



# AIR STREAM



## Operation and Maintenance Model 89300

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# 1.0 SAFETY INSTRUCTIONS

**THIS EQUIPMENT SHOULD BE USED ONLY BY PERSONNEL WHO HAVE BEEN GIVEN THE APPROPRIATE TRAINING, AND WHO ARE COMPETENT TO USE IT. THESE INSTRUCTIONS ARE TO BE MADE AVAILABLE TO OPERATORS OF THIS EQUIPMENT AT ALL TIMES, FAILURE TO OBSERVE THESE SAFETY INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY AND/OR PROPERTY DAMAGE.**

## **WORK AREA AND GENERAL SAFETY**

1. Read and understand the operation and maintenance manual supplied with this equipment. Keep it in a convenient place for future reference.
2. Keep children and untrained personnel away from this equipment while in operation.
3. Keep all guards and safety devices in place. Do not operate this equipment with guards removed or damaged.
4. Keep hands, feet and loose clothing away from moving parts, especially at cable entry points.
5. Always stop the machine and isolate compressed air and electrical services to carry out lubrication and servicing.
6. Check machine before starting for worn or damaged parts. Check for signs of loose nuts and bolts etc.
7. If machine is left unattended, ensure that unauthorized use is prevented.
8. Never leave the machine unattended while in use.
9. Consider the use of safety barriers, especially when used in public places, observe all statutory requirements for working environments.
10. Beware of pinch points involved with rotating components,
11. Beware of hot surfaces, machine uses compressed air.
12. When operating machine always wear appropriate safety clothing, ear defenders, eye protection, hard hat, safety shoes and leather gloves, machine operates with compressed air at up to 15 Bar.
13. Prior to installation ensure the tube route is connected properly.
14. Beware of exposed electrical contacts. Do not touch, or allow metal objects to come into contact.
15. Machine may cause additional fire hazard if involved in an existing fire due to compressed air.
16. No personnel are to be in manholes or ducts when the Cable Blowing Machine is being operated.
17. The machine must be operated on firm ground.
18. Stay clear of cables or lines under tension.
19. Stay clear of pressurized air line and tube.
20. Only use the machine for its intended purpose, do not use the roller drive without the air chamber to push or to retrieve cable, blow air in the far end to help cable recovery.
21. Do not place cable drum too close to the Cable Blowing Machine.
22. The compressed air supply must not be allowed to enter the air chamber or tube before the rollers have

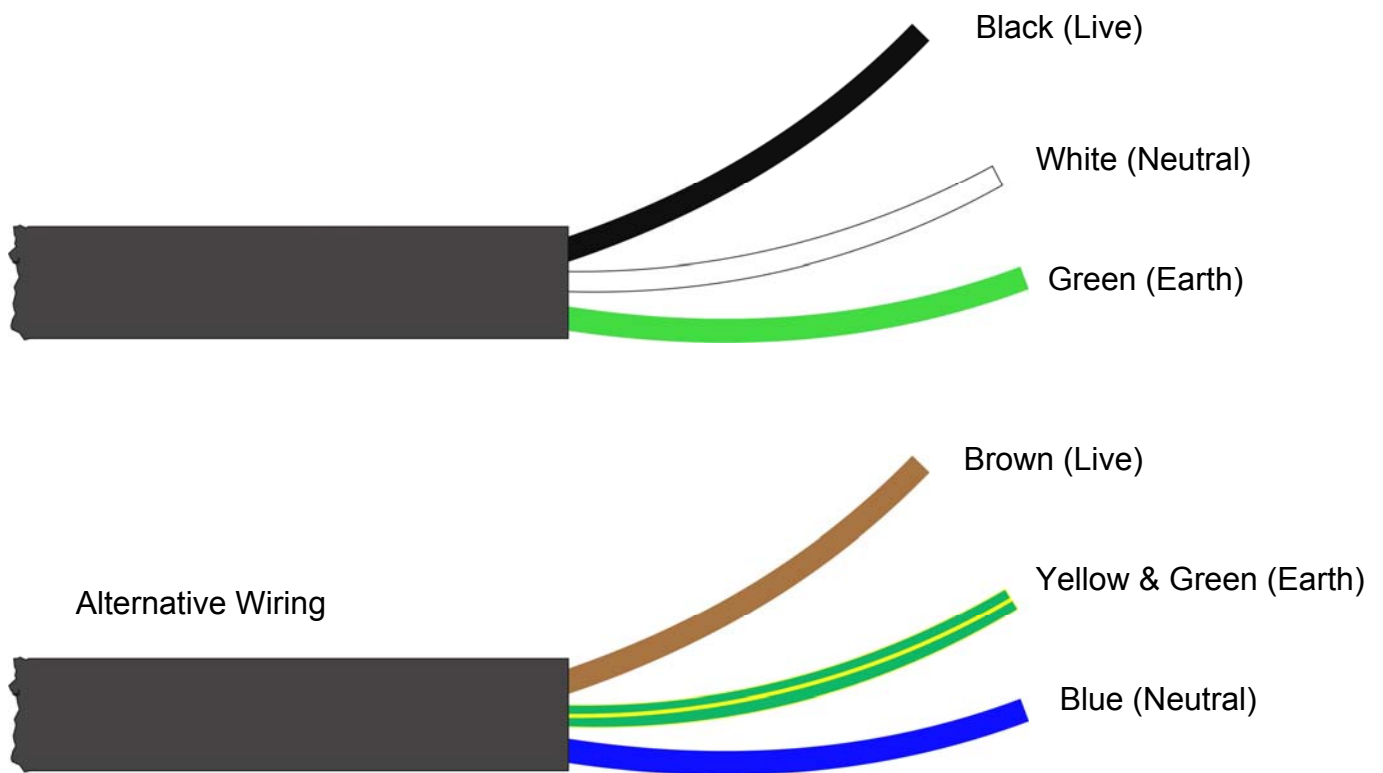
been closed on to the cable. Do not turn the air on until a reasonable length of cable 150 ft. (50m) has been installed into the tube.

- 23. Ensure the cable drum rotates freely on its stand, the cable should leave from the top of the drum.
- 24. The cable should enter the machine in a clean and dry condition. In damp, dusty atmospheres, the cable should be cleaned continuously as it enters the machine.

**FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY, AS THE CABLE COULD BE EJECTED FROM THE CABLE BLOWING MACHINE WITH HIGH FORCE AND VELOCITY.**

If the connecting plug on the power lead to the generator / (or supply) supplied with the Airstream machine is unsuitable and requires replacement, the new plug must be correctly connected observing the color codes as below.

IT IS THE RESPONSIBILITY OF THE USER TO ENSURE THAT THE CONNECTIONS MEET THE ELECTRICAL REGULATIONS FOR THE RELEVANT COUNTRY.



## **GENERAL PNEUMATIC SAFETY INSTRUCTIONS**

The GMP Fiber Optic Cable Blowing Machine is a pneumatic device, using pressurized air to project cable at high velocities. Please observe the following precautions when operating the Cable Blowing Machine:

- ▶ Compressed air can cause flying debris. This could cause personal injury. Always wear personal protective equipment.
- ▶ Ensure no personnel are in the manhole at the far end of the cable run. Severe personal injury may result.
- ▶ Never open the air chamber when pressurized.
- ▶ Only authorized, fully trained personnel should operate the air compressor.

## **GENERAL ELECTRICAL SAFETY INSTRUCTIONS**

The machine has electronic and electrical power and control circuits. Electric shock hazards exist that could result in severe personal injury. Observe the following precautions to avoid electrical hazards:

- ▶ Do not operate in water. Do not expose the machine to rain.
- ▶ Do not remove cover of electronic control panel or power supply unit. There are no user serviceable parts inside. Refer servicing to qualified service personnel.

## **2.0 CRITICAL POINTS THAT DRAMATICALLY AFFECT THE OPERATION OF THE CABLE BLOWING MACHINE**

- ▶ **PRESSURE ON THE CABLE (POSITION OF THE CLOSE ARM ASSY) SHOULD BE SET AS PER THE INSTRUCTIONS**
- ▶ **BELTS TO BE CLOSED AT ALL TIMES WHEN CABLE IS INSTALLED INTO MACHINE.**
- ▶ **CORD SEALS IN AIR CHAMBER IN GOOD CONDITION AND CORRECTLY INSTALLED TO PROVIDE GOOD SEALING.**
- ▶ **CORRECT CABLE SEAL INSTALLED.**
- ▶ **TUBE FULLY CONNECTED AND PRESSURE-TESTED.**
- ▶ **TUBE AND CONNECTING FITTINGS ARE SUITABLE FOR OPERATING AT 15 BAR AIR PRESSURE.**
- ▶ **TUBE CLAMP SECURELY TIGHTENED.**
- ▶ **COMPRESSOR CAPACITY 15 BAR AND SUITABLE FOR SIZE OF TUBE BEING USED.**
- ▶ **CABLE DRUM MUST BE LOCATED DIRECTLY BEHIND AND IN LINE WITH THE BLOWING MACHINE.**
- ▶ **AIR CHAMBER, DRIVE BELTS AND PULLEYS, CABLE GUIDES, MUST BE CLEAN AND FREE FROM DEBRIS, SLUDGE, DIRT, WATER AND LUBRICANT.**
- ▶ **THE CABLE MUST BE HAND GUIDED INTO THE BLOWING MACHINE THROUGH A DRY CLEAN CLOTH BY THE OPERATOR WEARING WORK GLOVES.**
- ▶ **ENSURE THE COMPRESSED AIR SUPPLY IS NOT APPLIED TO THE CABLE UNTIL APPROXIMATELY 150 FEET OF CABLE HAS BEEN INSTALLED OR THE MOTOR BEGINS TO LABOR.**

## **DISCLAIMER**

**General Machine Products Co., Inc. takes care in the design of its products to insure that the cable is protected during installation. Due to the variety and different methods of cable manufacture the responsibility of checking the cable compatibility with the equipment lies with the operator. Therefore, General Machine Products cannot accept liability for any damage to the cable.**



### 3.0 GENERAL DESCRIPTION

The GMP AirStream machine is designed to install small diameter cable into underground tubes.

