Airbond Splicers

114 Series splicers

Splicers for extremely heavy yarns and tows

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Getting started

Model 114 – 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 will have some or all of the following:

- Splicer
- Additional splicing chamber(s)
- Optional carrying strap
- Optional buckle
- Optional hanger and screws
- Optional hanging clip

If they have been supplied, place the buckle and strap over the air union, before connecting the splicer to the air supply. The operator may then loop the strap round his wrist to reduce the likelihood of the splicer being dropped.

It may be useful to have a fixed place to store the splicer temporarily when the operator has finished. If it has been supplied, bolt the hanging clip to a convenient spot on a machine. Fix the hanger to the back of the splicer, using the screws provided. (This operation will involve the removal and replacement of the splicing chamber). 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.

Connect the splicer to an air line.

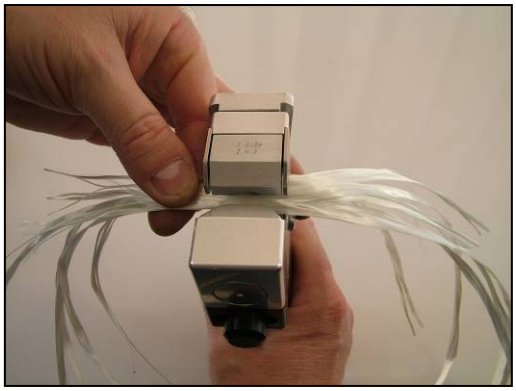
Under normal circumstances, the line pressure should be around 6 bar. The line should preferably be fitted with a pressure regulator so that adjustment may be made to suit local needs.
Hold the splicer with the trigger button facing the body, and press the trigger with the thumb.

- 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

Splicer threading

A Model 114 HW splicer is shown below, as used by a right-handed operator. The splicer is held in the right hand, with the thumb on the trigger button.

Figure 1



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

2. Take the second yarn into the splicer, overlapping the two yarns by the desired amount. Normally, a joint in 10000 tex yarn should use around 200 – 250 mm of overlap.

3. Press the trigger lightly, so that the chamber pad closes, but no air blast emerges from the chamber.

4. Check that the position of the yarn in the chamber is correct, and that the yarn is not trapped by the closed chamber pad.

5. Press the trigger fully, so that the air blast emerges from the chamber.

Figure 2

6. A single point of intermingling will be created, similar to that shown here. In this illustration, the partially-completed splice has been removed from the splicer, so that it can be seen more clearly. The creation of this single intermingled zone stabilises the structure, so that the yarns remain in the correct relationship during the formation of the remainder of the spliced joint.

7. Move the splicer to the left, and make a second intermingled point, to the left of the centre line.

8. Move the splicer to the right, and make a third intermingled point, right of the centre line.

Figure 3

9. Repeat this process until a satisfactory splice form is created. Make the last intermingled points near to the cut ends, to leave the splice appearance as neat as possible. The splice length, and the number of intermingled points, is determined by the technical requirements of the operator. This illustration shows a splice of about 100 mm, made with three intermingled points. With very high counts, it may be necessary to make a longer joint, with more intermingled points.

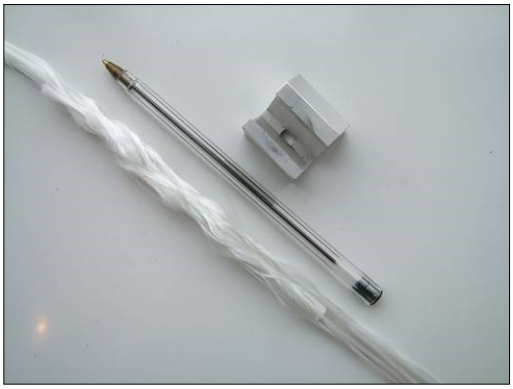


Figure 4

This picture shows the range of operation of the Model 114 splicer. A splice of length 150 mm has been made in 9600 tex. The splicing chamber which was used to make the joint is shown in the illustration. The spliced yarns are comparable in diameter to the standard ball point pen shown.

