
- Optional flow control device

It may be useful to have a fixed place to store the splicer temporarily when the operator has finished, in which case you will have specified the "W" modification. This modification will change the splicer designation – the Model 131 H, for example, becomes the 131 HW. If it has been supplied, bolt the hanging clip to a convenient spot on a machine. The splicer can then be placed in the hanging clip when not in use. This reduces the likelihood of the splicer being dropped and damaged in service.

You may have chosen to have a flow control device fitted. In that case, you will have specified the "F" modification. This modification changes the splicer designation further – the Model 131 H, for example, becomes the 131 HF, and the Model 131 HW becomes the 131 HFW.

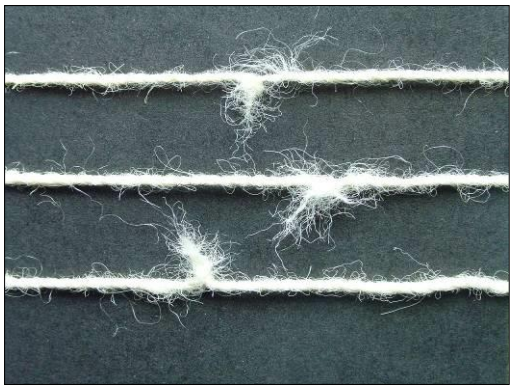
Connect the splicer to an air line.

Under normal circumstances, the line pressure should be around 6 bar. The line should preferably be fitted with a pressure regulator so that adjustment may be made to suit local needs.
Hold the splicer with the trigger button facing the body, and press the trigger with the thumb.
Look down into the splicer
Press trigger part-way down - see the pad move until it hits the chamber
Press trigger further - listen for the air blast

Making a splice

Airbond splicers make joints of two forms:

Ends-opposed splices, shown here., are suitable for higher-quality applications.
They offer a better appearance, but are slower to make.

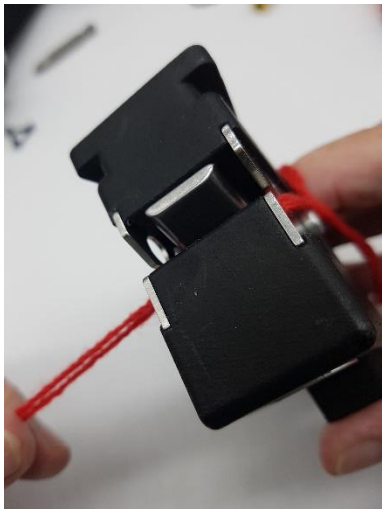


Ends-together splices, shown here., are suitable for lower-quality applications.

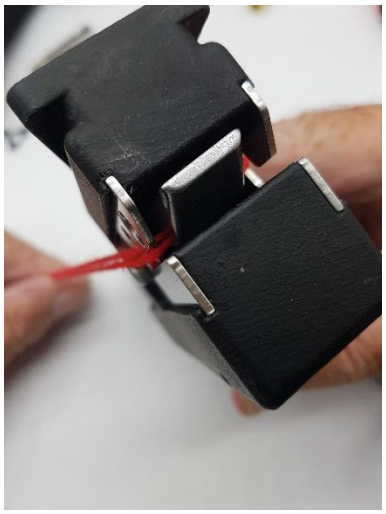
Though their appearance is poorer, they are quicker to make.

This is the splice form made by the Airbond 131 Series.

Making a splice

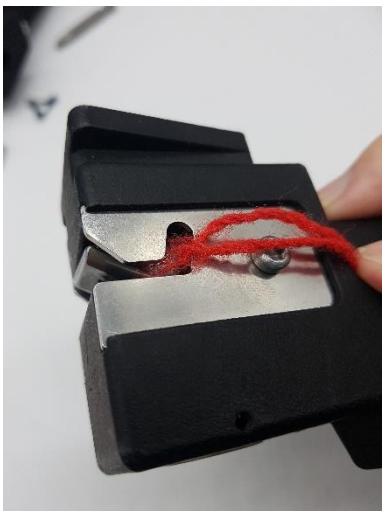


The yarns pass over the edge of the knife on the left-hand side.



For a clean cut, the yarns must be pulled down sharply over the knife edge.

The precise moment of cut will depend on the splicing procedure chosen.
(See next page)



A completed splice emerging from the right-hand side of the splicer.

Normally, the splice will escape from the splicer without any intervention by the operator. Occasionally, it may be helpful to draw the yarns downward gently with the fingertip.

Waste ends of yarn, which have been cut off on the left-hand side, are discarded.

Optimising splicing performance - relative timing of blast and cut

Different yarns require different treatment during splicing. For example, 60% fine wool, being relatively fragile, requires a short blast, while tough yarns such as polypropylene can survive being exposed to a more violent blast.

Because, on the Model 131, blast and cut are completely independent, three splicing procedures are available to the user. All involve squeezing the trigger to close the chamber and initiate the blast, and all involve cutting; but the relative timing of blast and cut can be altered.

