Airbond splicers

144 Series splicers

Splicers for heavy yarns and tows

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

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 144 is the printed equivalent of the established 114.

Model 144

The manual-cut splicer for very high-count synthetics, up to 16000 tex.

The Airbond Model 144 is a splicer designed for super-large yarns – up to around 16000 tex in the right circumstances.

Developed by expanding the existing Model 143, the 144 retains most of the 143's characteristics, as a light, user-friendly tool. And, like the 143, this splicer can be supplied with a handle to suit the customer's requirements, or with a very short base, so that it can be used in confined environments.

Like the 143, the 144 can be supplied with a flow control system which supplies variable-pressure air to the blast chamber, while keeping the main factory line pressure unchanged..

With distinct, innovative techniques for joining brittle yarns such as glass and carbon and joining inherently strong aramids, the Model 144 is internationally recognized as the user-friendly, super-heavy-count splicer.

Splice format:	Ends opposed.
Applications:	Composites processes such as filament winding, pultrusion, and weaving.
Yarns:	Carbon fibre, glass fibre, aramid, Panox, synthetic C.F.
Yarn counts:	Up to 16000 tex.
Twist:	Zero or low twist.

Getting started

Model 144 – 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 144 H, for example, becomes the 144 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 144 H, for example, becomes the 144 HF, and the Model 144 HW becomes the 144 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

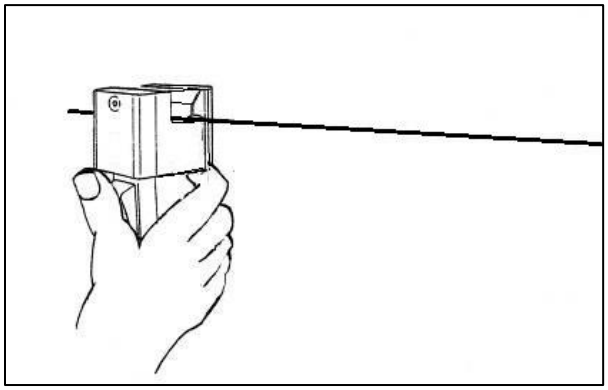
Model 144 – how to use the splicers

Forms of splice
The Model 135 makes only splices which we call "ends-opposed"; these are used when splice appearance is important.

Most composites applications require the flattest splice possible – and ends -opposed splice meet this criterion.

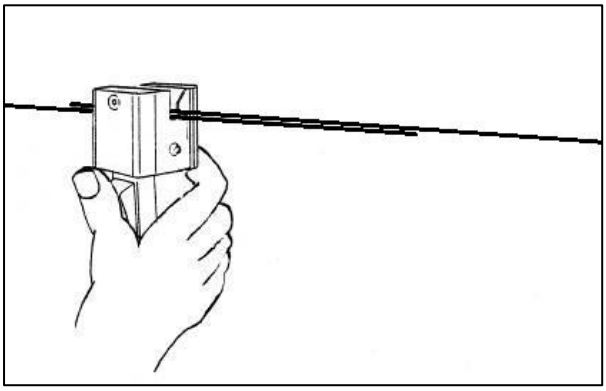
The photo opposite shows the typical output from a Model 144 splicer – glass, aramid, and carbon.

This photo shows the full potential of the Model 144; it is quite unique in that is capable of splicing yarns up to around 16000 tex.



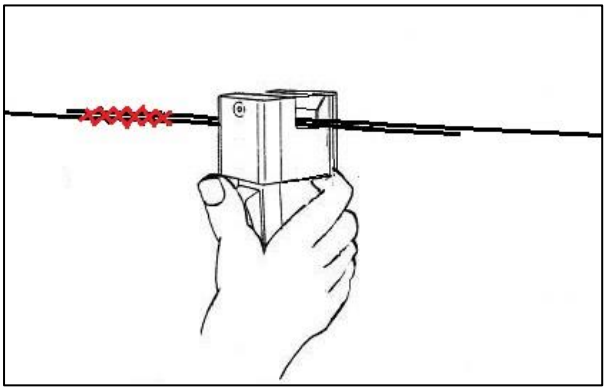
A Model 144 H splicer is shown here, as used by a right-handed operator. The splicer is held in the right hand, with the thumb on the trigger button.

