

Gas Welding, Cutting, Brazing & Heating Outfit

Safety and Operating Instructions

**Read All Instructions
SAVE THESE INSTRUCTIONS**

 **WARNING**

Before installing and operating the Gas Welding and Cutting Apparatus, and Compressed Gas Regulators, READ AND UNDERSTAND THESE ENTIRE INSTRUCTIONS THOROUGHLY. The content of these instructions are from the manufacturer's suggestions. It is the users' responsibility of judgment when using these instructions. Manufacturers assume no liabilities for their use. SAVE THESE INSTRUCTIONS.

Gas Welding, Cutting, Brazing & Heating Outfit Safety and Operating Instructions

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Genstar Technologies Co., Inc. shall not, under any circumstances, be liable for any loss or damage caused by errors in these instructions, whether such errors result from negligence or otherwise.

Purchase Information for the warranty coverage:

Purchase From: _____

Purchase Date: _____

Outfit Model Number: _____

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SECTION 1: INTRODUCTION

These Instructions are offered as a practical guide to the safe operation of this equipment used for oxy-fuel applications. Information and instructions contained in this booklet are intended for experienced operators and those who are well trained and working under the close supervision of skilled welders.

Safety, health protection and fire prevention during installation, operation and maintenance of the welding and cutting equipment should conform to regulations from Federal, State, County and City. For details of safety information refer to provisions of ANSI standard Z49.1, "Safety in Welding & Cutting" and AWS manual C4.2/C4.2M-09, "Recommended Practices for Safe Oxyfuel Gas Cutting Torch Operation".

There are many hazards to be considered when using oxy-fuel welding, cutting, brazing and heating equipment. Proper safety precautions must be taken when using such equipment. Read, understand, and implement all safety precautions prior to performing any welding, cutting, heating or brazing operation!

Signs of Warnings, Cautions and Notices are used in these instructions for emphasized information:

WARNING

WARNING sign indicates hazardous conditions which may cause serious injury or even death if ignored.

CAUTION

CAUTION sign indicates potential hazardous situations which could cause injury if ignored.

NOTICE

NOTICE sign indicates important information which is worth of attention.

NOTICE

This Outfit comes complete with Torch Handle Reverse Flow Check Valves. (Note: See SECTION 3.6 for check valve maintenance.)

WARNING

Reverse flow check valves should always be used between the torch handle and the regulator during use of the welding outfit. Check valves are used to prevent mixed gases from flowing back into the hoses or regulators. Oxygen or fuel separately are not explosive. However, when the two are mixed together in a hose or regulator they can ignite and cause an explosion, resulting in injury or damage.

WARNING

Apparatus should be serviced or repaired by authorized facilities or qualified technicians only. Service and repair by unauthorized facilities or unqualified technicians could result in malfunction or damage to the apparatus or even operator's injury.

WARNING

California Proposition 65 Warning

These products may contain chemicals known to the State of California to cause Cancers, Birth Defects or other Reproductive Harm. **WASH YOUR HANDS AFTER HANDLING.**

SECTION 2: SAFETY INFORMATION

Before installing and operating Gas Welding and Cutting Apparatus, and Compressed Gas Regulators, read these entire instructions thoroughly. **SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE.**

WARNING

Basic safety precautions should always be followed to reduce the risk of fire and personal injury, including the following checklist:

- 1. Never use acetylene pressure over 15 PSIG.**
- 2. Never use damaged or leaking equipment.**
- 3. Never use oil or grease on or around Oxygen equipment and cylinders.** Oil or grease is easily ignited and burns violently in the presence of oxygen.
- 4. Never use Oxygen or fuel gas to blow dirt or dust off clothing or equipment.** Pure oxygen supports combustion and a spark can ignite oxygen-saturated clothing.
- 5. Never light a torch with matches or a lighter. Always use a striker.**
- 6. Always wear the proper welding goggles, gloves and clothing when operating Oxy-Acetylene equipment, pants should not have cuffs.**
- 7. Do not carry lighters, matches or other flammable objects in pockets when welding or cutting.**
- 8. Always be aware of others around you when using a torch.**
- 9. Before installing the regulators** “crack the cylinder valves by opening each valve slightly and then closing. This will clear the valves of dust or dirt that could be carried to the regulators and cause damage. Do not discharge flow of gas at any person or flammable material.