The machine uses a DC servo motor and reduction gearing to drive a pair of flexible belts (both belts are driven).

The belts are covered with a soft pliable coating to prevent damage to the cable. A range of different coatings and profiles are available depending on the surface texture of the cable being installed. The belts offer a large surface area in contact with the cable ensuring high grip with reduced compressive loading.

During installation, the torque applied to the cable by the rollers can be adjusted to prevent the cable buckling and to prevent damage to the cable. A full range of accessories is available to allow the machine to handle a wide range of cables and tubes. This machine has the added function of high/low torque selection; this has been developed to give greater sensitivity when operating in the low torque region aiding the installation of small cables.

The machine may be placed on the ground or on a support to bring the cable to a suitable height. A separate reinforced transit housing is provided, this will protect the machine from damage during transit and can be used as a support for the machine when being used to install cable.

The remote control allows control when the machine is situated where access is difficult, i.e. down a manhole.

## 4.0 SPECIFICATION

Cable size:	Ø2.5 to Ø11.0mm	0.118" to 0.433"
Tube size: (OD)	Ø 5 to Ø18.0mm	0.197" to 0.708"
Cable speed:	0-80m/min.	0-262 ft/min
Maximum pushing force:	20 Kg.	44 lb.
Maximum air pressure:	15 bar.	210 psi.
Power requirements:*	100-277Vac 50/60 Hz (power supply input)	
	48Vdc, 250W (power supply output)	
Weight	14Kg approx.	31 lbs. approx.
Weight inc case	31 Kg approx.	68 lbs. approx.
Dimensions (ht x length x width)	266mmx460mmx305mm	10 1/2"x18 1/8" x12"
Ambient Temperature Range	0-40° C	32-104° F

\* The sensitive electronics needed to give the desired control over the installation speed and torque require a certain electrical supply quality. Should a generator be necessary General Machine recommends the use of an inverter type generator with a pure sine wave output. Please contact General Machine Products Co., Inc. should you require further assistance.

## 5.0 OPERATING PROCEDURE

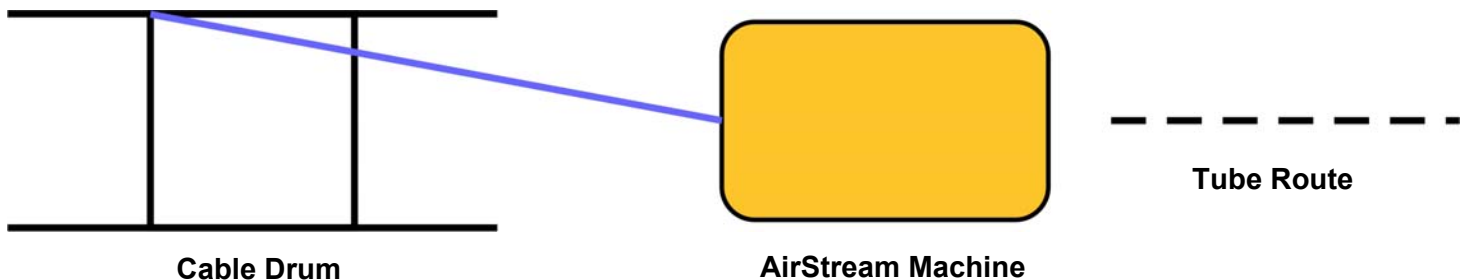
IT IS IMPERATIVE THAT ALL PERSONS USING, OPERATING OR MAINTAINING THIS CABLE BLOWING MACHINE:

- HAVE RECEIVED COMPREHENSIVE TRAINING IN THE USE OF THIS MACHINE.
- ARE COMPETENT TO USE IT,
- AUTHORIZED TO USE IT AND
- HAVE READ AND UNDERSTOOD THIS MANUAL
- GENERAL MACHINE PRODUCTS CO., INC. CANNOT BE HELD RESPONSIBLE FOR MISUSE OF THIS EQUIPMENT.

**Set up for installing cable with the machine mounted above ground:**

Position the machine in line with the route of the duct.

Position the cable drum behind the machine and in line with the machine. See sketch below (this shows a plan view of the recommended set up).



Ensure the machine is secure (either on its own stand or a separate suitable stand).

Ensure the machine is fitted with the appropriate guides and collets to suit the cable being installed and tubes into which the cable is to be installed. (See Appendix 1 for details of interchangeable parts).

Ensure the remote is plugged in.

**Note: The machine will not operate without the remote and will stop if it is accidentally pulled out or the cable severed.**

To set the machine up to install cable it will be necessary to:

Select the appropriate torque setting for the cable being installed, if in doubt start with the low torque setting.

Fit the tube into which the cable is to be installed into the air box and tube clamp.

Fit the cable through the machine.

Connect the air supply to the machine.

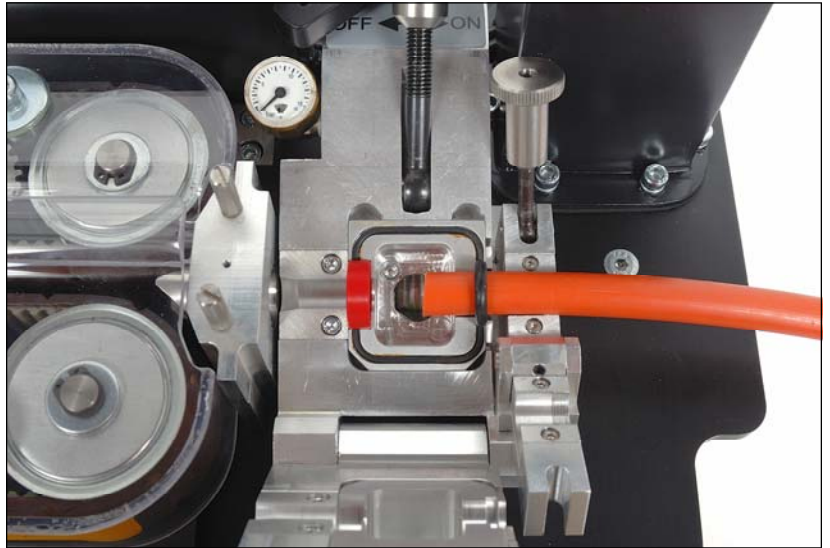
Connect the electrical power input to the machine.

## Fit the tube into which the cable is to be installed into the air box and tube clamp.

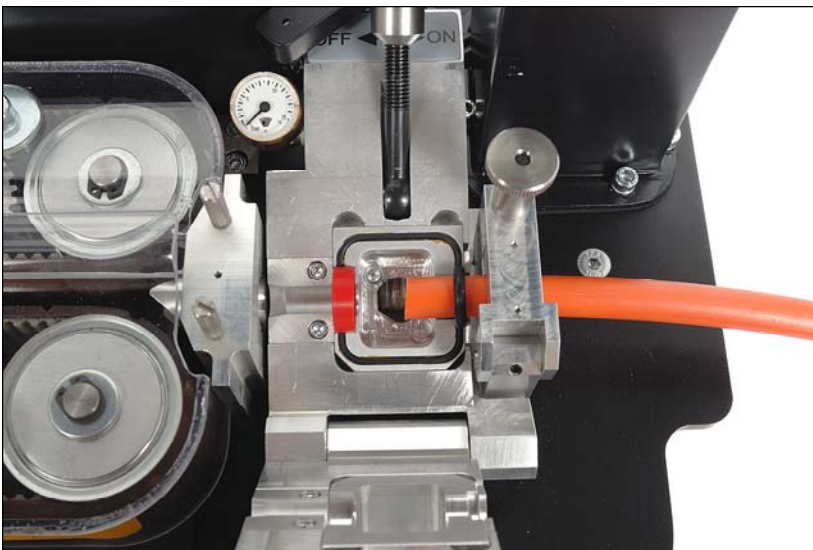
It is recommended that a length of tube similar in size to the tube into which the cable is to be installed be fitted in the tube clamp. This length of tube may then be connected to the installed tube (the length of tube underground into which the cable is to be installed) using a suitable connector.

Slide a suitable size O ring over the end of the tube.