Take the first yarn into the splicer, leaving a small length of yarn projecting from the left hand side.

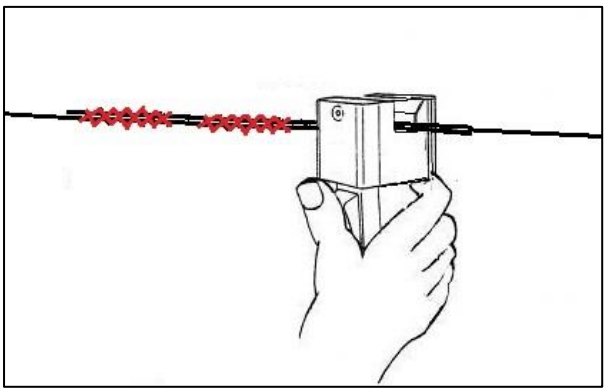


Overlap the two yarns to be joined by the desired amount.

Normally, a joint in 2400 tex yarn needs around 100 – 150 mm of overlap.



Press the trigger lightly, so that the pad closes, but no air blast emerges from the chamber. Check that the position of the yarn in the chamber is correct, and that the yarn can move freely through the chamber. Then press the trigger fully, so that the air blast starts Move the splicer to the right, leaving the first splice exposed.



Repeat the splicing operation. Three splices over about 100 mm usually makes a satisfactory joint.

Trim waste yarn ends with scissors.

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Important service information

Apart from accidental damage, and the occasional replacement of cutters, the Model 144 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 144 – general product information

Introduction

With the development of high-performance yarns for industrial applications, there is an increasing need for making splices in yarns of very heavy count - typically glass fibre and carbon fibre rovings of up to 4800 tex. Counts already exceed 15000 tex.

It made good technical sense for GTW Developments to design the its heavy-count splicers around the design features of the successful Model 101. The 101, originally a splicer for carpet yarns, was designed with durability and simple servicing in mind, and has proved its reliability over many years of service.

The result of the development of the Model 101 for rovings was the Model 110 - simple, small and light like the 101, but capable of splicing neat, strong joints in rovings, up to about 9000 tex. The 110 set a new standard; it was unique in being the only product on the market capable of making extra-large splices in these very heavy yarns. After only a short production life, it became accepted as a heavy-count splicer in countries across the world.

Subsequently, the Model 110 was redeveloped, with the target of improving the splicer's performance.. The outcome was the Model 113, which has the same operating range as the 110, but is simpler and stronger.

Like the 110, the Model 113 splices 4800 tex as routine, and in most circumstances it can handle 9600 tex.

Customer requirements are changing, however, and the capacity to splice 9600 tex is no longer sufficient for the market. For that reason, Airbond developed the Model 114 – a "stretched" version of the Model 113. The 114 had enhanced capabilirty, splicing up to around 16000 tex.

Now the Model 144 is the direct counterpart to the Model 114 – similar in appearance but printed in tough polyamide. It handles the same range of yarns as the 114.

The Model 144 is currently available in nine forms. Further variants are likely to be added to the range in the near future.

General description

Being printed from tough PA12 polymer, the new Model 144 Splicer is capable of standing up to heavy-handed use, but is still much lighter than its predecessor, the 114.

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 114, and it can be dismantled and re-assembled in about five minutes, without any special tools.

The splicer has a number of components mounted inside the casing, via which compressed air is conducted for the splicing action.

Trigger – the first pressing of the trigger causes the pad to move until it closes the splicing chamber

Pad - further pressure on the trigger pushes the pad firmly against the splicing chamber, causing the chamber to move back.

Valve – the splicing chamber and valve form a single sub-assembly, which means that movement of the splicing chamber moves the valve, allowing compressed air to pass into the chamber for splicing.

Splicing chamber – this has a profiled recess on the front face which, with the closed pad, forms a confined space in which the splice is made.

The Model 701 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 completely new blast air technology, which is simple, revolutionary and patented. The splicer design allows the tool to make joints in a wide range of yarn counts without any change of configuration.