Optimising splicing performance

The operator has a number of operating parameters which can be changed at will, so that the optimum performance may be achieved for a given situation. The following variations are possible:

- Change of air pressure.
- Change of length of overlap.
- Change of number and spacing of intermingled points.
- Change of splicing chamber.

As a general rule, the more prone to damage the fibre, the lower the air pressure should be. Clearly, all operating parameters will ultimately depend on the exact requirements of the user, but we

recommend as staring point the following air pressures:

Carbon	80 psi	5 bar approx
Glass / acrylic	120 psi	8 bar approx
Nylon / polyester	120 psi	8 bar approx

Important maintenance information

Apart from accidental damage, the Model 114 requires very little attention. However, one aspect of maintenance should NEVER be neglected. The main 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 sealing plug and pad assembly should be removed and greased with Dow Corning 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. The removal and maintenance of this component is shown in the main body of the manual.

Model 114 – general product information

General description

The Model 114 Splicer has five principal components mounted on a body in which airways conduct the compressed air for the splicing action.

1. Trigger - pressing the trigger initiates the splicing operation.
2. Valve - operation of the trigger moves the valve allowing compressed air to pass into the body head for splicing.
3. Pad - in the initial operation, compressed air closes the pad onto the splicing chamber prior to the splicing operation.
4. Splicing chamber - has 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.
5. Guide plates - the plates provide a means of guiding the yarn across the splicing chamber.

The Model 114 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 splicing chamber technology, which enables the splicer to make joints in a wide range of heavy yarns, currently up to about 15000 tex.

Figure 5

The Model 114 makes a splice in a form which we call "ends-opposed"; such splices are suitable for applications where smooth structure and appearance are of crucial importance.

This is an ends-opposed splice in carbon fibre.

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 15000 tex.

It made good technical sense for GTW Developments to design the new heavy-count splicer for this application. The successful Model 101 was re-developed into the Model 110 - simple, small and light, but capable of splicing neat, strong joints in rovings. The 110 set a new standard as an effective and user-friendly tool for making extra-large splices in these very heavy yarns. It was swiftly accepted as a heavy-count splicer in countries across the world.

Some customers identified a series of technical requirements which could not be met by the Model 110 – in particular the requirement for an extremely compact form, which could be used easily on carbon fibre production lines, where acrylic precursor yarns pass through ovens.

Development work to meet these new requirements has led to the Models 113 and 114.

- Like the Model 110, all the Model 114 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.
- The Model 114 can be kept in active service with a minimum of regular voluntary maintenance.
- Simple construction leads to simple maintenance; the splicer in its basic form can be completely dismantled and re-assembled in about ten minutes.

The Model 114 is currently available in three forms, the Model 114 S, the Model 114 M, the Model 114 MW, the Model 114 H, the Model 114 HW, and the Model 114 B. Distinguishing characteristics of these splicers are:

114 S	Splicer with no handle – just a simple lower cover. For use in very tight spaces
114 SW	Splicer of 114 S form, with wedge hanging assembly
114 M	Splicer with handle, 60 mm long
114 MW	Splicer with handle, 60 mm long, and wedge hanging assembly
114 H	Splicer with handle, 100 mm long
114 HW	Splicer with handle, 100 mm long and wedge hanging assembly
114 B	Splicer of 114 S form, modified to run along a rail

Model 114 S

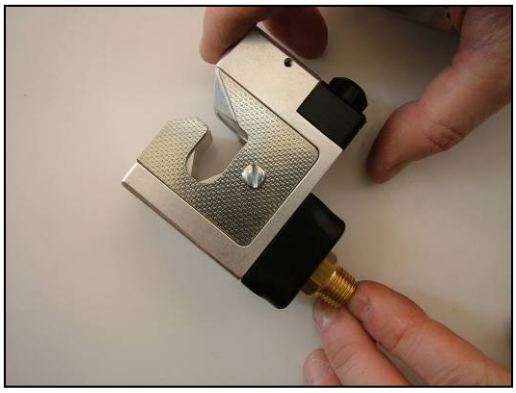


Figure 6

Model 114 S splicer. Shown here viewed from the left-hand side. This is the simplest hand held splicer, which has a lower cover instead of a full handle. It is designed for use in restricted spaces.