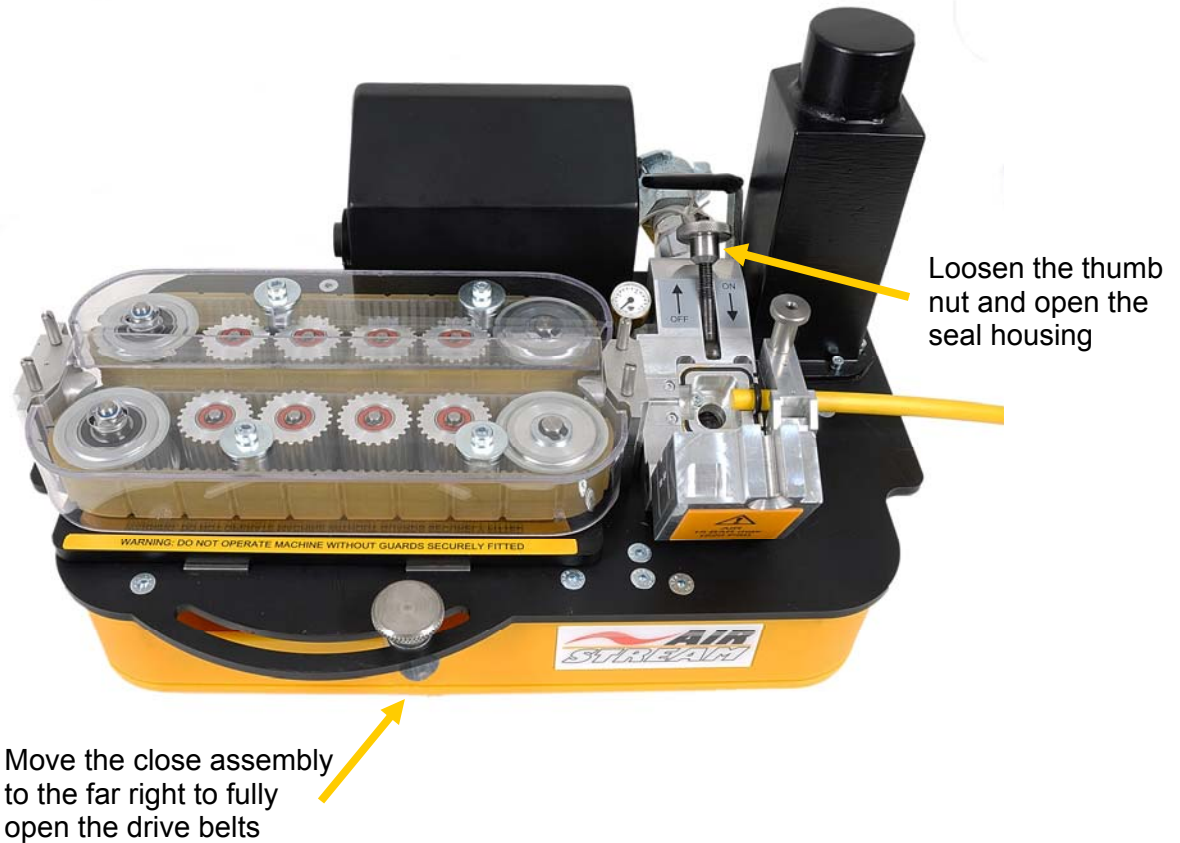
Fit the tube into the end of the air box housing so that it protrudes approx. half way into the housing, position the O ring so that it sits against the seal face, as shown in the illustration below.



Once the tube has been positioned, the tube clamp may be closed, the swing bolt swung down and the thumb nut tightened, the tube is now secure.



## Fit the cable through the machine.



It is now possible to insert the cable in the machine, this can be carried out in 2 ways.

### Method 1:

This method is only suitable if the machine has been previously set up with the correct infeed and exit guides from the belts to suit the cable being installed, see section 9 for the procedure for changing the guides.

- Turn the speed control to zero.
- Turn the torque control to approx.  $\frac{1}{4}$  turn from zero.
- Open the close assembly arm fully to the right.
- Ensure the direction switch is in the forward position.
- Select the appropriate split cable seal (see appendix 1) and position it in the groove in the seal housing.
- Press Start and slowly turn the speed control clockwise until the belts are just moving.
- Take the cable to be installed and pass it through the infeed guide so that the end is between the belts.
- Close the close arm to the left gently until the cable is gripped (there is no need to apply the full installation pressure to the cable at this stage) – the cable should now feed slowly through the belts, cable seal, air box and into the tube.
- Press Stop.
- Close and tighten the thumb nut securing the airbox.
- Set the machine up to install the cable into the duct.

## Method 2:

- Open the close assembly arm fully to the right.
- Remove the top halves of the belt infeed and exit guides using the knurled screws (screwdriver slots are provided if necessary). Ensure the correct guides are fitted for the cable (see appendix 1)
- Select the appropriate split cable seal (see appendix 1) and position it round the cable.
- Take the cable and simultaneously place it into the tube in the air box and thread it through the gaps in the belts guards and between the belts. Ensure the cable seal seats in the appropriate groove in the seal housing.
- Replace the top halves of the belt infeed and exit guides.
- Close the airbox
- Set the machine up to install the cable in the duct.

## Setting the clamp force:

Close the drive roller assembly onto the cable as follows:

The photo shows the drive roller close thumb screw slightly loosened. (The assembly is free to move). This thumb screw is attached to the clamp arm lever. The clamp arm lever controls the position of the roller assembly.

As the clamp arm is moved around the quadrant the belts move together and apart.

When the clamp arm is furthest to the right, the gap between the belts is at a maximum. And vice versa.

When preparing the machine to insert the cable, the clamp arm is positioned at its furthest point to the right (rollers open). Once the cable has been positioned in the machine the rollers must be closed on the cable in order to drive the cable. (And to stop the cable being dragged back out of the machine by any tension in the cable).

The amount of pressure on the cable can be varied simply by loosening the thumb nut, moving the clamp arm lever to the right or left; as required, and tightening the thumbscrew.

As more experience is gained using the machine, the amount of compression required will become clear.

### **Note:**

An alternative method of setting the compression force is detailed in the note at the end of Appendix 2.



## Connect the air supply to the machine.

The air inlet to the machine is male via a crowfoot coupling on the back of the airbox. An on/off valve is fitted to the air box to provide control of the air supply to the operator and a pressure gauge is fitted to the air box to indicate air box pressure. Maximum safe working pressure is 15 Bar ( 210 psi).

## Connect the electrical supply to the machine.

**Note:-** Please refer to Section 4.0 Specification for details on power supply quality. General Machine Products Co., Inc. recommend the use of a Honda EU1000i generator.

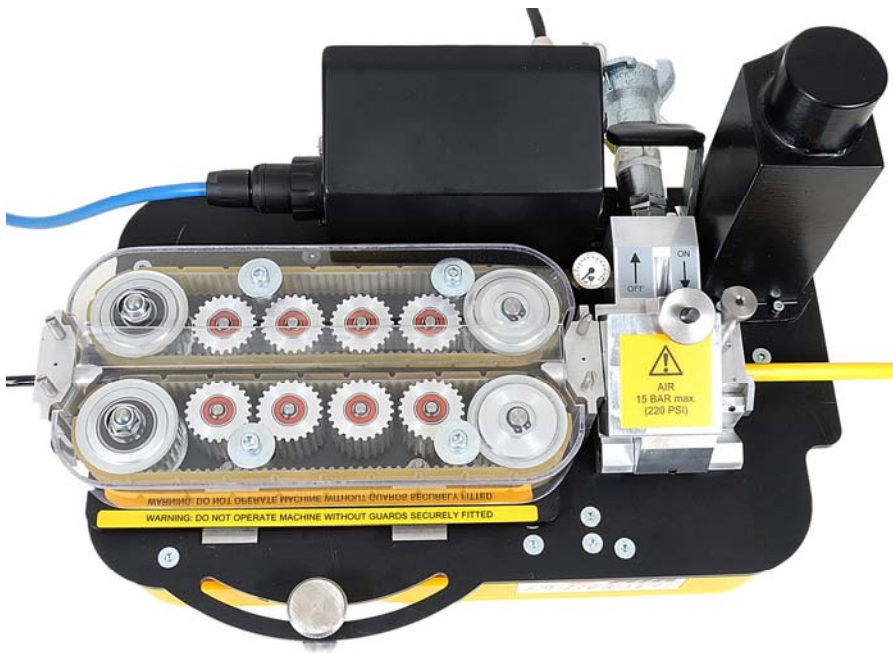
The transformer accepts voltages between 100-277 Vac 50/60Hz automatically. Adaptors are available to suit any required existing connector, speak to our sales department for full details and specification of connector.



If the power supply lead supplied with the AirStream Cable Blowing Machine is unsuitable and requires to be changed refer to the safety instructions for further details.