Splice method 1- "Early cut"

Half press the trigger, so that the chamber pad closes, but not so far as to start the blast
Cut the yarn bundle by pulling down across the blade
Depress the trigger fully, so that the blast enters the chamber.
Keep the trigger depressed fully.
The splice should jump out of the chamber after less than a second

Splice method 2 – "Standard cut"

Press the trigger all the way down, so that the pad closes, and the blast enters the chamber.
At the same time as pressing the trigger, cut the yarn bundle by pulling down across the blade
Keep the trigger depressed fully.
The splice should jump out of the chamber after less than a second

Splice method 3 – "Late cut"

Press the trigger all the way down, so that the pad closes, and the blast enters the chamber.
Allow the blast to disturb the yarn for a short time; then cut the yarn bundle by pulling down across the blade.
Keep the trigger depressed fully.
The splice should jump out of the chamber after about one second

Important service information

Apart from accidental damage, and the occasional replacement of cutters, the Model 131 requires very little attention. However, one aspect of maintenance should NEVER be neglected. The upper bore, in which the chamber pad moves, needs regular lubrication. The frequency of lubrication depends upon the nature of the factory environment and the workload on the splicer.

As a general rule, the cap and pad assembly should be removed and greased with Molykote 111 (available from the company) at least once per month. The service interval should be reduced if the splicer experiences very heavy work loads.

Model 131 – General product information

Introduction

For many years, the Airbond Models 101 and 105 set the highest standards for the joining of yarns for carpets and upholstery products. Many of these splicers are in operation world-wide.

Despite its success, some customers requested improvements. Some of these customers remained very loyal to the original Model 101, which had been discontinued on cost grounds. They requested a re-think of the design of the old 101, by the adoption of new manufacturing techniques. Airbond needed to develop a product which resembled the 101, but which was superior in a number of aspects.

Development work to meet these new requirements has led to the Model 131, and its variants.

Being 3d-printed, the Model 131 is made in one piece – the handle and body are combined, producing a lighter but stronger structure. And, being printed from tough PA12 polymer, the 131 is capable of standing up to heavy-handed use, but is still much lighter than its predecessor.

Like its predecessors, all the Model 131 splicers have a simple straight-line string-up, and a simple and very strong construction, machined out of a solid block of alloy.

The splicer's yarn guide plates are much stronger than is necessary for their function as guides; the thick stainless steel plates give the splicer a strong box-like structure.

Like the 101, the Model 131 can be kept in active service with a minimum of maintenance.

The inner splicer unit has a novel, patented design, which is simple to operate and extremely simple to repair. The number of components has been reduced, when compared to the 101, and it can be dismantled and re-assembled in about five minutes, without any special tools.

General description

The Model 131 Splicer has a number of components mounted on a body in which airways conduct the compressed air for the splicing action.

Trigger - pressing the trigger initiates the splicing operation.

Valve - operation of the trigger moves the valve allowing compressed air to pass into the body head for splicing.

Pad - in the initial operation, compressed air closes the pad onto the splicing chamber prior to the splicing operation.

Splicing chamber - having a profiled recess on the front face which, with the closed pad, forms a chamber in which the splice is made. Air enters into the chamber to form the splice.

Restrictor plate - attached to the splicing chamber, to extend its range of operation.

Knife and guide plates - the plates provide a means of guiding the yarn across the splicing chamber; a static knife on the exit side enables the yarn to be severed during splicing.

The Model 131 is simple and easy to maintain. Moreover, its construction is such that it is extremely rugged, and requires very little attention in service. The splicer has revolutionary and patented splicing chamber technology, which enables the splicer to make joints in a wide range of yarns without any change (high-twist, low-twist, heavy, fine, S-twist, Z-twist) - in general, there is no need to change chambers when changing yarns

131 Model range

131 H	Standard Splicer
131 HW	Standard Splicer with hanging assembly
131 HF	Standard Splicer with flow control device.
131 HWF	Standard Splicer with hanging assembly and flow control device.
131 *E	Splicers as above but with extended block for larger yarns or false grass.
131 *EE	Splicers as above but with variable extension blocks for larger yarns or false grass.

Example:

Splicer Model 131 HW, fitted with wedge hanger.

Note the QR code; scanning this code will enable the user to access the Airbond web site - and an on-line version of this technical manual for the splicer

Model 131 – Maintenance

Model 131 splicing chambers - bath-tubs and restrictor plates

All Model 131 splicing chambers are asymmetric in design; the nature of the asymmetry is what gives the Model 131 its excellent performance. The chambers come in two forms; those with a "restrictor plate" and those with a built-in "bath tub".

The photo below shows three chambers. The two on the left are “bath-tubs”. A scooped section is machined out of one end of the chamber; this is the reason for the bath-tub name. The one on the right is more conventional, with a bowl, fitted with a “restrictor plate” to provide the asymmetry.

Bath-tubs are the chambers which are fitted most commonly to the Model 131/133/135.

The most common form of bathtub chamber is shown in the centre.

The yarns enter the chamber from the Side with the small V cross-section. The cutter knife is fitted next to the wider section.

The bath-tub chamber has the virtue of extreme simplicity, being a single element.