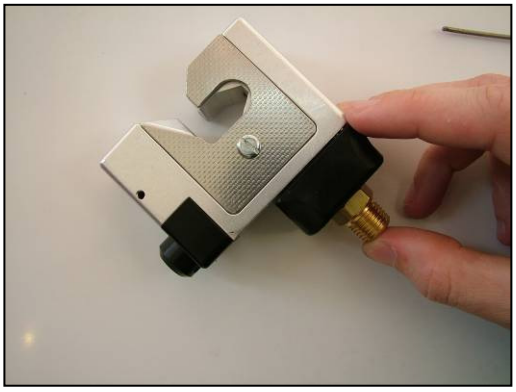


Figure 7

Model 114 S splicer. Shown here from the right-hand side.

Model 114 SW

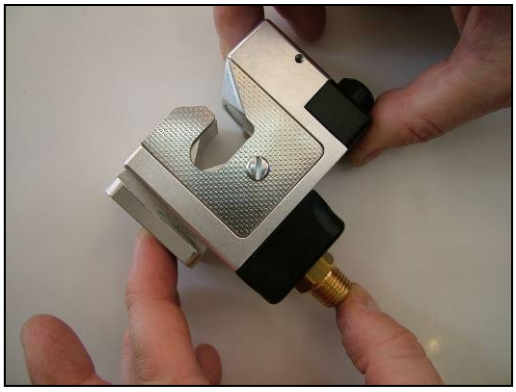


Figure 8

Model 114 SW splicer. This is a splicer Model 114 S, fitted with a wedge-shaped hanging assembly. A wedge-shaped piece of machined metal can be attached to the rear face of the splicer. This wedge can engage with a hanging clip, which is itself positioned conveniently for the operator to "park" the splicer when not in use.

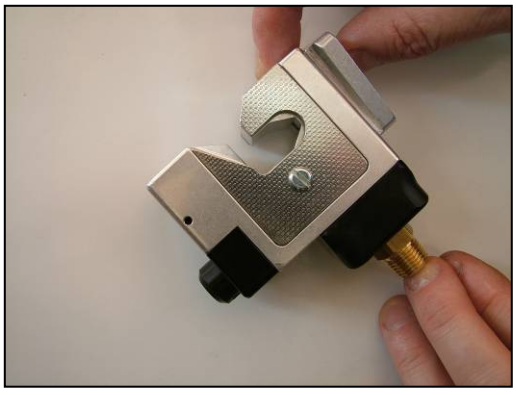


Figure 9

Model 114 SW splicer. Here the wedge is slotted into the hanging clip. The hanging clip will normally be bolted to a textile machine, in a position easily accessible to the operator. "Parking" the splicer prevents damage from the splicer being dropped or run over by machinery.

Model 114 M

Figure 10

Model 114 M splicer. Shown here viewed from the left-hand side. This is the hand held splicer, fitted with an intermediate-length handle. It is not suitable for environments as space-limited as the 114 S, but users sometimes need a handle which is shorter than standard.

Figure 11

Model 114 M splicer. Shown from the right-hand side.

Model 114 MW

Figure 12

Model 114 MW splicer. Shown here fitted with a hanging wedge.

Figure 13

Model 114 MW splicer. Shown here fitted with a hanging wedge.

Model 114 H

Figure 14

Model 114 H splicer. Shown here viewed from the left-hand side. This is the hand held splicer, fitted with a full-length 100 mm. handle. It is not suitable for environments which are space-limited as the 114 S, but has the design best suited to continuous manual operation.

Figure 15

Model 114 H splicer. Shown here from the right-hand side.

Model 114 HW

Figure 16

Model 114 HW splicer. Shown here fitted with a hanging wedge, left hand side.