**IT IS THE RESPONSIBILITY OF THE USER TO ENSURE THAT THE CONNECTIONS MEETS THE ELECTRICAL REGULATIONS FOR THE RELEVANT COUNTRY.**

**The machine is now ready to start the cable installation.**



### **Set up for installing cable with the machine mounted below ground:**

The set up is similar to the set up for installing cable above ground, (described above) typically this type of installation is demanded for “series blowing” i.e. when a length of cable is already installed, and the limit of installation distance is reached. In such cases it is customary to couple a “series machine” sited down a manhole some distance from the point of main installation. This machine operates in conjunction with the machine sited at the main point of installation. The GMP Airstream machine is ideally suited to this type of operation, it may be coupled with a second machine to increase the distance a single cable can be installed without joins. The only difference between this set up, and the set up for installing cable with the machine above ground, is that there will be no drum stand carrying the cable drum. The cable will be exiting from one side of the manhole and blown into the tube at the other side of the manhole. The machine should be aligned with both the incoming cable and the outgoing tube path, both side to side and up and down.

### **NOTE: THE MACHINE MUST NOT BE SUBMERGED IN WATER.**

If the hole is full of water it must be pumped out before placing the machine on the bottom of the hole.

### **Connecting the Remote Control**

To use the remote control, simply connect the remote cable into the socket located on the back of the control panel, see photo below.

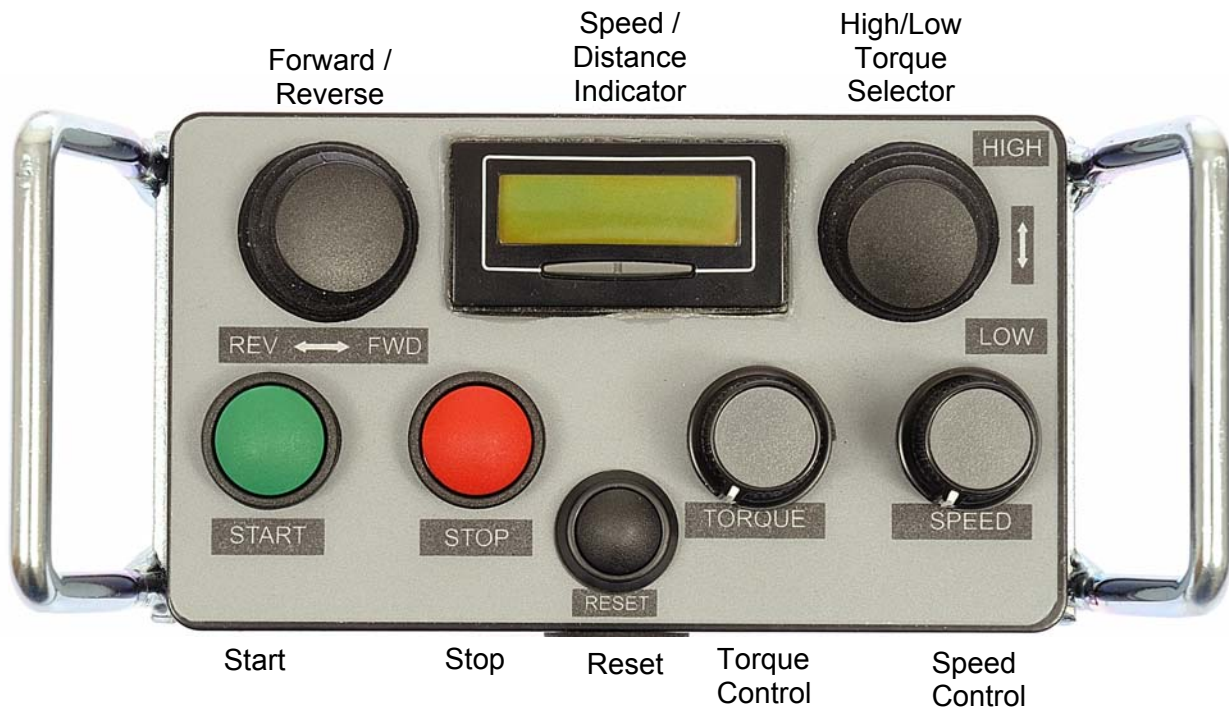


## Installing cable.

**Note:** Should the remote lead be accidentally pulled out of the Airstream the machine will automatically stop.

The machine is fitted with a range of controls to help the operator to install cable in the minimum time with the least risk of causing damage to the cable or tube.

These controls are identified and their function is described below.



### Torque control:

This dial controls the motor torque, turn this clockwise to increase the torque (pushing force) applied to the cable by the belts. Turn counter-clockwise to reduce the amount of torque applied to the cable by the belts.

### Speed control:

This dial controls the motor speed, turn this clockwise to increase the speed of the belts (and the cable). Turn counter-clockwise to reduce the speed.

### Start:

This switch starts the belts moving in the direction selected, with the speed and torque selected by the dials and the high/low torque switch. Whenever the power to the machine is disconnected and reconnected, it will be necessary to depress this switch before the machine will run.

### Stop:

This switch will stop the belts, the motor will remain energized preventing air pressure blowing the cable out of the machine.

### Speed Distance indicator:

This device will measure and display the distance travelled by the cable and also the speed at which the cable is travelling. To toggle between speed and distance press the left-hand button. An R on the left side of the screen designates speed is being displayed, an M designates a distance in meters and FT designates a distance in feet. To reset the distance to zero press the separate button labelled RESET at the bottom of the control panel.

**Note: It is possible to reset the distance to zero even if speed is being displayed on the screen.**

Should it be necessary to replace the speed distance-measuring device please contact GMP Products.

## High/Low Torque Switch:

This allows the selection of the torque range the breeze operates in. For smaller cables the low torque setting will give finer adjustment over low end torque for the machine. Positions are UP for high torque and DOWN for low torque.

**Note: It is not possible to switch between high and low torque once the belts are moving. To switch the torque press STOP, change the torque switch setting and start again.**

## Forward/Reverse Switch:

This will change the direction of the belts but only when the machine is stationary to prevent accidental reversing of the machine while installing cable.

## To install cable:

**Note: If the belts are stationary for approx. 5 seconds the machine will reset and it will be necessary to press the start button again to continue installing. This is a safety feature added to protect both the cable and Airstream motor.**

For the first time. i.e. installing a cable type that has not been installed before and whose characteristics are unknown.

Connect the power to the machine.

Select the high/low torque switch position, if in doubt initially use the low torque setting.

Select the Forward direction.

Turn the torque and speed controls counter-clockwise to the minimum position.

Press "start" button.

The machine will try to push the cable, with the torque control set to a minimum the belts will not turn or only very slowly.

It is now necessary to set the torque control to a position appropriate to the stiffness of the cable and the characteristics of the cable insulation. See Appendix 2 for recommendations. If the cable type has been installed before, the settings will be available; the torque control may be set at the previously determined position.

Set the torque control to the position determined above and turn the speed control. The rollers will now start to turn and the cable will feed through the air box (increase speed setting to max. if required). When the cable has travelled a reasonable distance, (say 300ft/100 meters) turn on the air feed, this will help the machine to feed the cable.

The tube route, through which the cable is to be fed, should be configured in such a way that the cable can feed all the way along the tube and out the other end. It will be necessary to be able to determine when the cable has emerged at the other end of the tube route. A typical way of achieving this aim is to have a colleague positioned at the end of the tube run; in contact with the main installer using a radio transmitter/receiver of some description. In this way the main installer may be advised when the cable has completed the run, he can then stop the machine.

If there is an unexpected obstruction in the tube route the rollers will see this as an increase in torque demand, assuming the torque control has been set at an appropriate level, the rollers will stop turning before they push the cable so hard as to cause it to buckle. If (due to lack of previous knowledge of the cable characteristics) the torque control has been set at a figure which is too small to push the cable the setting may be increased. Bear in mind that this will increase the risk of the cable being damaged by buckling.

## 6.0 Maintenance

The GMP AirStream Cable Blowing Machine has been designed to give reliable, trouble free service over long periods. The machine requires no sophisticated maintenance procedures, simple common sense checks and precautions are all that are needed.

The main source of breakdown and/or malfunction of a machine being used outdoors is contamination by the elements, this contamination may be introduced into the machine in a number of different ways.

There may be mud, dust or other contaminants carried into the machine on the cable or tube (there may be surface coatings of lubricants or other release type agents on the outer surfaces of the cable and tube, this could build up on the belts and make them slip).

The machine may be set down on a muddy surface, or be splashed by road going vehicles when it is being used by the roadside.

It is convenient to consider each function of the machine in turn.

**Air box parts:** keep clean, build up of moisture and dust will prevent the joint faces from mating, prevent the housing seal from sealing etc. Use any traditional workshop cleaning agent.



**Tube clamp inserts:** keep clean, build up of moisture and dust, particularly in the grooves, will reduce the clamping effect. Use traditional workshop cleaning agent.

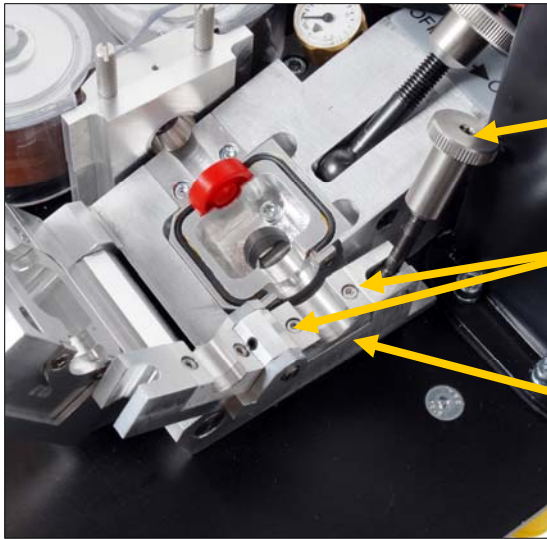
**Cable infeed and exit guides:** keep clean, build up of moisture and dust may nip the cable. Use any traditional workshop cleaning agent.