144 Model range

144 H	Splicer with a 100 mm handle and no accessories
144 M	Splicer with a 60 mm handle and no accessories
144 S	Splicer with a stub handle and no accessories
144 HW	Splicer with a 100 mm handle and hanging kit
144 MW	Splicer with a 60 mm handle and hanging kit
144 SW	Splicer with a stub handle and hanging kit
144 HFW	Splicer with a 100 mm handle and hanging kit and flow control
144 HFW	Splicer with a 60 mm handle and hanging kit and flow control
144 HFW	Splicer with a stub handle and hanging kit and flow control

Example:

Splicer Model 144 M.

Model 144 – maintenance

General views of Model 144 splicer

View of front face of splicer – upper sealing plug and and trigger button.

View of left side of the splicer.

Note:

- Large aperture for yarn entry.
- Large profile splicing chamber
- QR code for access to web site and technical manual download.

Removing yarn guide plates

View of guide plate, left-hand side, with securing screw Item 1191

Removing side plates

Remove guide plate securing screw Item 1191..

Removing side plates

The guide plate is retained in the splicer body by plastic mouldings.

The guide plate should be slid upwards (left-to-right in the photo) for removal.

Removing side plates

The splicer showing the guide plate And screw removed (exposing the side of the splicing chamber)

Repeat this process for the other plate.

Removing splicing chamber.

This photo shows the splicing chamber retaining screw, Item 908.

Removing splicing chamber.

Remove the splicing chamber retaining Screw, Item908.
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Removing splicing chamber.

Remove the splicing chamber from the splicer body.

Removing trigger button and surround

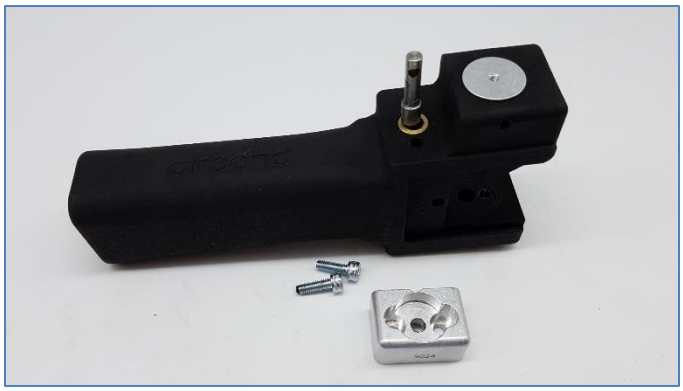
The trigger button, Item 1318, is retained by a single socket head screw, Item 1318, whose tip fits into a recess in the air valve stem.
Several turns of the screw will be needed to release the button.

Removing trigger button and surround

This photo shows the trigger removed from the valve stem; this exposes the two securing screws for the trigger surround. The air valve stem projects through a hole in the trigger surround.

Removing trigger button and surround

Remove the trigger surround securing Screws, Item 1191.
Lift off the trigger surround, Item 1346.



Removing trigger button and surround

The trigger surround removed from the splicer body. The air valve stem Item 1404 is now fully accessible.

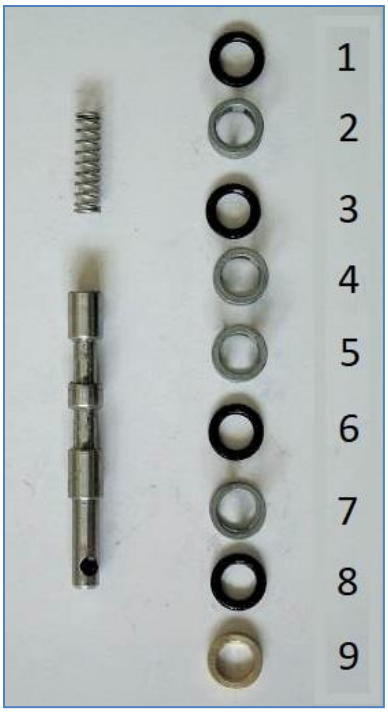
Removing trigger button and surround

Withdraw the air valve stem Item 1404, Complete with its small return spring. Check that the valve stem is coated with Molykote grease; if not, then be sure to re-grease the valve during reassembly.

Removing trigger button and surround

Using an appropriate tool, withdraw the O-rings, shells, and compression spacer from the valve bore in the splicer body.

Note the following:
Small hole in the lower end of the valve stem. This is the hole which locates the socket set screw restraining the trigger button.



Small return spring, Item 787, at the top end of the valve. This is the trigger Return spring. It can be kept in position by applying Molykote grease to the deep hole in the end of the valve.