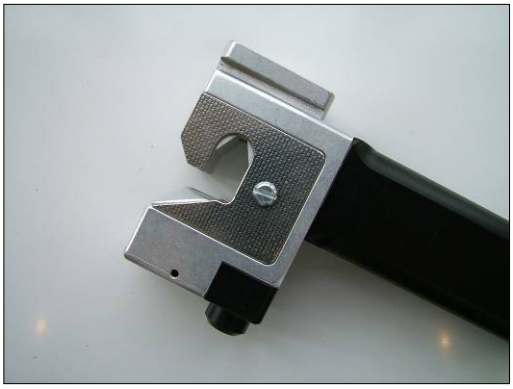


Figure 17

Model 114 HW splicer. Shown here fitted with a hanging wedge, right hand side.

Model 114 B

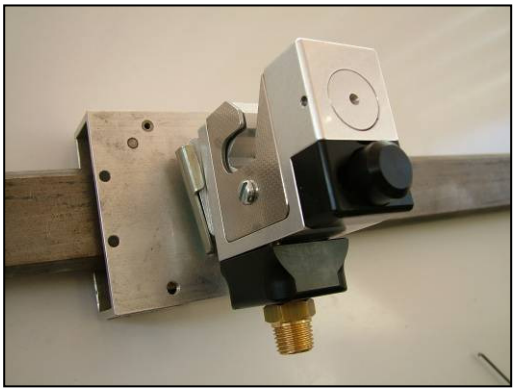


Figure 18

Model 114 B splicer. Shown here viewed from the left-hand side. This is the Model 114 S splicer, re-configured to fit on a carriage to run along a beam.

Maintenance

Model 114 splicing chambers

Figure 19

All Model 114 splicing chambers are symmetrical in design, but the cross-sectional profile of the chambers may be varied, according to customer needs. This photograph shows a typical large splicing chamber for the Model 114. The circular dark marks are signs of wear on this (experimental) chamber, which is made of aluminium, instead of the normal steel.

Changing splicing chambers

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.

Uniquely, the Model 114 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.

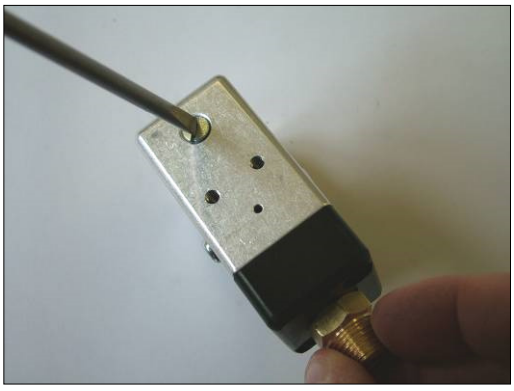


Figure 20

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.

Splicer dismantling - side plates and knife

Figure 21

Removal of the yarn guide plate, left side, Item 1403. Remove the slotted button-head screw, Item 254.

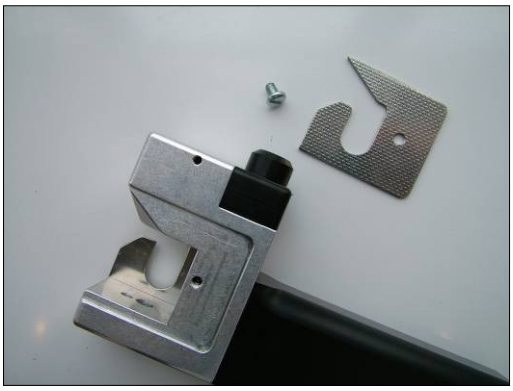


Figure 22

Lift off the yarn guide plate. This exposes the side of the splicing chamber.

Removal of the yarn guide plate, right side, is performed in exactly the same way.

Splicer dismantling - trigger assembly

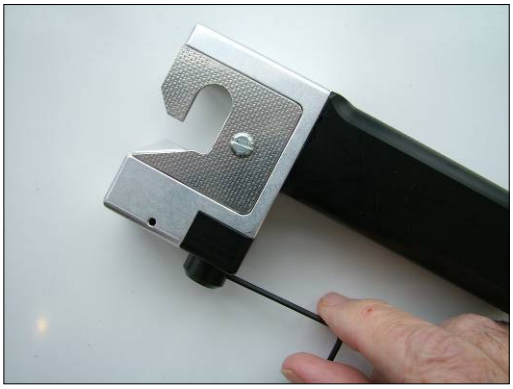


Figure 23

The trigger assembly can be removed without disturbing any other elements of the splicer.