As a general rule, every time an interchangeable part is removed and replaced by a part of a different size, shape etc. the part being removed should be thoroughly cleaned before being returned to its box. Similarly the cavity from which it was removed can also be cleaned prior to the assembly of the replacement part.

The machine should be returned to the manufacturers (or an approved service agent) after every 1000 hours use (or at intervals of 12 months) for a major service. The service will include the following.

- Strip down the machine.
- Clean and inspect all parts for damage, replace as necessary.
- Check all screws and fasteners for damage, replace as necessary.
- Check all bearings for smooth running, replace as necessary.
- Check all electrical connections for continuity and damage, remake connections and/or replace connectors as necessary.
- Check all air box connections and insert settings. Replace any badly damaged parts which compromise sealing integrity as necessary.
- Check / Replace lower housing seals.
- Check / Replace the drive shaft seal housing "O" rings.
- Rebuild the machine, to current build standard.
- Test.

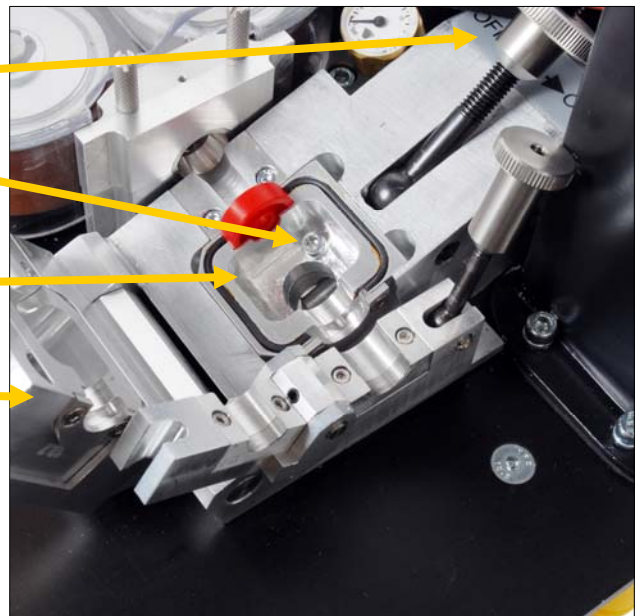
## 7.0 Procedure for changing inserts in the tube clamp



- ▶ Loosen the thumb nut, rotate the swing bolt to open the tube clamp housing
- ▶ Loosen and remove the (2) m2.5 fixing screws. (Do not lose these screws, they will be needed for the replacement insert).
- ▶ Remove the insert

## 8.0 Procedure for changing inserts in the air box

- ▶ Loosen the thumb nut, rotate the swing bolt to open the air box
- ▶ Loosen and remove the m4 fixing screw. (Do not lose this screw, it will be needed for the replacement insert)
- ▶ Remove the insert
- ▶ Repeat the process for the insert in the other box half
- ▶ To fit the new inserts, reverse the disassembly procedure.



## 9.0 Procedure for changing inserts in the belt infeed and exit guides



Unscrew knurled screws securing the upper guide housing



Loosen and remove the M2.5 screw securing the guide into the housing

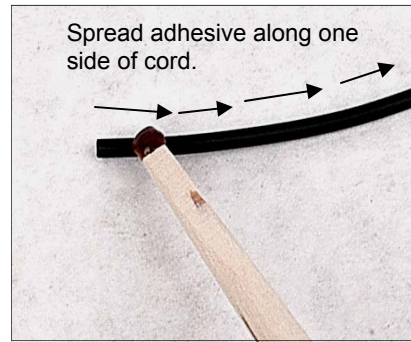


Remove and replace the guide

## 10.0 Procedure for replacing the air box housing seal



Cut a length of 0.08inch sealing material 2 1/8" long (a little longer than is necessary).



Apply a thin coat of 3M Rubber and Gasket Adhesive to the top of the cut sealing material

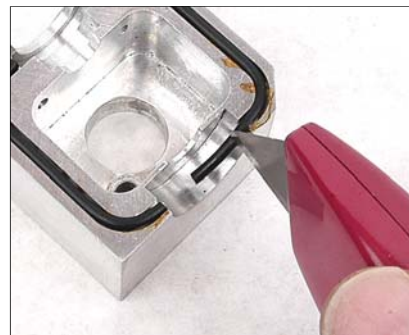


Place the pre-cut length in the groove, glue surface down, starting at the end with the retainer plate and aligning flush with the end of the groove.



Work your way around, pressing the seal into the groove and allowing the excess material to hang over the opposite side.

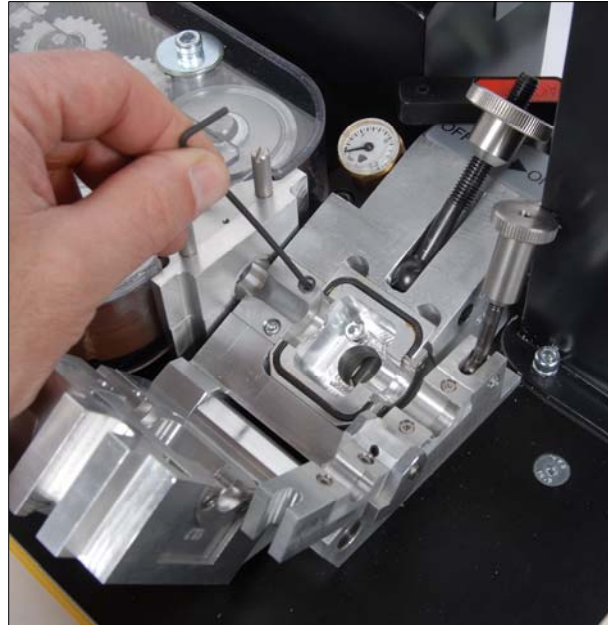
Repeat the procedure for the second groove



Trim excess material flush with end of groove.

## 11.0 Procedure for changing the air box infeed guide

- ▶ Loosen and remove the (2) M3 screws. (Do not mislay these screws, they will be needed for the new infeed guide.
- ▶ Remove the air box infeed guide
- ▶ Repeat the procedure for the infeed guide insert in the other housing half
- ▶ To fit the new guides, reverse the disassembly procedure



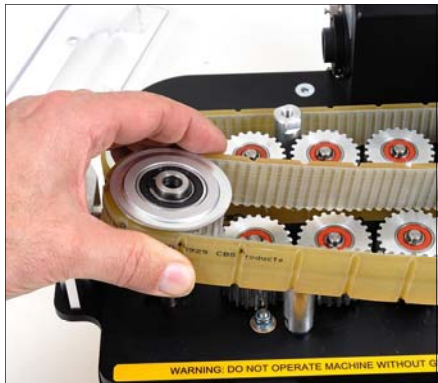
## 12.0 Procedure for changing the cable drive belts

The machine is fitted with standard belts, tests have shown that these belts give a good compromise of life and grip. There may be circumstances when a belt with much higher grip will be needed. If, for instance it is necessary to install a cable, which will sustain crushing damage when light compression forces are applied to it. It will be necessary to use a belt with a surface coating with high friction characteristics. This will allow the cable to be pushed with high torque while being compressed lightly. Additionally, smaller cables may require a belt with a smaller groove profile to gain the best grip possible. If these types of belt are needed the General Machine Products Co., Inc. sales office will be able to advise on part numbers etc. To fit these belts it will be necessary to remove the standard belts, the procedure is as follows:

Remove the 4 screws retaining the belt guards.



Loosen and remove the tension nut on the idler pulleys. This should slacken the belts enough for removal.



Place the new belt in position on the pulleys and tension as described in section 13.0.

For easier installation, remove the pulley first, place pulley in loop of belt and then slide on shaft.

**NOTE: NEVER POWER THE MACHINE UP OR RUN WITH THE GUARDS REMOVED. DOING SO MAY RESULT IN INJURY TO THE OPERATOR.**

## 13.0 Procedure for tensioning the drive belts

Place the new belt in position in over the pulleys and ensure the belt is correctly located in all the pulley grooves.





Using a non-metallic object so as not to damage the pulleys, push the adjustable pulley to the end of its travel and tighten the tension nut.