 **WARNING** (Cont.)

10. **Be careful not to let welding hoses come into contact with torch flame or sparks from cutting.**

11. **Make sure all connections are tight.** Do not force connections. Never test for leaks with a flame. Use only an approved leak detector solution.

12. **Before lighting the torch purge oxygen and fuel gas separately.** This will help prevent the improper mixing of gases.

13. **Always use recommended pressure settings.**

Improper pressures are wasteful. Watch for extreme pressure build up in the regulators which signifies they need repair.

14. **“Good Housekeeping” in work area is a “must”.**

Prepare your work area by moving out of the vicinity, any combustible material.

15. **Always have an approved fire extinguisher handy.**

16. **Always purge the system after use.** When shutting down, close cylinder valves, then bleed the system by emptying both hoses independently. First, open torch oxygen “oxy” needle valve, drain line until pressure is zero, then close “oxy” needle valve. Repeat process with torch fuel needle valve.

17. **Do not use frayed or damaged hose.**

18. **Never use the torch as a hammer or to knock slag from work.**

19. **Always work in a well ventilated area.** Flammable materials burn violently in an oxygen atmosphere. Flames and burning materials such as tobacco smoking must be absent when using oxygen.

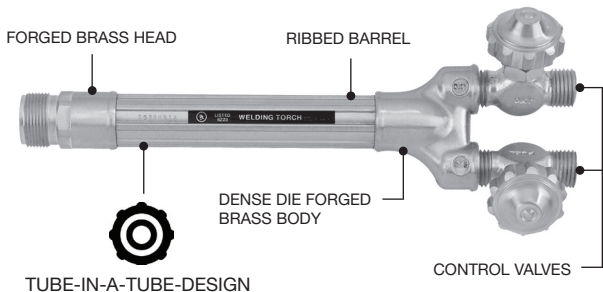
SECTION 3: OXY-FUEL WELDING AND CUTTING APPARATUS

Typical oxy-fuel welding and cutting outfits contain the following apparatus:

- Torch Handle
- Cutting Attachment
- Cutting Tips
- Welding Nozzles
- Heating Nozzles
- Oxygen and Fuel Gas regulators
- Twin Welding Hoses
- Welding Goggles
- Striker

3.1 Torch Handle

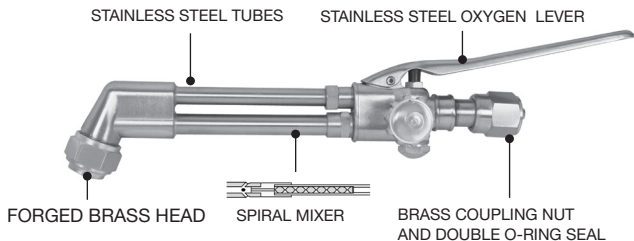
 MODEL 143T ILLUSTRATED



Two Control Valves on the torch handle are used to control the supplies of oxygen and fuel gas. The valve marked “OXY” is used to control oxygen and “FUEL” is used to control fuel gas. The internal Tube-In-A-Tube design delivers Oxygen in the inner tube and Fuel gas between Inner Tube and Barrel respectively.

3.2 Cutting Attachment

 MODEL 143ACA ILLUSTRATED



Cutting Attachment is connected to the Torch Handle to perform cutting operation. The Coupling Nut and the Cone End inside the Coupling nut match the Torch Head of the Torch Handle. There are two O-Rings on the Cone End providing secure connection and continuous separation of Oxygen and Fuel Gas into the Cutting Attachment.

The Preheat Oxygen Control Valve has the same function as the Oxygen Control Valve which is fully opened on the Torch Handle. Fuel Gas is controlled by the Fuel Valve on the Torch Handle. Oxygen and Fuel Gas are mixed by the Spiral Mixer in the lower tube and then sent to the surrounding holes (preheat orifices) in the Cutting Tip for supporting Preheat Flame. Located above the body of the cutting attachment, Stainless Steel Oxygen Level controls the pure Oxygen flow to the upper stainless steel tube and then to the center hole (cutting orifice) in the Cutting Tip for cutting performance.

WARNING

Always check the existence and quality of the O-Rings. Damaged or worn O-Rings will cause the mixture of Oxygen and Fuel Gas before entering the Cutting Attachment. This can result in backfire or flashback in the Cutting Attachment or Torch Handle.