It might seem that the simplicity should result in a limited range of performance. Not so; the bath-tub chamber covers an enormous range of yarns, and the other designs incorporating restrictor plates are used only in special applications

.

Changing splicing chambers

Uniquely, the Model 131 can splice a wide range of textile yarns on a single splicing chamber, so it is rarely necessary to change chambers. Nevertheless, you will sometimes need to remove the splicing chamber - during routine maintenance, or because the splicer has become fouled with fibre particles.

To release the splicing chamber, remove the single fixing screw, Item 908, from the rear of the splicer body, when the splicing chamber can be lifted clear of the splicer.

Usually, it is not necessary to remove the yarn guide side plates, but if the interior of the splicer is particularly filthy, removal of the plates will help cleaning.

This photo shows the splicer with the splicing chamber removed.

Note the asymmetric design of the chamber profile – the bath-tub form in this case.

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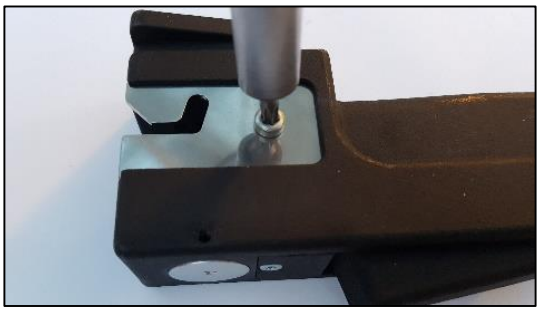
WARNING: If the splicing chamber is removed while the splicer is connected to the air supply DO NOT press the trigger; the pad will be blown out of the main chamber. There will almost certainly be damage to the extension spring.

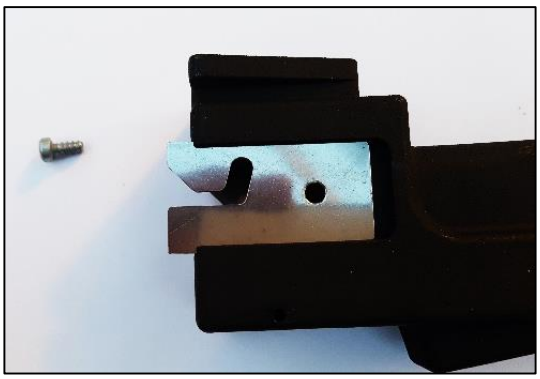
Removing yarn guide plate, yarn entry side.

This photo shows the splicer from the yarn entry side.



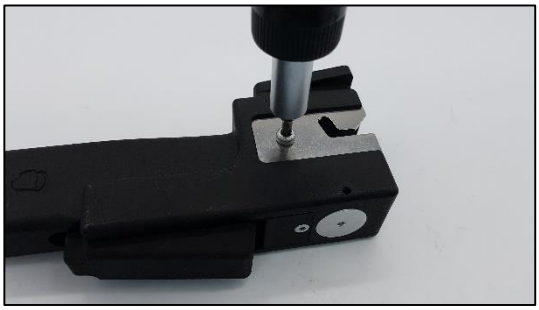
Removing yarn guide plate, yarn entry side.

Undo the screw Item 1194, which secures the yarn guide plate, entry side, to remove the guide plate, Item 1032.



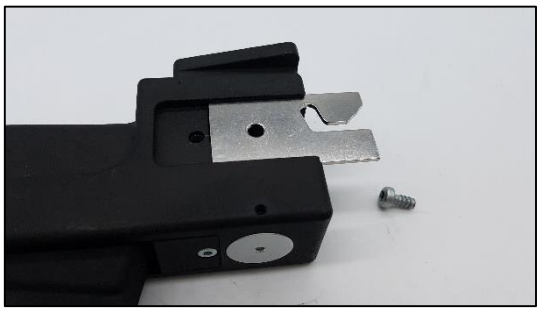
Removing yarn guide plate, yarn entry Side.

Note that on the new, printed splicers, the plate does not simply lift out of its recess. It is retained in place by a small moulding on each side, and must be slid out as shown here.



Removing the guide plate, exit side, Item 1031, and cutter blade, Item 909.

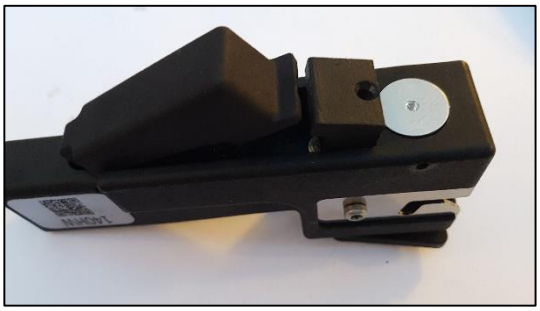
Repeat the process on the yarn exit side. Note that this side contains the small cutter; potentially, this is a safety hazard, so take care.