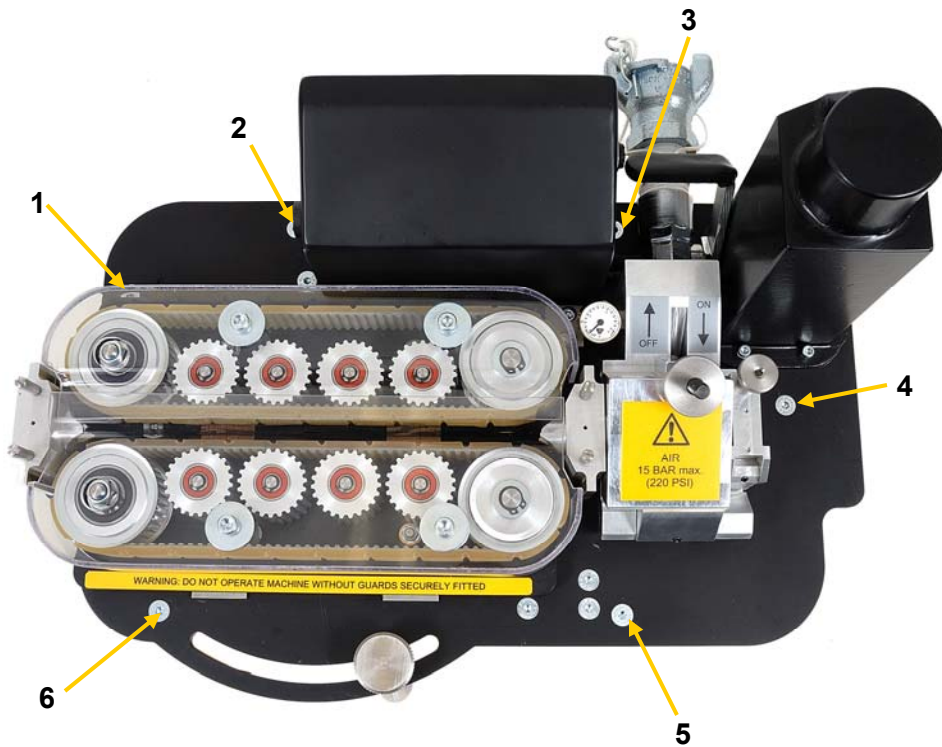
Check the belt tension, this should be approximately 1/4" (6mm) offset. If necessary, slacken off the tension nut and re-adjust until the correct tension is achieved. Check that the tension nut is tight. (Note the belt tension should be checked periodically).



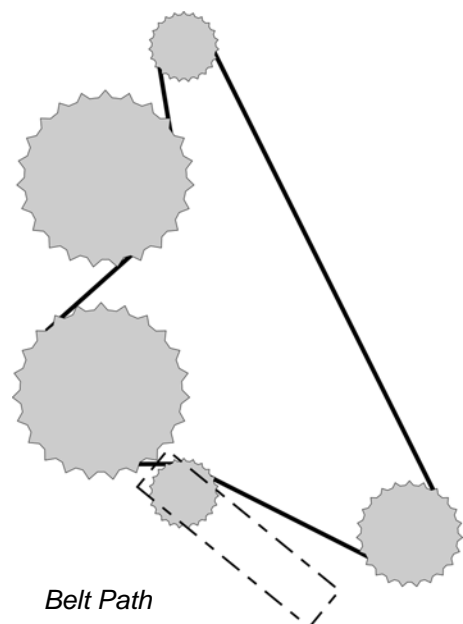
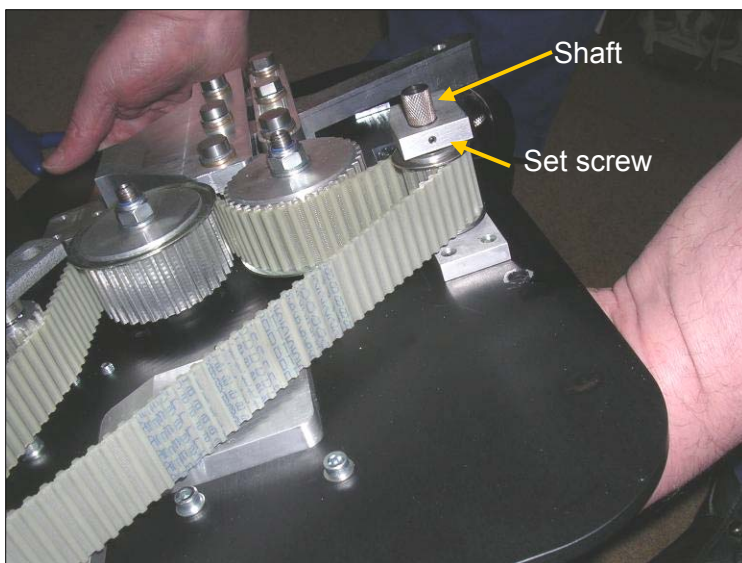
Replace the drive belt guards and retaining screws.

## 14.0 Procedure for checking and replacing the motor drive belt

Remove the 6 screws retaining the machine base as shown below:



Turn the machine over revealing the motor drive belt. Loosen the set screw retaining the idler pulley, as indicated below. The shaft retaining the pulley should now be free to remove. Once removed the belt can easily be replaced. Assembly is the reverse of disassembly.



## 15.0 Monthly service – check list

This section is included in the manual for your convenience, there follows a list of suggested checks, it is recommended that these checks be carried out on a regular basis, depending on use. Monthly checks are convenient; a few minutes can be set aside on the same day of each month to complete these simple checks. The next section of this manual is an empty table, the dates when these checks and all other service and repair jobs are completed can be entered into the spaces provided in this table. This will give the user a record of what service has been carried out and when.

1. Check the tool box, ensure all tools and interchangeable parts are present, clean and ready for use.
2. Remove the clear belt guards, clean the outside of the machine and replace.
3. Check the slide mechanism operates smoothly, lubricate if necessary with a dry film lubricant.
4. Clean the exposed threads on the swing bolts that hold the air box and tube clamp assembly together. Add a smear of grease/oil to prevent build up of surface corrosion and to ensure smooth operation of the thumb nuts.
5. Check the cable drive belt tension.



## 17.0 Tube integrity and Lubrication

**This is entirely the responsibility of the operator.**

To be sure that the tube into which the cable is to be inserted is installed appropriately, it is recommended that its integrity and lubrication be checked.

**i.e. check that the tube is:**

1. Not blocked
2. Not squashed
3. Continuous (i.e. it has not been fractured somewhere along its route and the fractured ends separated)
4. Also check that any joins are pressure tight
5. Finally check that the tube is appropriately lubricated.

The easiest and most straightforward way to complete these checks is to set the machine up for a normal cable insertion but fit a seal in place of the cable. The tube can then be pressurized without running the belt drive.

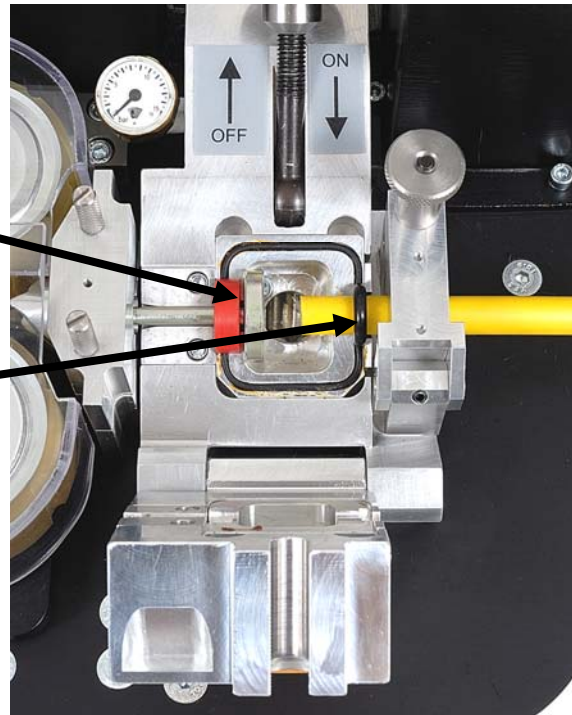
**CAUTION: ANY OBJECT INADVERTENTLY LEFT IN THE TUBE DURING THE TUBE LAYING MAY BE EXPELLED FROM THE END OF THE TUBE WITH HIGH FORCE AND VELOCITY. IT IS IMPERATIVE THAT NO PERSONNEL BE IN THE VICINITY OF THE END OF THE TUBE OR THAT A SUITABLE DEVICE IS FITTED TO THE END OF THE TUBE TO ARREST ANY EXPELLED OBJECT.**

The checks listed at 1-4 (inclusive) above may all be carried out at the same time using one check. The procedure is outlined below.

Set up the air box and tube clamp as shown right.

Fit the appropriate plug as shown  
(see Appendix for plug number)

Fit the air box seal, tube and tube seal in  
position as for normal cable installation



When the air box has been set up as shown in the photo, the air box and tube clamp should be closed as for usual cable installation.

The air box and tube clamp are now set up to blow air through the tube. Connect the air as for normal blowing. Make sure there are personnel at the other end of the tube run, and that they are aware that the air is to be turned on. Make sure that a suitable device is fitted to prevent injury should any object be expelled from the far end of the tube.

The far end of the tube run should be monitored, air should be leaving the tube under reasonable pressure. The minimum pressure required will vary with the length of tube in the run, the friction characteristics of the tube and the cable and the lubrication being used. However, as a starting point the air leaving the far end of the tube should be (at least) similar to a light breeze. Bear in mind that if the tube run is of considerable distance, it may take a few minutes for the air to reach the far end of the tube.