3.3 Twin Welding Hoses

Twin Welding Hoses transport Oxygen and Fuel gas from the outlets of the Compressed Gas Regulators to the Torch Handle. U.S. Welding Hoses are color-coded for gas service identification. The Oxygen hose is green and the Fuel Gas is red. The colors are subject to change in other countries.

WARNING

There are three grades, “R” “RM” “T” for welding hoses. The Grade is marked on the hose. “T” grade hoses can be used for all fuel gases (including Acetylene) and, “R” and “RM” are only for Acetylene. DO NOT use “R” and “RM” grade hoses with LP type (including Propane) gases.

CAUTION

Before using a brand new welding hose which contains a preservative talc, clear the residue in the hoses in well-ventilated area and away from flammable substances with the following procedures:

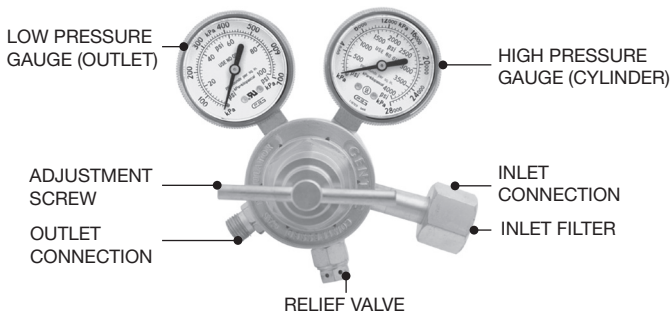
1. Connect the green Oxygen hose to the oxygen regulator.
2. Turn the Adjustment Screw clockwise until the pressure on the outlet gauge (left gauge when you face the regulator) shows around 5PSI.
3. Allow the Oxygen to flow out of the hose for 5 seconds.
4. Turn the Adjustment Screw counter-clockwise until the gas shut off.
5. Follow step 1 to 4 to clear the red Fuel Gas hose connected to the fuel gas regulator.

CAUTION

Exam hose carefully for oil, grease or damaged fitting and cuts before use. Replace or repair the hose if they are found.

3.4 Pressure Regulators

When attached to cylinders, Pressure Regulators reduce the high pressure from cylinder to low working pressure for welding, cutting and heating operations. The Inlet Connection is connected to cylinder and the outlet connection is connected to the welding hoses. The High Pressure Gauge shows the cylinder pressure and the Low Pressure Gauge shows the outlet pressure when the Adjustment Screw is turned to adjust the pressure. To protect the low pressure side of the regulator, Relief Valve will open when the outlet pressure exceeds the preset relief pressure. It will reset itself when the pressure in the system is released.



 **WARNING**

Relief Valve (if attached) is not for protecting downstream equipment. It is only for protecting the low pressure side of the regulator.

 **WARNING**

DO NOT modify or alter a regulator for other gases. Only use the regulator for its specific Gas and Pressure.

 **WARNING**

Carefully check the regulator for damage, dirt, oil, grease and any flammable substances. Regulators must be **free of Oil, Grease and any flammable substance.** They can cause an explosion. If oil and grease are found, clean the regulator by a qualified technician.

 **WARNING**

For your safety, when opening cylinder valve, **NEVER stand in front or behind the regulator.** Stand to the side of the cylinder to make the cylinder between you and the regulator.

3.5 Reverse Flow Check Valve

 **WARNING**

Reverse flow check valves should always be used between the torch handle and the regulator during use of the welding outfit. Check valves are used to prevent mixed gases from flowing back into the hoses or regulators. Oxygen or fuel separately are not explosive. However, when the two are mixed together in a hose or regulator they can ignite and cause an explosion, resulting in injury or damage.

3.6 Reverse Flow Check Valve Maintenance and Leak Test

If the Reverse Flow Check Valve leaks, it would not be able to stop the backflow when it happens. Follow the following steps to perform a leak test.