Brass spacer, numbered 9, Item 1406, at bottom. This spacer is important; it compresses the O-rings, so that the assembly seals properly.

Sequence for reassembly; 1 – 9.
First item placed in the bore is the O-ring, 1, Item 264, followed by the shell, 2, Item 276, and so on to the spacer, 9.

Removing sealing plug and chamber pad Items 1102 and 1405.

The sealing plug is retained by two socket head screws, Item 1128, whose tips fit 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 plug 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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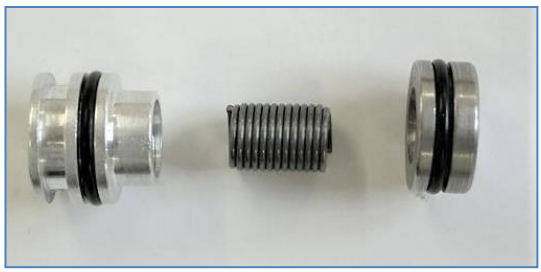
This photo shows the threaded rod method of extraction; the threaded rod can be seen at the left hand side.

Removing sealing plug and chamber pad

The splicer shown with the sealing plug and pad assembly 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.

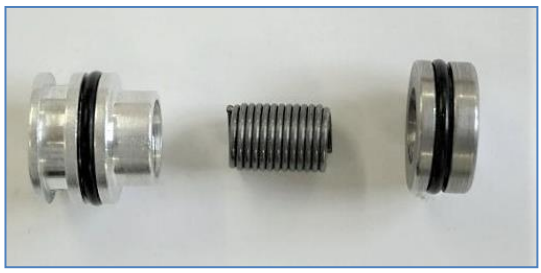
Unscrew the pad from the spring, and the spring from the sealing plug. Discard the spring.
Thoroughly clean and de-grease the screw threads in the sealing plug and pad.

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:

- Splicing performance deteriorates without apparent breakage or malfunction
- Pieces break or malfunction

1) Poor splicing

This section is concerned only with 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? In normal operation,, the splicer requires the operator to make several splices in a line (usually three, spaced at about 40 mm). If the procedure changes (perhaps making two splices instead of three, or making a single “smeared” splice, performance will change.

Are the splice ends being trimmed properly – indeed, are they being trimmed at all? The splicer has no cutters, and relies for perfect performance on the operator trimming the ends. Some operators cut carelessly, leaving “tails” perhaps 30 mm long. Some have been observed doing no trimming at all – leaving tails perhaps 150 mm long. While long tails may be unimportant in some processes, they can be profoundly disruptive in others, such as pultrusion lines.

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.