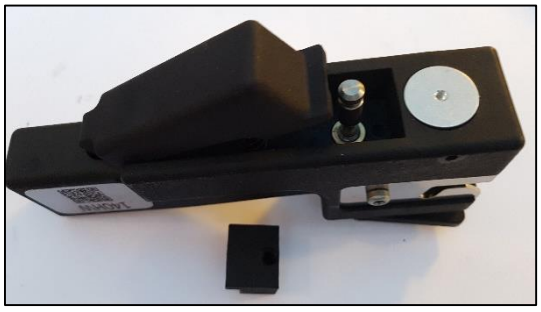


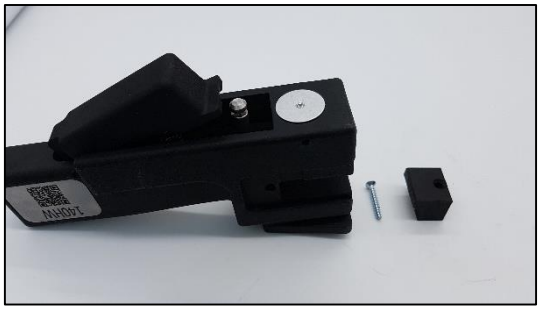
This shows the yarn guide plate, partly removed. Like the other plate, this one is restrained by a small moulding, and must be slid outward when being removed..

This shows the cutter blade, Item 909.

The cutter is also restrained by a small moulding, and must be slid outward when being removed.







Splicer dismantling – trigger assembly

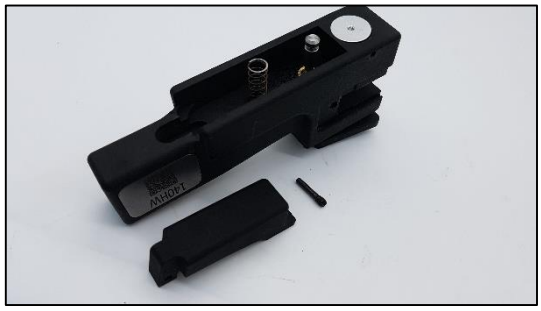
To remove the trigger assembly, it is first necessary to remove the splicer cap, Item 952.

Undo the single screw, Item 1192, holding the splicer cap. Remove the cap; this can be done without disturbing the valve assembly.

The trigger assembly is here partially withdrawn. Just visible between the splicer body and the trigger is the trigger return spring, which fits into a circular recess in the splicer body.

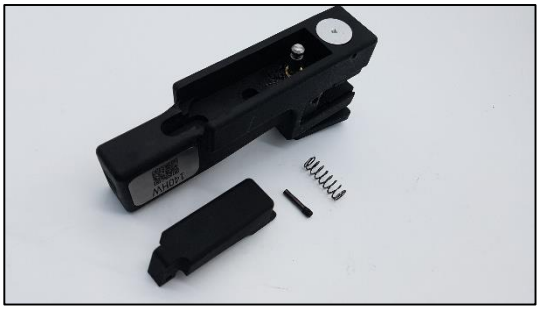
The trigger, Item 951, is secured by a pivot pin, Item 942, which terminates in a 2.5 mm hexagon socket.

Using a hexagon wrench, unscrew the pivot pin. Withdraw the pivot pin through the right hand side of the splicer.



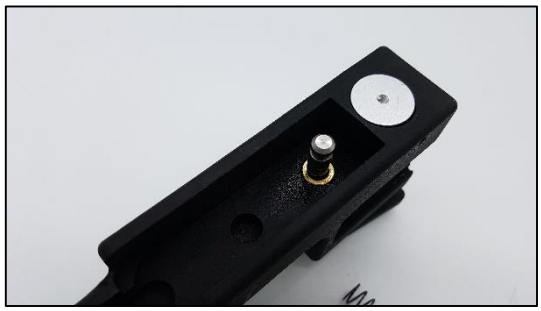
The trigger assembly is here completely removed.

The pivot pin can be seen beside the trigger

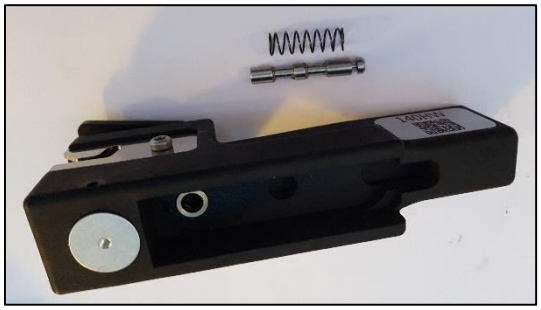


The trigger return spring Item 273, which fits into a circular recess in the splicer body, can now be lifted out.

The pivot pin and the trigger return spring can be seen beside the trigger



The main valve stem, Item 901 is now exposed, projecting from the splicer body.



Splicer dismantling – valve assembly

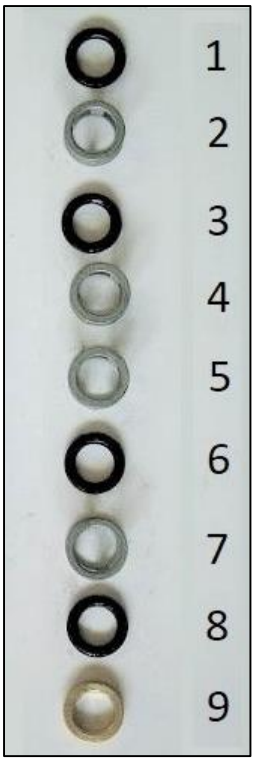
This shows the splicer with the cap and trigger assembly removed.