1. Set up Cylinder, Regulators, Hoses, Torch Handle and Welding Tip or Cutting Attachment with Cutting Tip (see SECTION 4.1).
2. Plug the end of the tip.
3. Open all Pre-heat Control Valves.
4. Disconnect Red (Fuel) Hose from Fuel Gas Regulator.
5. Put the end of the Red Hose under water or use soap water.
6. Adjust the Oxygen Regulator to 5PSI outlet pressure.
7. Wait for 10 seconds. Fast bubbles blowing will happen if the Fuel Check Valve is leaking. (2 to 3 bubbles in 5 seconds is normal).
8. If the Fuel Check Valve leaks, re-connect the red hose to the Fuel Gas Regulator.
9. Unplug the tip.
- 10 Set outlet pressure of Fuel Gas Regulator at 10PSI and flush for 3~5 seconds.
11. Retest. If Fuel Check Valve still leaks, replace the check valve.
12. Follow step 2 to step 11 to test the Oxygen Check Valve with a Green Hose and Oxygen Regulator. If flushing is required in Step 10, set 30PSI of Oxygen outlet pressure and flush for 3~5 seconds.
13. Purge the system (see SECTION 4.2) after the test.

 **CAUTION**

Leak test Reverse Flow Check Valves at least every six(6) months.

SECTION 4: WELDING AND CUTTING AND HEATING SETUP AND OPERATION

4.1 Apparatus Installation

1. Secure the DOT approved cylinders in a Cart, Wall or Work Bench with chain. Keep the cylinder in vertical position.

CAUTION

Cylinders are highly pressurized. Handle with extreme care. Never allow cylinders to be knocked over, dropped, or subjected to excessive heat.

WARNING

If oil or grease or damage is found at cylinder valve, discontinue use of cylinder immediately and contact your cylinder supplier.

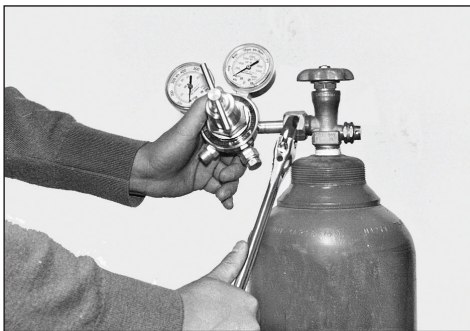
2. While standing to one side, “crack” each cylinder valve. “Cracking” is to quickly open and close the valve, allowing gas to escape and clearing the valve of any foreign material.



3. Attach regulators to proper cylinders and tighten securely with a wrench. Make sure they are tightened in correct directions. (Normally clockwise for oxygen and counterclockwise for acetylene.) NEVER use cylinder without Gas Regulator.

⚠ WARNING

Carefully check the regulator for damage, dirt, oil, grease and any flammable substances. Regulators must be free of Oil, Grease and any flammable substance. They can cause an explosion. If oil and grease are found, clean the regulator by a qualified technician.



4. Regulator adjusting screws should be turned counterclockwise to relieve pressure on diaphragm before opening cylinder valves. If this is not done, pressure from cylinder can damage diaphragm and render regulator inoperable. See Picture on the next page.

⚠ WARNING

For your safety, when opening cylinder valve, **NEVER stand in front or behind the regulator.** Stand to the side of the cylinder to make the cylinder between you and the regulator.



5. Both cylinder valves and regulator connections should be checked for leaks. Stand so the cylinder valve is between you and the regulator. **SLOWLY OPEN THE CYLINDER VALVE to avoid Diaphragm damage in regulator.** An approved leak detector should be used.

 **CAUTION**

Acetylene cylinder valve should be opened a maximum of one turn.



6. Connect proper hose to regulator. (Green to oxygen and red to acetylene.) Tighten nuts securely with wrench.

⚠ CAUTION

Exam hose carefully for oil, grease or damaged fitting and cuts before use. Replace or repair the hose if they are found.



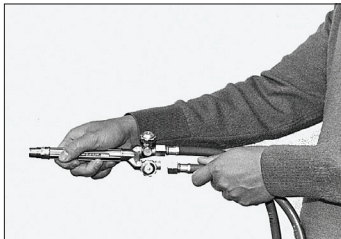
7. Purge the new Hoses: Before using a brand new welding hose which contains a preservative talc, clear the residue in the hoses in a well-ventilated area and away from flammable substances with the following procedures:

- a. Turn the Oxygen Regulator Adjustment Screw clockwise until the pressure on the outlet gauge shows around 5PSI.
- b. Allow the Oxygen to flow out of the hose for 5 seconds.
- c. Turn the Adjustment Screw counter-clockwise until the gas shuts off.
- d. Follow step 1 to 4 using the red Fuel Gas hose connected to the fuel gas regulator.

8. Connect hoses to the **check valve that is installed** on the torch handle. (**Oxygen is right-handed and fuel gas is left-handed**).