If after waiting a suitable time there is no air leaving the far end of the tube, this would indicate that there is a blockage or similar obstruction in the tube run, or, that the tube is fractured. In either case the fault should be corrected before any attempt is made to blow cable down the tube.

Once the tube integrity has been confirmed by the method outlined above. The tube may be lubricated. Open the air box and tube clamp assembly, as shown in the sketch above, withdraw the tube and raise it so that the lubricant will pour into it easily and not overflow from the top. Pour lubricant of recommended quality and quantity down the tube (A recommended quantity is 100ml per 1km of tube length). Insert a suitable foam plug into the tube and put the tube back into the air box and tube clamp as shown in the sketch above.

The air box and tube clamp assembly are now set up to blow the foam plug through the tube, the foam plug will help to deposit an even coating of lubricant to the inside walls of the tube. Connect the air as for normal blowing. Make sure there are personnel at the other end of the tube run, and that they are aware that the air is to be turned on. Make sure that a suitable device is fitted to prevent injury should any object be expelled from the far end of the tube. When the foam plug has been expelled from the far end of the tube run, cable can be installed into the tube.

**Note:** when the air is turned off, after checking the tube integrity and sending the foam plug down the tube to spread the lubricant, it may take some time for the pressure in the tube to dissipate. Time must be allowed for the pressure to fall back to low levels.

## 18.0 Recommended spares list

1. Tube –‘O’ Rings – See Appendix 1
2. Cable Seal – See Appendix 1
3. Coated Cable Drive Belts – See Appendix 1
4. 2 mm cord seal – See Appendix 1
5. 7 A Fuses - P/N 30936
6. 315 mA Fuses - P/N 89593
7. Motor Drive Belt - P/N 30944

**For spare parts always quote the machine type and serial number and contact:**

**General Machine Products Co., Inc.**

**3111 Old Lincoln Hwy**

Trevose, Pa 19053

**TEL: 215-357-5500**

**FAX 215-357-6216**

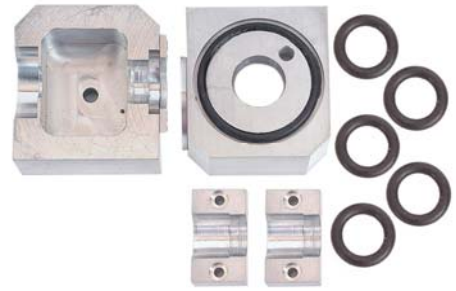
**E-MAIL: [info@gmptools.com](mailto:info@gmptools.com)**

**Website: [www.gmptools.com](http://www.gmptools.com)**

# APPENDIX 1

This section lists the appropriate inserts collets etc required for a given cable/tube combination.

<b>TUBE COLLET AND CLAMP ASSEMBLIES</b>	
89310	TUBE COLLET AND CLAMP ASSEMBLY 05 mm O.D.
89311	TUBE COLLET AND CLAMP ASSEMBLY 07 mm O.D.
89312	TUBE COLLET AND CLAMP ASSEMBLY 08 mm O.D.
89313	TUBE COLLET AND CLAMP ASSEMBLY 10 mm O.D.
89314	TUBE COLLET AND CLAMP ASSEMBLY 12 mm O.D.
89315	TUBE COLLET AND CLAMP ASSEMBLY 12.7 mm O.D.
89316	TUBE COLLET AND CLAMP ASSEMBLY 14 mm O.D.
89317	TUBE COLLET AND CLAMP ASSEMBLY 16 mm O.D.
89318	TUBE COLLET AND CLAMP ASSEMBLY 18 mm O.D.



<b>CABLE GUIDE ASSEMBLIES</b>	
89305	CABLE GUIDE, 2.5mm DIAMETER
89306	CABLE GUIDE, UP TO 3.0mm DIAMETER
89307	CABLE GUIDE, 3.0 TO 6.4mm DIAMETER
89308	CABLE GUIDE, 6.0 TO 11.0mm DIAMETER



<b>CABLE SEAL COLLET ASSEMBLY</b>	
89374	CABLE SEAL COLLET ASSEMBLY 2.5 TO 3.0 mm DIAMETER
89375	CABLE SEAL COLLET ASSEMBLY 3.0 TO 3.8 mm DIAMETER
89376	CABLE SEAL COLLET ASSEMBLY 3.8 TO 5.0 mm DIAMETER
89377	CABLE SEAL COLLET ASSEMBLY 5.0 TO 6.4 mm DIAMETER
89378	CABLE SEAL COLLET ASSEMBLY 6.4 TO 8.0 mm DIAMETER
89379	CABLE SEAL COLLET ASSEMBLY 8.0 TO 9.5 mm DIAMETER
89373	CABLE SEAL COLLET ASSEMBLY 9.5 TO 11.0 mm DIAMETER



<b>SPARE CABLE SEAL</b>	
89510	CABLE SEAL 2.5 TO 3.0 mm (PACK OF 5)
89511	CABLE SEAL 3.0 TO 3.8 mm (PACK OF 5)
89512	CABLE SEAL 3.8 TO 5.0 mm (PACK OF 5)
89513	CABLE SEAL 5.0 TO 6.4 mm (PACK OF 5)
89514	CABLE SEAL 6.4 TO 8.0 mm (PACK OF 5)
89516	CABLE SEAL 8.0 TO 9.5 mm (PACK OF 5)
89517	CABLE SEAL 9.5 TO 11.0 mm (PACK OF 5)

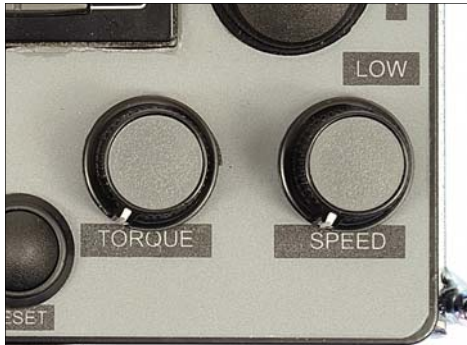
<b>DRIVE BELTS (sold in pairs)</b>	
30952	DRIVE BELT, 3-11 mm DIAMETER CABLE
30953	DRIVE BELT, 1-5 mm DIAMETER CABLE

<b>SPARE TUBE SEAL O RING</b>	
89549	TUBE SEAL O RING 05 mm DIAMETER (PACK OF 5)
89550	TUBE SEAL O RING 07 mm DIAMETER (PACK OF 5)
89551	TUBE SEAL O RING 08 mm DIAMETER (PACK OF 5)
89552	TUBE SEAL O RING 10 mm DIAMETER (PACK OF 5)
89553	TUBE SEAL O RING 12 - 12.7 mm DIAMETER (PACK OF 5)
89554	TUBE SEAL O RING 16 mm DIAMETER (PACK OF 5)
89558	TUBE SEAL O RING 18 mm DIAMETER (PACK OF 5)

<b>SPARE CORD SEAL</b>	
89691	SEAL CORD 2 mm DIAMETER X 3' (1M) LONG

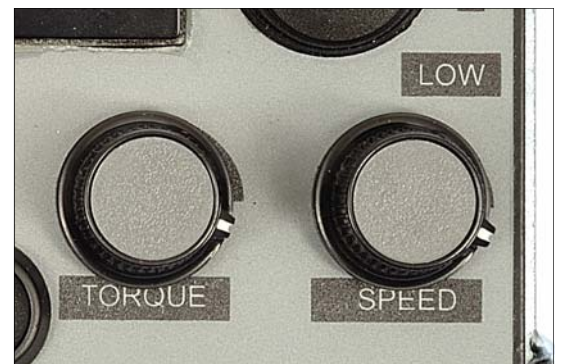
## APPENDIX 2

This section makes recommendations for the initial setting of the torque control potentiometer when installing a cable which has not been installed before, and, whose characteristics are unknown.



The picture to the left shows the torque and speed control potentiometers set in the maximum counter-clockwise position. In this position both torque and speed will be minimum. (Zero)

The picture to the right shows the torque and speed control potentiometers set in the maximum clockwise position. In this position both torque and speed will be maximum (see specification for details).