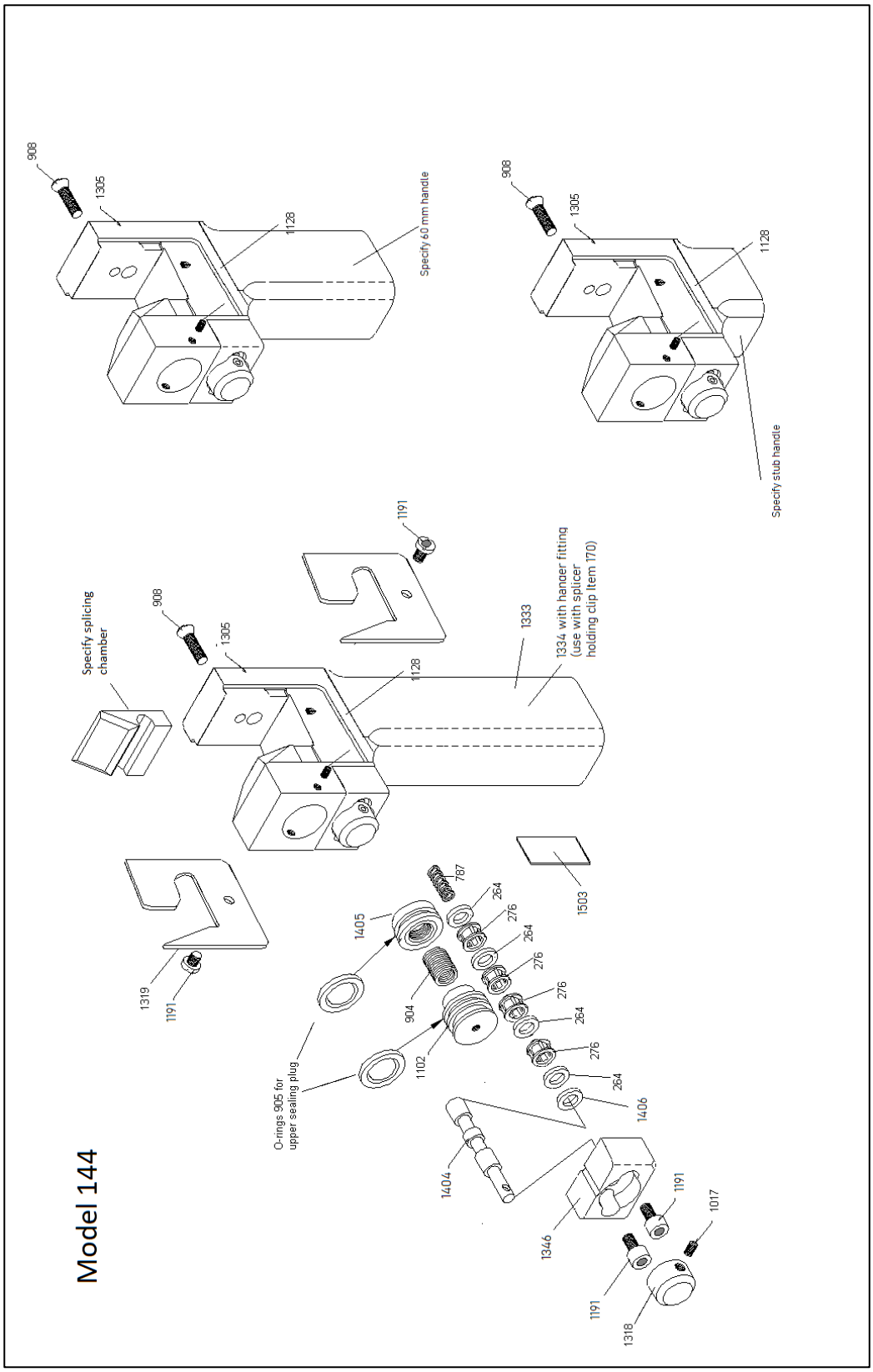
Remove the entire valve / O-ring assembly from the splicer unit. (See pages 20 and 21). Clean the components and the surface of the large bore with a small quantity of light solvent
Examine the components for signs of damage - particularly a damaged or displaced O-ring, or extension spring. If there 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 144: Parts List

Description	Item No.	Part No.	Quantity
O-ring	264	01-10-10	4
Shell	276	2200-43-04	6
Air valve return spring	787	10-136-018	1
Splicing chamber		SPECIFY	1
Spacing bush	902	10-133-114	1
Extension spring	904	10-136-113	1
O-ring pad RM-0140-20	905	02-14-20	2
C/sunk slotted screw M4 x 16	908	16-14-16	1
Blast valve & yarn clamp adjusting screw	1017	10-138-118	1
Upper sealing plug	1102	10-135-126	1
Socket set screw M3 x 10	1128	17-13-10	2
M4 x 12 torx cap head self tapping screw	1191	19-44-12	4
Trigger button 144	1318	10-114-103	1
Splicer body - 144H	1333	10-133-133	
Trigger housing 144	1346	10-121-109	1
Model 144 side plate	1403	10-105-153	2
Blast valve 144	1404	10-113-125	1
Pad 144	1405	10-113-111	1
Spacing bush 144	1406	10-133-115	1
Pad 144 (with item 905) - Item 1405 without O-ring 905	1408	10-113-111A	1
Name plate (45 x 16)	1503	10-139-153	1
Hanging assembly parts			
Splicer holding clip	170	201-1199	SPECIFY
Splicer body - 144HW	1334	10-133-134	


Model 144
908
1305
1128
Specify 60 mm handle
908
1305
1128
Specify stub handle
1191
Specify splicing chamber
908
1305
1128
1333
1334 with hanger fitting (use with splicer holding clip Item 170)
1503
1319
1191
787
264
276
264
276
276
264
276
264
1405
904
1102
O-rings 905 for upper sealing plug
1406
1404
1346
1191
1017
1191
1318