 **CAUTION**

If any traces of oil or grease are found, do not use. Contact your supplier immediately.



9. Connect cutting attachment, welding or heating nozzle to the torch handle. **HAND-TIGHTEN ONLY**. The two O-Rings at Cone End will help seal.

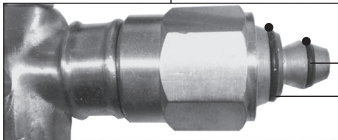
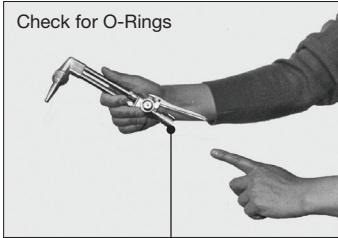
 **WARNING**

There must be two(2) “O” rings on the cone end in an undamaged condition. The absence of either “O” ring creates a condition that allows pre-mixing of oxygen and fuel gases. This can lead to flashback within the torch handle or cutting attachment.

Always check cone end coupling nut and torch head for damage or oil presence. If either are found contact your supplier.

See the picture in the next page.

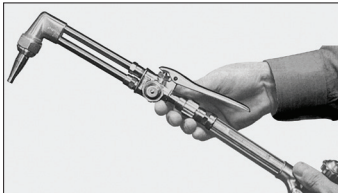
Check for O-Rings



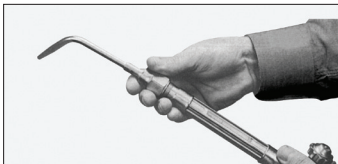
O-Ring

O-Ring

Cone End of Cutting
Attachment and Nozzles



Connect Cutting Attachment



Connect Welding Nozzle

4.2 Pressure Setup and System Purge

1. Refer to cutting tip or welding nozzle chart (SECTION 5) to determine the proper regulator pressures.
2. Close both Gas Regulators and both valves on Torch Handle (also Pre-Heat Oxygen Valve on Cutting Attachment).
3. Open Oxygen Valve on Torch Handle (and pre-heat Oxygen valve on cutting attachment).
4. Open Oxygen cylinder valve and adjust the Oxygen regulator outlet pressure according to the size and type of the tip.
5. Close the Oxygen Valve on Torch Handle (and pre-heat Oxygen valve on cutting attachment).
6. Open Fuel Valve on Torch Handle.
7. Open Fuel cylinder valve and adjust the Fuel regulator outlet pressure according to the size and type of the tip.
8. Close the Fuel Valve on Torch Handle.

WARNING

Never set acetylene regulator above 15 PSIG working pressure.

4.3 Leak Test (Connections and Seat)

Check all connections for leaks.

1. Close both cylinder valves.
2. Turn the adjustment screws of both regulators counterclockwise to shut off the regulators.
3. Check the Pressure Gauges on regulators. If the pressure reading drops in high pressure gauge, it is possible that there is leaking at all connections in the high pressure side (cylinder valve, inlet connection, high pressure gauge connection). If the pressure reading drops in low pressure gauge, it is possible

that there is a leak at the connections on the low pressure side (low pressure gauge connection, outlet connection, hose connection, all control valves). Use an approved leaking detector solution at the connections. If leaks are found tighten nuts more securely. If leaks still persist, discontinue use and call your supplier.

4. If the pressure reading on the low pressure gauge rises and at the same time, the high pressure gauge drops, there is a seat leak. The seat may be contaminated. Discontinue use and repair the regulator by a qualified repair technician.

4.4 Lighting the Torch and Adjusting the Neutral Flame

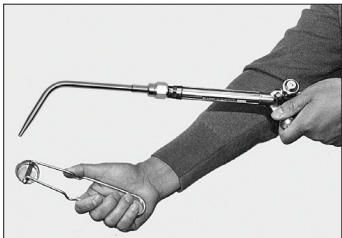
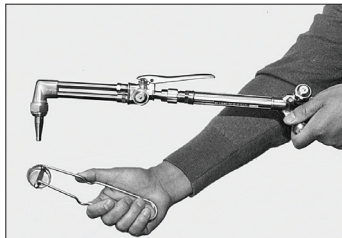
1. Following section 4.2 to set up the pressures.
2. Hold the torch in one hand and spark lighter in the other.
2. Open acetylene torch valve about 1/4 turn and ignite the acetylene gas coming out of the tip.