The end of the valve assembly is visible, below the main bore. The valve can now simply be withdrawn.

Surrounding the valve is a cluster of O-rings and air shells, which are assembled in a specific order. It is likely that some of the O-rings and shells will remain in the small bore after the valve has been removed, so the components should be carefully hooked out with a suitable soft tool, and then cleaned and re-greased before replacement.

Use only recommended lubricants.

This photograph shows the valve, and its associated air shells and O-rings,
After removal from the small bore.



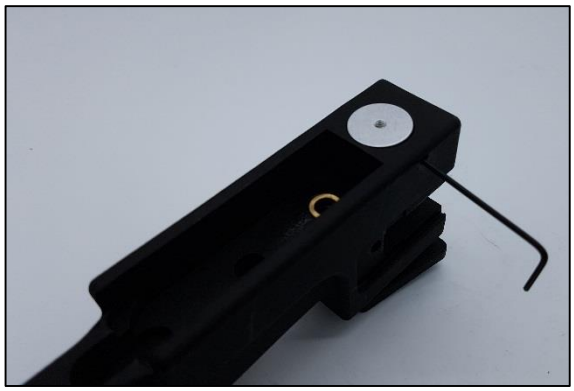
Valve assembly removal

Note the following:

The groove in the top end of the valve stem. This is the groove which locates the trigger plate.

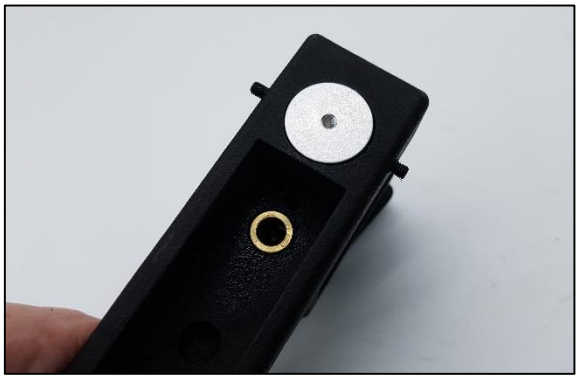
Note the brass spacer, numbered 9, Item 902, at bottom. This spacer is important; it compresses the O-rings, so that the assembly seals properly.

Sequence of components during reassembly; 1 – 9.
First item placed in the bore is the O-ring, Item 264, followed by the shell, Item 276, and so on to the spacer, Item 902.



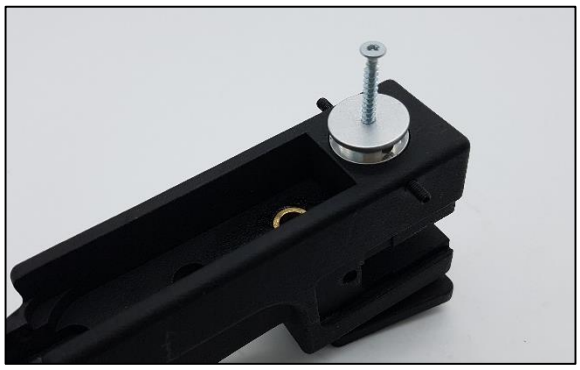
Removing sealing plug and chamber pad

The sealing plug Item 1102, with O-ring Item 905, is retained by
two socket head screws, Item 1128, whose tips fit fits into recesses in the sealing plug. Several turns of the screws will be needed to release the sealing plug.



Removing sealing plug and chamber pad.

This photo shows how far the screws will need to be exposed, before the pug can be withdrawn.



Removing sealing plug and chamber pad

Once free to move, the sealing plug and chamber pad can be withdrawn:

Either by screwing a threaded rod into the tapped hole in the sealing plug, or by pushing the chamber pad itself.

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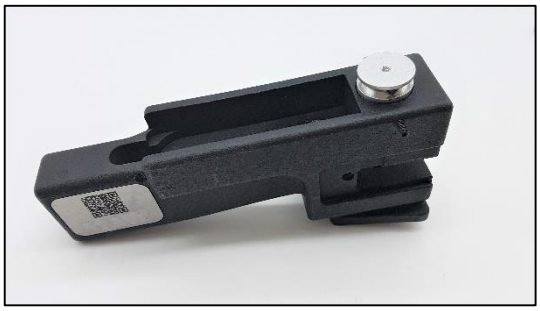
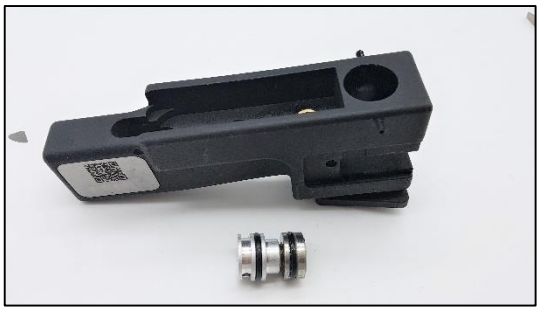
This photo shows the threaded rod method of extraction; the threaded rod can be seen at the left hand side.