The trigger button is secured by a M4 socket set screw, and is released by a 2.0 mm hexagon wrench.

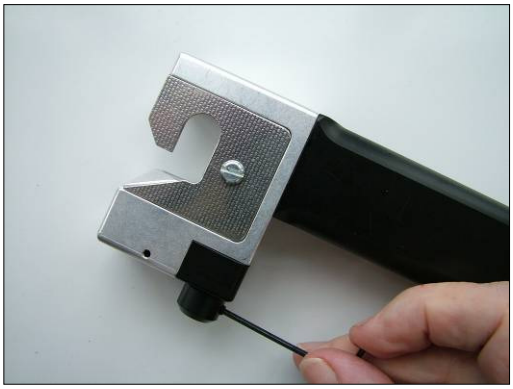


Figure 24

Using the hexagon wrench, unscrew the trigger button securing screw. Once the securing screw is partly withdrawn, the trigger button moves freely on the air valve stem.

Figure 25

With the securing screw withdrawn, the trigger button can be removed from the end of the air valve. In this illustration the air valve can be seen, protruding from the black trigger surround.

Splicer dismantling - chamber pad and spring

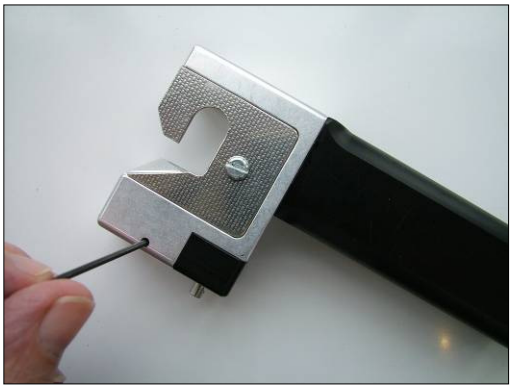


Figure 26

The first stage of removing the pad assembly involves loosening the two screws which secure the upper sealing plug – one on either side of the body. These are socket set screws, M3 x 10 Item 1128.

Loosen and remove the screws using a 1.5 mm hexagon wrench.

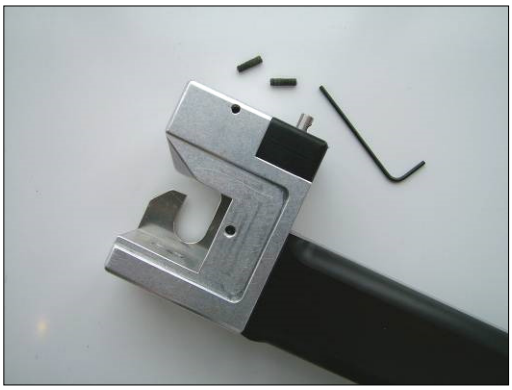


Figure 27

With the screws removed, the upper sealing plug can be removed

Figure 28

Using the tip of a screwdriver, press on the surface of the circular chamber pad. This will release the upper sealing pad from the body of the splicer, so that the complete sealing plug / chamber pad assembly can be removed.

Figure 29

The assembly should come out freely, but it may be restrained because the pad is stuck in the bore. This may have happened if there has been insufficient lubrication. **Solution;** remove the splicing chamber to give access to the front of the chamber pad, through the other end of the main bore. With a suitable tool, gently push back on the pad. The assembly will slide out.

Here the assembly is removed. The upper sealing plug, chamber pad and O-rings are clearly visible, and the return spring can just be seen in the small gap between sealing plug and pad.

Chamber pad and spring assembly: maintenance

Figure 30

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.

Figure 31

Before reassembly, it is necessary to ensure that the sealing plug, spring, and pad will fit together correctly. Therefore it is recommended 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 millimetres. Allow the adhesive to cure for approximately 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.