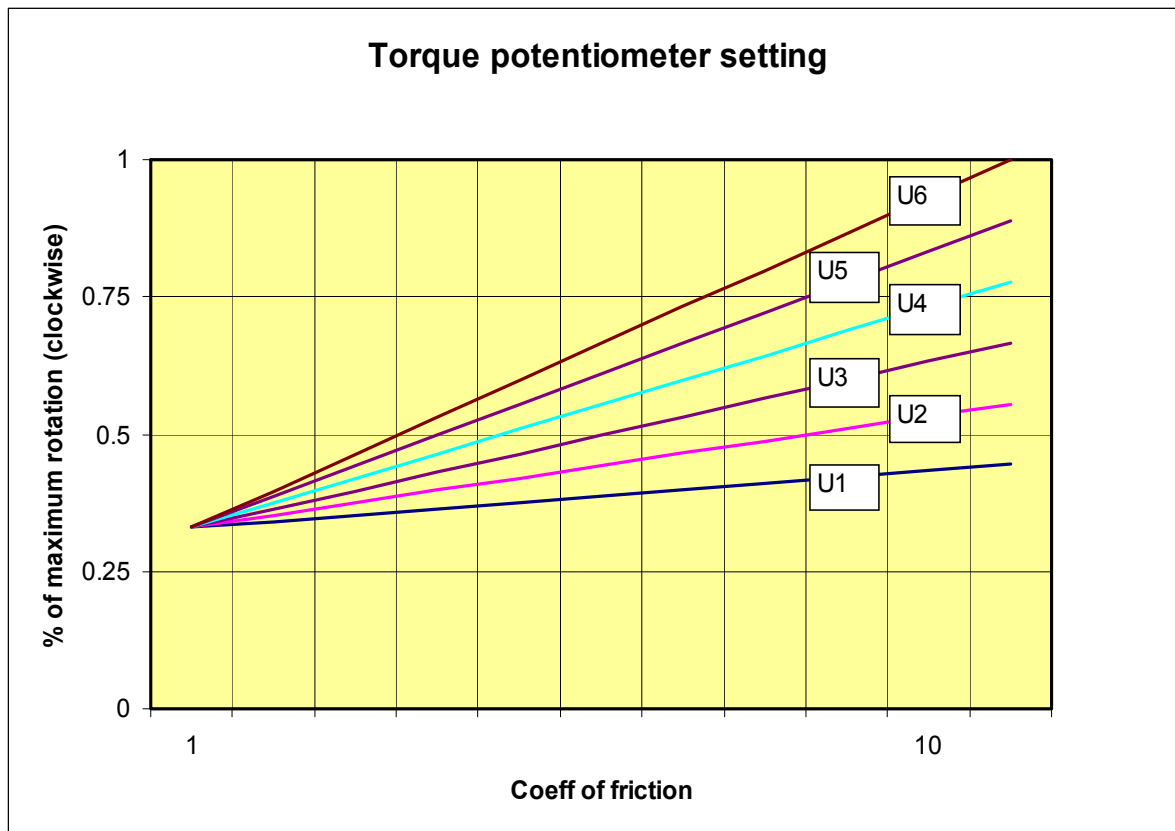
**The torque control setting will allow the cable to be installed efficiently and without damage. It is of vital importance that the torque setting is made with great care, a little time spent understanding the way to arrive at the optimum settings will save time and frustration during the installation. There are two stages to arriving at the correct torque setting they are described below.**

- 1 Establish the stiffness coefficient from the table below: the stiffness coefficient is a figure used to represent the diameter and the stiffness of a cable. This figure is only relevant in the context of setting the torque, it has no other relevance. The higher the U figure the stiffer the cable. There is a degree of subjectivity about determining the cable stiffness. What is low stiffness? What is high stiffness? Determining this (the stiffness) relies upon the user having some familiarity with bundled optical fiber cables, this will give the experience to assess whether the cable has low, medium or high stiffness. For instance a small diameter cable with high stiffness may be less stiff than a large cable with medium stiffness. The table reflects this. If there is any doubt, in the first instance err on the low side, i.e. select a lower U figure.

<b>Cable dia (mm)</b>	<b>Cable stiffness</b>	<b>Stiffness coefficient (U)</b>
2.0 - 3.5	Low	U1
	Medium	U1
	High	U2
3.5 - 5.0	Low	U1
	Medium	U2
	High	U3
5.0 - 6.5	Low	U2
	Medium	U3
	High	U5
6.5 - 8.0	Low	U2
	Medium	U4
	High	U6

- 2 Assess the coefficient of friction of the cable insulation (the outer coating). Is it low or high. Once again this relies on the user having some experience with bundled optical fiber cables. As a guide, if the surface feels smooth and dry the coefficient of friction will be low, if you slide your hand over the surface does it snatch your flesh? If it does the coefficient of friction will be high. As above, if there is any doubt, err on the low side i.e. select a lower coefficient of friction.

- 3 Referring to the chart below. The “x” axis (the bottom line) represents the coefficient of friction; 1 is very low: 10 is very high. Look along this line from left to right. Pick a vertical line that is approximately the value of the coefficient of friction. Look vertically upward along this line. It crosses a series of angled lines, these lines are numbered U1, U2 etc. where the vertical line crosses the angled line with the U figure determined from step 1 make a mark on the chart. Draw a horizontal line (parallel with the other horizontal lines on the chart) from the marked point. Where this line crosses the “y” axis (the vertical line at the extreme left hand of the chart), make a second mark on the chart. The height of this line represents the % of maximum clockwise rotation of the torque control. If this line is very close to the figure 0.5 marked on the “y” axis, set the torque control potentiometer approximately one half of the way around its maximum travel etc.



There is an alternative way of arriving at the appropriate setting for the torque control potentiometer. Do the following.

Select a sample of the cable to be used. Pass the cable through the machine as described in the manual. Feed the cable into the beginning of a length of sample tube (say 5 meters long). Seal the open end of the tube. Position the torque control potentiometer at the position determined by the recommendations in this Appendix, Start the machine. Drive the cable hard into the sealed end of the sample length of tube. The rollers will stop turning, this is because the torque limit has been reached. Repeat this procedure, each time turning the torque potentiometer a little further clockwise. Eventually, the cable will buckle. The setting of the torque control potentiometer is now a little too far clockwise. Turn it back (counter clockwise) a little. This is the optimum setting.

**Note:**

This method may also be used to set the clamping force of the belts on the cable. Initially, the clamp arm lever should be set so that the belts press very lightly onto the cable.

Carry out the test outlined above (drive the cable into the closed end of a sample tube). The belts will slip. Repeat this procedure, each time increasing slightly, the pressure the belts apply to the cable. Eventually the belts will stop turning because the torque limit has been reached. It is worth noting at this stage that this approach may result in a great deal of force being applied to the cable. More than the cable can withstand without sustaining damage, sometimes it may be that the cable may be protected from buckling by a combination of torque control setting and slip. The main purpose of the exercise is to install the cable as far as possible without causing damage to the outer sheath, in some circumstances a compromise may be found that uses a degree of torque control and slip.

## APPENDIX 3

### Programming Parameters

- Press & Hold 'STOP' and middle button on the counter
  - 'PROG' will be displayed followed by a countdown. Continue to hold these buttons until 'GENERAL' is displayed on the screen.
- Press ◀ Button
  - 'CNT MODE' displayed
- Press ▶ Button several times until 'UP DOWN' displayed
- Press ◀ Button
  - 'CNTSPEED' displayed
- Press ▶ several times until '10kHz' displayed
- Press ◀ Button
  - 'CNT EDGE' displayed
- Press ▶ until 'RISING' displayed
- Press ◀ Button
  - 'INPUT' displayed
- Press ▶ until 'SINK' displayed
- Press ◀ Button
  - 'DISPLAY' displayed
- Press ▶ until 'DUAL' displayed
- Press ◀ Button
  - 'BCKLIGHT' displayed
- Press ▶ until 'ON' displayed
- Press ◀ Button
  - 'DISPLAY 1' displayed
- Press ◀ Button
  - 'MODE TR' displayed
- Press ▶ until 'TOTAL' displayed
- Press ◀ Button
- Press ▶ until 'INPUT' displayed
- Press ◀ Button
  - 'PRSCALER' displayed
- Press ▶ until 'DIVIDER' displayed
- Press ◀ Button
- Enter '00001720' for meters, '00000536' for ft
  - Use ▶ to increment digit
  - Use ◀ to move to next digit
- Press ◀ Button several times to move to next menu item
  - 'TXT CHR' displayed
- Press ▶ until 'CHR 1' displayed for meters and 'CHR 2' displayed for feet
- Press ◀ Button
- Enter 'M' for meters, 'FT' for ft
  - Use ▶ to increment digit
  - Use ◀ to move to next digit
- Press ◀ Button several times to move to next menu item
  - 'DEC PNT' displayed
- Press ▶ until '0' displayed
- Press ◀ Button

- 'DISPLAY 2' displayed
- Press ◀ Button
- 'MODE TR' displayed
- Press ▶ until 'RATE' displayed
- Press ◀ Button
- 'UPDATE' displayed
- Enter '1.0'
- Use ▶ to increment digit
- Use ◀ to move to next digit
- Press ◀ Button several times to move to next menu item
- 'ZERO' displayed
- Enter '1.0'
- Use ▶ to increment digit
- Use ◀ to move to next digit
- Press ◀ Button several times to move to next menu item
- 'PRSCALER' displayed
- Press ▶ until 'DIVIDER' displayed
- Press ◀ Button
- Enter '00000027' for meters/min, '0000008' for ft/min
- Use ▶ to increment digit
- Use ◀ to move to next digit
- Press ◀ Button several times to move to next menu item
- 'TXT CHR' displayed
- Press ▶ until 'CHR 1'
- Press ◀ Button
- Enter 'R'
- Use ▶ to increment digit
- Use ◀ to move to next digit
- Press ◀ Button
- 'DEC PNT' displayed
- Press ▶ until '0' displayed
- Press ◀ Button
- 'EXIT' displayed
- Press ◀ Button
- 'SAVE DATA' displayed
- Press ▶ Button until 'KEEP' displayed
- Press ◀ Button
- 'STORED' displayed

Programming completed.









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