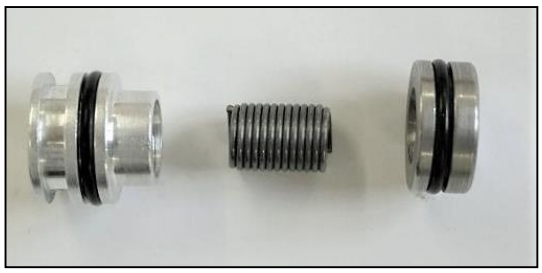
Removing sealing plug and chamber pad

The splicer shown with the pad assembly partially removed.



Removing sealing plug and chamber pad

The splicer shown with the pad assembly completely removed.



The pad is tethered to the upper sealing plug by an extension spring. The extension spring is screwed into the sealing plug, and the pad screwed to the spring. When the splicer has been dismantled, we recommend that the spring always be replaced.

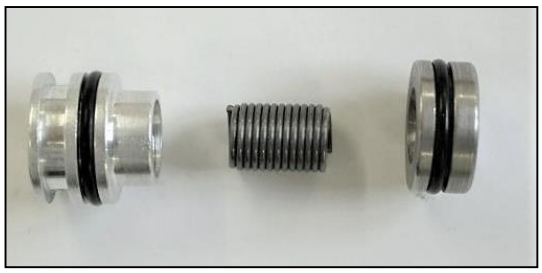
Unscrew the pad from the spring, and the spring from the sealing plug. Discard the spring.
Thoroughly clean and de-grease the screw threads in the sealing plug and pad.

We recommend that a special flat-tipped M10 tap be used to clean out the threads in plug and pad.

Before reassembly, ensure that the sealing plug, spring, and pad will fit together correctly. We recommend that the components first be 'dry assembled'.

Screw the spring into the sealing plug until four or five coils of the spring remain exposed. Screw the pad onto the spring for a few turns.

Check that the pad is approximately parallel to the sealing plug and that a gap of 1.5 to 2.0 millimetres between sealing plug and pad can be achieved. If the components are markedly out of parallel, discard the spring.



If the 'dry assembly' is satisfactory, dismantle and repeat the operation Using adhesive. Apply a drop of Loctite Structural Adhesive 326 to the coils at one end of the spring, and screw the spring into the sealing plug until four or five coils of the spring remain exposed.

Apply more adhesive to the exposed coils of the spring and screw the pad onto the spring, ensuring that the gap between sealing plug and pad is roughly parallel and is between 1.5 and 2.0 mm. Allow the adhesive to cure for about 30 minutes.

Before replacing the assembly, lightly smear the 'O' ring in the pad with Molykote grease. Apply a small amount of grease to the surface of the main bore.

Compressed air

Pneumatic splicers are operated by compressed air. Therefore the air supply must be appropriate.

The following points are important:

Splicers generally operate at a pressure between 3 and 8 bar.

Pressure may vary according to application, but it must be as uniform as possible.

The air supply should be reasonably dry and clean, with the lowest possible flow resistance.

Because the time taken to make a splice is short, transient pressure drops associated with other demands in the mill may become important,

When the splicer is operated, line pressure at the splicer head normally drops by about 1 bar. If there are restrictions in the line, air will not be replenished, so that the pressure drop will be greater; weak splices may result.

Compressed air installations should therefore be designed to minimise pressure drop.

Never use narrow-bore supply tube; this introduces resistance.

When there is doubt about the quality of the air supply system, a pressure gauge should be fitted - temporarily - as near as possible to the splicer, so that static pressure and pressure drop can be monitored. This is particularly desirable in an installation which uses long lengths of coiled hose; losses in such hoses tend to be significant.

Sometimes, static line pressure is known to be adequate, but there sometimes serious problems with transients. Then it may be useful to fit a few metres of wide-bore pipe or other form of plenum, close to the splicer. This will act as a reservoir, to minimise pressure drops while the splicer is in use.

Do not fit lubricators in the line very near to the splicer; an excess of oil on the yarn may weaken the splice.

Compressed air and safety

All our splicers have been designed with safety in mind. The few moving parts have been enclosed or shielded to reduce the possibility of injury to the operator. In normal use, the only component which is in any way a source of hazard is the knife assembly. By design, however, the blades are difficult to reach, and are not dangerous in any normal circumstances. Knives represent a hazard only during removal and disposal. So, in normal use, the splicers present no risk.

However, the splicers do use compressed air, and that has the potential to cause injury. Compressed air is dangerous: avoid any bodily contact with it.

Always follow the safety precautions recommended by the compressor manufacturer. Always ensure that unions and connectors are fully tightened and sealed, and that there are no leaks.

Check the conditions of air supply lines on a regular basis. Always ensure that any flexible hoses are unblemished; if there are any cuts or abrasions to the outer surface of the hose, stop using the splicer and have the hose replaced by qualified personnel.

Do not look into the working parts of the splicer when it is being operated.

If a splicer malfunctions, do not use it until it has been repaired by qualified personnel.