Splicer dismantling - valve assembly

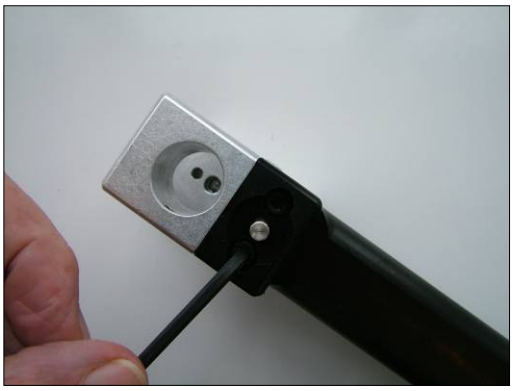


Figure 32

This shows the splicer with the sealing plug and pad assembly removed. The end of the valve assembly is visible, below the main bore. Also visible, either side of the projecting valve, are the M4 x 8 hexagon socket screws which secure the trigger surround.

Release these screws using a 3.0 mm hexagonal wrench

Figure 33

The trigger surround can now simply be withdrawn. This action exposes the projecting end of the valve assembly.

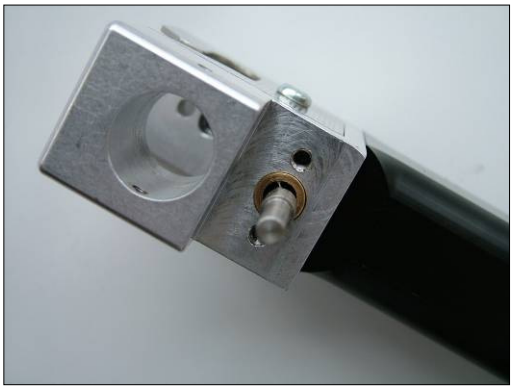


Figure 34

Surrounding the valve is a cluster of O-rings and air shells, together with a brass spacer, which is just visible in this photograph.

Withdraw the valve. Then the components which are associated with the valve can be removed. 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.

Figure 35 This photograph shows the valve, and its associated air shells and O-rings, after removal from the small bore.

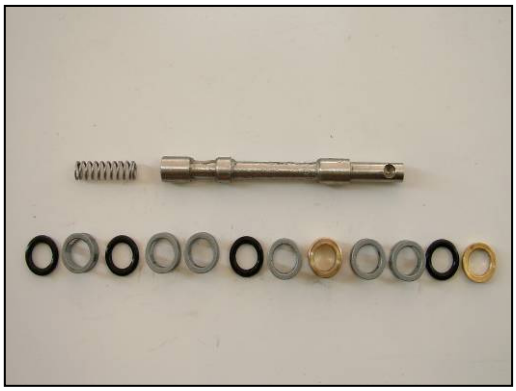


Figure 36

Note the following:

- Small hole in the left-hand end of the valve stem. This is the hole which locates the socket set screw restraining the trigger button.
- Small return spring at the right hand end of the valve. This is the trigger return spring. It is easily lost, but can be kept in position by applying a small amount of Molykote grease to the hole in the right-hand end of the valve.
- Brass spacer at extreme left. This spacer is important; it applies a compressive force to the O-rings, so that the assembly seals properly.
- Sequence of components: spacer, O-ring, shell, shell, spacer 114, shell, O-ring, shell, shell, O-ring, shell, O-ring.

Splicer dismantling – handle or lower cover

Figure 37

The splicer is available in a number of forms – with a simple lower cover, with a handle of 60 mm, or with a handle of 100 mm. In all three cases, the assembly method is similar, the only difference being in the length of the two socket cap head securing screws.

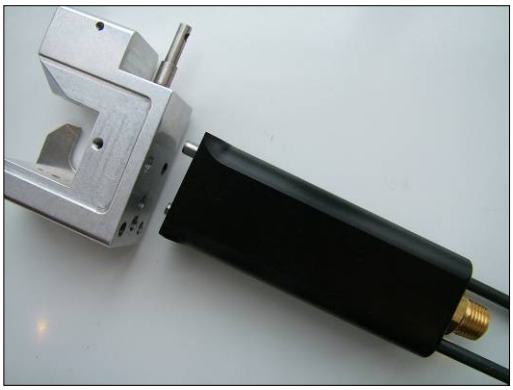


Figure 38

Here the handle (or the lower cover, if fitted) is fully removed from the splicer body