WARNING

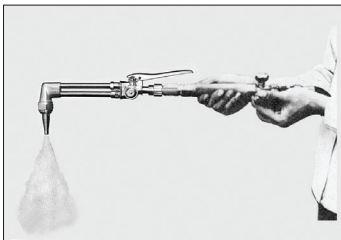
Always point torch away from any person when lighting.

WARNING

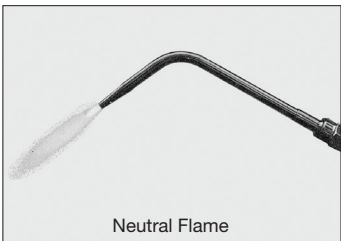
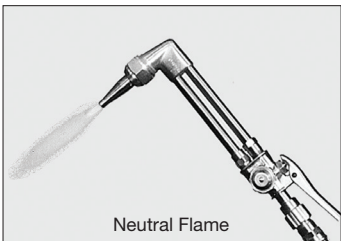
Always wear the proper welding goggles, gloves and clothing when operating Oxy-Acetylene equipment. Pants should not have cuffs.



3. Turn on the acetylene torch valve slowly until smoke subsides and the flame jumps away from the end of the tip slightly.



4. Slowly open the oxygen valve (for cutting attachment, fully open the oxygen valve on torch handle and use the pre-heat oxygen valve on the cutting attachment to control oxygen gas) until a brilliant neutral flame is reached. (If the flame has a smooth inner cone the flame is neutral).

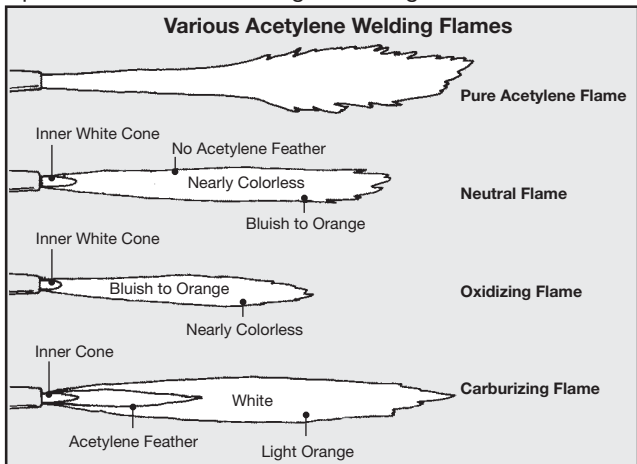


 **CAUTION**

Flame setting is increased by opening the torch control valves or increasing the operating pressure. Never reduce the flame setting. This will cause the tip or nozzle to overheat which will result in flashback. If less heat is required, use a smaller tip or nozzle.

NOTICE

Proper Flame. A neutral flame is used for almost all gas welding. The oxy-acetylene flame consumes all oxygen in the air around the welding area, which leaves an uncontaminated weld area and a weld of maximum strength. An oxidizing flame is rarely used, but a carburizing flame is occasionally helpful when flame hardening or brazing.



⚠ WARNING

If you experience a **backfire** or **flashback** (a shrill hissing sound caused by the flame burning inside the mixer area), **turn off the oxygen valve immediately and then the fuel valve.** Follow the shut down procedures in section 4.5. Allow the equipment to cool off before attempting to reuse. If the problem reoccurs, bring the equipment to a qualified repair technician.

4.5 Shutting Down Equipment

1. Turn off oxygen valve on torch first, then turn off acetylene valve on torch.
2. Close both cylinder valves.
3. Open the oxygen control valve and release the pressure in the hose and regulator.
4. Close the oxygen control valve.
5. Turn the pressure adjusting screw on the oxygen regulator counterclockwise until there is no pressure on the adjusting spring and the screw turns freely.
6. Open the fuel control valve and release the pressure in the hose and regulator.
7. Close the fuel control valve.
8. Turn the pressure adjusting screw on the fuel regulator counterclockwise until there is no pressure on the adjusting spring and the screw turns freely.
9. All pressure gauges should read zero "0" PSI.

4.6 Storage

When the outfit is not in use, it should be protected from oil, grease and dust.