For maintenance staff, additional advice is necessary. When cleaning or servicing is being carried out, access to the internal mechanism of the splicer is essential. Under these circumstances, maintenance engineers will be at greater risk than ordinary users. The engineer should adhere strictly to the following guidelines:

- Before undertaking any service work, disconnect the splicer from the air supply.
- Under normal circumstances, always refit safety covers before reconnecting the splicer to the air supply.
- Under exceptional circumstances, it may be necessary - for test purposes - to reconnect the splicer to the air supply without its safety covers.
- While the splicer is being tested, wear protective gear and exercise due caution.

Compressed air and noise

A splicer uses compressed air, which for a brief period - about 1 to 2 seconds – is vented to atmosphere while the splice is being made. Air at perhaps 7 bar pressure escapes through a small blast hole, creating intense turbulence in a small volume.

Noise is inevitable.

Typical maximum noise levels vary from 80 db to 98 db, depending on the splicing chamber. Some chambers are quieter than others, simply because they have a smaller blast-hole, and allow less air to emerge.

Our noisiest splicer, with the biggest blast hole in our range, generates a noise spectrum as shown in the table below:

Hz	63	125	250	500	1000	2000	4000	8000	16000
dB	47	52	57	63	74	89	92	93	95

In practice, splicers are barely noticeable in a textile mill. This is because the other mill machinery tends to be very noisy, and the sound of the splicer is lost in the general noise. Also, the blast only lasts for about one second.
Nevertheless, in compliance with UK health and safety regulations, we recommend that ear defenders (to local standards equivalent to British Standard 6344 Part 1) be worn.

Troubleshooting

Trouble with splicers generally takes one of two forms: poor splicing or component malfunctioning.

1) Splicing performance.

If there is no apparent damage to the splicer, there may still be something subtle, which cannot easily be seen. It will be best, however, to look at the possible causes which are easy to spot. These include:

Simple checks:

- Has yarn **specification** changed markedly? The splicer is very flexible, but it can't do ALL yarns on one configuration. If the yarn has changed, take another look at your operating procedures and – possibly – the splicing chamber specification. If, for instance with glass, the yarn count has remained constant, but the level of sizing has increased, it may be necessary to increase air pressure and/or increase the duration of the blast.

- Is the air pressure as it should be? The line pressure may have changed – upward or downward. Excessive air pressure will cause bad filamentation, and low air pressure will result in weak splices. Consideration should be given to using flow-control versions of the splicer.

- If you have a splicer with flow control – has the position of the flow controller shifted? This can happen if the clamping screw has come slightly loose.

- Are there any obstructions in the main air line or in the splicer itself? It has been known for foreign matter to get into the air-line, and to obstruct the chamber blast hole; this is usually accompanied by a reduction in the noise level of the blast.

- Have operating procedures changed? If the procedure changes, performance will change.

- Are the splice ends being trimmed properly? All splicers rely for perfect performance on the waste ends being trimmed efficiently. The splicer has a “razor-blade” form of cutter, and the yarns are pulled down sharply over the cutter edge. If the edge has become dull, poor cutting – and hence poor splicing – will result. At that time, the knife should be replaced; it is an inexpensive consumable item. With a relatively soft material such as 80/20 wool/nylon, a service lifetime of around one month can be expected. This lifespan will be reduced if the material being spliced is durable, and tough to cut - yarns such as continuous-filament polypropylene.

2) Sticking closure pad

Occasionally, the main valve in the splicing unit may stick. This could be the result of some form of damage to the internal components, but the explanation is normally much simpler; a lack of lubrication around the O-rings which seal the pad assembly, or an extension spring which has come adrift.

Remove the entire valve / O-ring assembly from the splicer unit, as shown in the main text. Clean the components and the surface of the large bore with a small quantity of light solvent

Examine the components for signs of damage - particularly a damaged or displaced O-ring, or extension spring. If there is damage to any of the components, proceed as in the maintenance section of the main text, replacing components as appropriate.

Examine the surface of the large bore. Minor scuffing - the stuff of normal wear and tear in service - should be of no consequence. Look closely, to determine whether the bore surface is scratched. This is a very rare occurrence, usually associated with an earlier rebuild having gone wrong. Minor scratching can generally be rectified with careful use of a reamer.