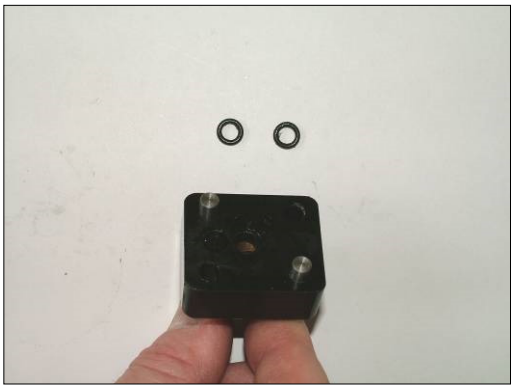


Figure 39

The lower cover (or either of the handles) has two locating pegs, Item 1012 and two recesses, containing small O-rings Item 729. If the O-rings remain in their recesses, remove them carefully with a suitable small tool.

Appendix 1 Compressed air

Pneumatic splicers are operated by compressed air. Therefore the air supply must be appropriate. The following points are important:

1. Splicers generally operate at a pressure between 3 and 8 bar.
2. Pressure may vary according to application, but it must be as uniform as possible.
3. The air supply should be reasonably dry and clean, with the lowest possible flow resistance.
4. Because the time taken to make a splice is short, transient pressure drops associated with other demands in the mill may become important,
5. 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.
6. Compressed air installations should therefore be designed to minimise pressure drop.
7. Never use narrow-bore supply tube; this introduces resistance.
8. 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 then to be significant.
9. Sometimes, static line pressure is known to be adequate, but there are demonstrable problems with transients. Then it may be useful to fit a few meters 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.
10. 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.

1. Compressed air is dangerous: avoid any bodily contact with it.
2. Always follow the safety precautions recommended by the compressor manufacturer.
3. Always ensure that unions and connectors are fully tightened and sealed, and that there are no leaks.

4. 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.
5. Do not look into the working parts of the splicer when it is being operated.
6. If a splicer malfunctions, do not use it until it has been repaired by qualified personnel.
7. 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:
8. Before undertaking any service work, disconnect the splicer from the air supply.
9. Under normal circumstances, always refit safety covers before reconnecting the splicer to the air supply.
10. 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.

114 Series - Parts list

Description	Item No.	Part No.	Quantity
Air connector ¼ BSP	157	22000-04-04	1
Slotted pan head screw M4 x 6	254	15-44-06	2
O-ring	264	01-10-10	4
Shell	276	2200-43-04	6
O-ring body to handle RM 0050-15	729	02-05-15	2
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	1
O-ring upper sealing plug RM-0140-20	905	02-14-20	1
C/sunk slotted screw M4 x 16	908	16-14-16	1
Dowel pin	1012	10-137-148	2
Blast valve & yarn clamp adjusting screw	1017	10-138-118	1
M5 x 100 fixing bolt for long handle	1035	11-15-100	2
Upper sealing plug	1102	10-135-126	1
M4 x 8 socket cap head screws	1127	11-14-08	2
Socket set screw M3 x 10	1128	17-13-10	2
Model 114 splicer medium handle 60 mm	1306	10-119-106	1
Trigger housing	1309	10-121-104	1
M5 x 60 fixing bolt for medium handle	1311	11-15-60	2
Fixing bolt for lower cover, 114S	1312	11-15-16	2
Model 114 splicer long handle 100 mm	1313	10-119-107	1
Model 114 lower cover, for 114S	1314	10-177-112	1
Trigger button 114	1318	10-114-103	1
Model 114 splicer body	1401	10-100-124	1
Model 114 side plate	1403	10-105-153	2
Blast valve 114	1404	10-113-125	1
Spacing bush 114	1406	10-133-115	1
Pad 114 (with item 905) - Item 1405 without O-ring 905	1408	10-113-111A	1
(continues with hanging assembly parts)			

Hanging assembly parts			
Splicer holding clip	170	201-1199	SPECIFY
C/sunk slotted screw M4 x 16	908	16-14-16	2
Hanging wedge (adaptor plate)	1008	10-165-109	1

MODEL 114
Assembly