SECTION 5: PRESSURE SETUP

Torch Model	Tip Model	Oxygen (psig)	Acetylene (psig)
140T with 141C	0-3-101	34	5
140T	00-171W	5	5
	1-171W	5	5
141T, 142TA with 141C	0-3-101	35	5
141T, 141TA	00-171W	5	5
	1-171W	6	5
142T, 142TE with 142C, 142CE	0-3-101	35	5
142T, 142TE	0-172W	3	3
	2-172W	5	5
	4-172W	10	7
	6-172H	15	12
143T, 143TL with 143CA, 143CE	1-1-101	35	5
163S, 163L			
143T, 143TL	1-173W	5	5
	3-173W	7	6
	5-173W	12	8
	8-173H	30	14
443T with 443C	472C-1	59	14
443T	472W-3	7	6
	472H-2	8	7
363S	672C-1	38	5
10ST, 11ST	10STP-3	3	3
	10STP-6	6	6
10CM	10CMP-3	8	8
	10CMP-6	10	10
10GAST	10GASTP-2	N/A	10
	10GASTP-4	N/A	12

SECTION 6: TECHNICAL DATA REFERENCE

When the compatible Cutting Tips, Welding Nozzles and Heating Nozzles are used, refer to this section for Operating Pressure data.

Oxy-Acetylene Cutting Tip Chart

Metal Thickness (Inches)	Tip Size	Cutting Oxygen Pressure (PSIG)	Preheat Oxygen (PSIG)	Acetylene Pressure (PSIG)	Speed I.P.M.	Kerf Width
1/8	000	20/25	3/5	3/5	20/30	.04
1/4	00	20/25	3/5	3/5	27/30	.05
3/8	0	25/30	3/5	3/5	24/28	.06
1/2	0	30/35	3/6	3/5	20/24	.06
3/4	1	30/35	4/7	3/5	17/21	.07
1	2	35/40	4/8	3/6	15/19	.09
2	3	40/45	5/10	4/8	12/15	.11
3	4	40/45	5/10	5/11	9/12	.12
4	5	45/55	6/12	6/13	8/11	.15

Welding Nozzle Chart

Metal Thickness (Inches)	Tip Size	Oxygen Pressure (PSIG)	Acetylene Pressure (PSIG)	Acetylene Consumption (SCFH)
Up to 1/32	000	3/5	3/5	1/2
Up to 3/64	00	3/5	3/5	1.5/3
Up to 5/64	0	3/5	3/5	2/4
Up to 3/32	1	3/5	3/5	3/6
Up to 1/8	2	3/5	3/5	5/10
Up to 3/16	3	4/7	3/6	8/18
Up to 1/4	4	5/10	4/7	10/25
Up to 1/2	5	6/12	5/8	15/35
Up to 3/4	6	7/14	6/9	25/45

Oxy-Acetylene Multi-Flame Heating Nozzle Chart

Tip Size	Oxygen Pressure Range (PSIG)	Acetylene Pressure Range (PSIG)	Oxygen Cubic Feet Per Hour	Acetylene Cubic Feet Per Hour
4	8/12	6/10	7/22	6/20
6	10/15	8/12	15/44	14/40
8	20/30	10/15	33/88	30/80
10	30/40	12/15	44/110	40/100

SECTION 7: STATEMENT OF WARRANTY

Any Genstar Technologies (GENTEC®) apparatus found to be defective either in material or workmanship during the time set forth below will be replaced by GENTEC® or its Authorized Distributors, provided that said apparatus was used under normal conditions for the purpose intended.

GENTEC® apparatus damaged or rendered inoperative due to abuse, negligence, misuse, accident or abnormal wear and tear is not covered by this warranty and must be repaired at the sole expense of the equipment owner. GENTEC® apparatus should be serviced facilities only. Service or repair of this apparatus by other than GENTEC® or designated service facilities may void any warranties and relieve GENTEC® of any claims for damage and/or liability.

To make a claim under this warranty, Buyer must notify GENTEC® or its Authorized Distributor of the details of such claim within 30 days of discovering a defect in material or workmanship along with proof of purchase. The Buyer will be responsible for transportation costs and related risks.

GENTEC® shall not, under any circumstances, be liable for any damages including but not limited to: indirect, incidental, consequential, or special damages, whether such damages result from negligence, breach of warranty or otherwise.

There are no other warranties, expressed or implied, except as stated herein. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. GENTEC® reserves the right to discontinue manufacturing of any product or change product materials, design or specifications without notice.

**Read All Instructions
SAVE THESE INSTRUCTIONS**



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