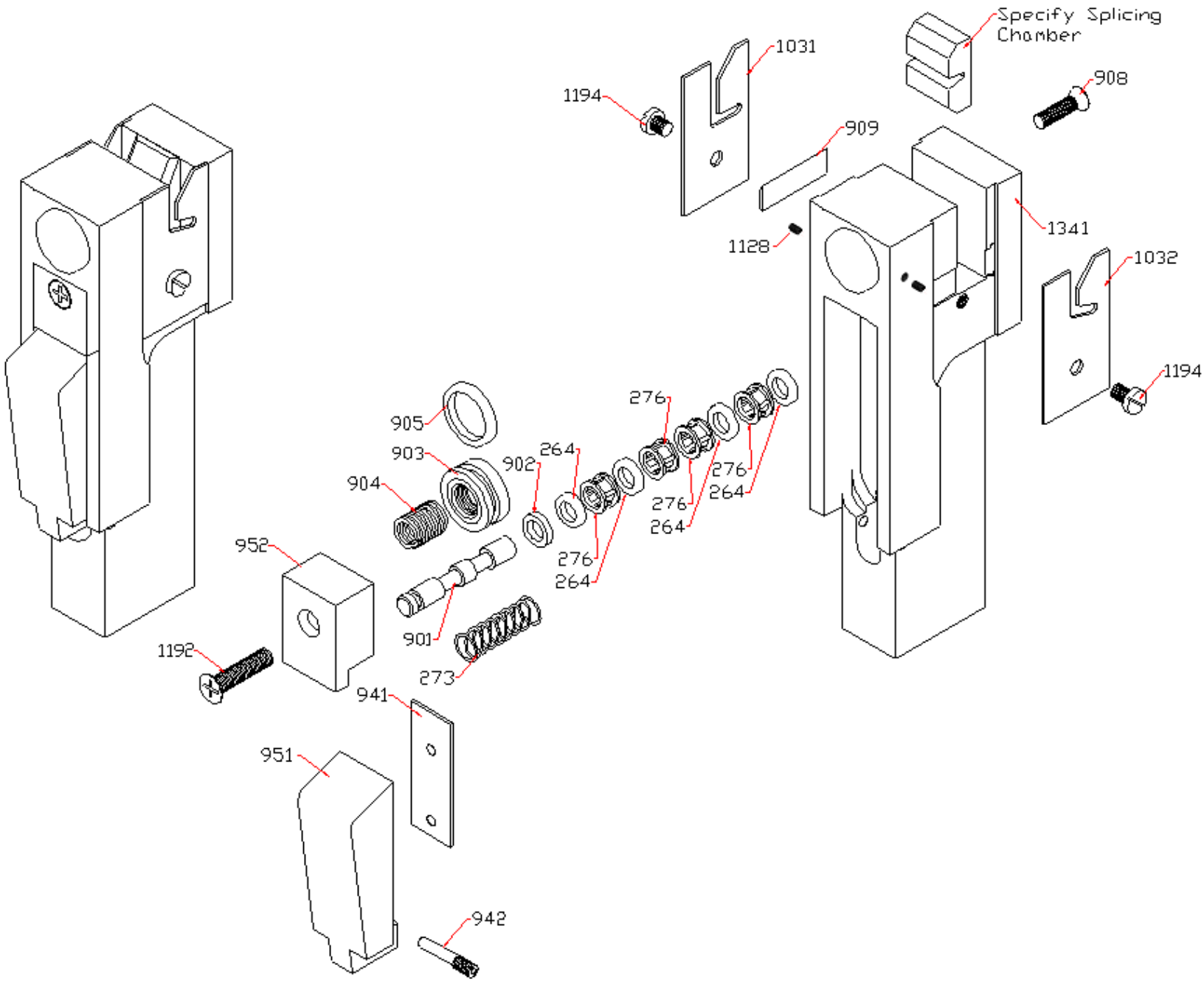
When any faults have been eliminated, reassemble as in the main text.

Model 131 Splicer - Parts list

Description	Item No.	Part No.
'O' Ring - BS 010	264	01 - 10 - 10
Spring, trigger return 112808	273	10 - 136 - 011
Shell for air valve	276	2200 - 43 - 04
Pad	899	10 - 113 - 112
Valve	901	10 - 113 - 113
Spacing bush	902	10 - 133 - 114
Pad (with item 905) – Item 899 without 'O' Ring 905	903	10 - 113 - 112
Extension spring	904	10 - 136 - 113
'O' Ring, RM 0140 - 20	905	02 - 14 - 20
Splicing chamber		To be specified by customer
M4 x 16 countersunk slotted screw	908	16 - 44 - 16
Knife	909	10 - 106 - 114
Molykote 111 100 gram	919	201 - 9993
Restrictor plate		To be specified by customer
Trigger plate, Series 2	941	10 -118 - 109
Trigger pin, Series 2	942	10 - 137 - 147
Trigger pad complete assembly, Series 2	951	10-101-9993D
Splicer cap, Series 2	952	10-101-1163D
Trigger pad assembly without plate, Series 2	955	10-102-9993D
Yarn guide plate – Knife side	1031	10-105-149
Yarn guide plate - Yarn entry side	1032	10-105-150
Upper sealing plug	1102	10-135-126
M3 x 10 socket set screw	1128	17-13-10
M3 x 20 torx countersunk self tapping screw	1192	19-43-20
M4 x 8 torx cap head self tapping screw	1194	19-44-08
Splicer body - 131H	1341	10-133-141
Name plate (45 x 16)	1503	10-139-153

Hanging Assembly parts		
Splicer holding clip	170	201-1199
Splicer body - 131HW	1342	10-133-142
Side Cover parts		
Splicer body - 131HE	1330	10-133-130
Splicer body - 131HEE	1345	10-133-145
Side cover for Model 131	953	10-177-1153D
Side cover extension for Model 131	954	10-177-115E3D
M3 x 16 countersunk slotted head screw	1034	16-43-16

Model 131 Exploded diagram assembly



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