



Avacaster

User Manual

March 2017





Maple Leaf Powder Company

David G. Sly

2025 Allenby Street

Victoria, BC V8R 3B9 Canada

Phone: (250) 744-8765

Email: davidgsly@mapleleafpowder.com

www.mapleleafpowder.com

March 2017

Table of Contents

SAFETY	4
TERMS	5
OVERVIEW	7
Bulkhead View.....	8
Behind Bulkhead View	9
ORDER OF OPERATION.....	10
1 AVACASTER SETUP INSPECTION	10
2 ATTACHING BARREL.....	11
3 ATTACHING NITROGEN REGULATOR AND FILLING HOSE.....	12
4 OPERATIONAL SAFETY CHECK/DRY FIRING PROCEDURE.....	13
5 CHARGING THE AVACASTER FOR FIRING.....	14
6 LIVE FIRING PROCEDURE	15
7 POST FIRE MISSION RECORD	17
8 DISASSEMBLY PROCEDURES	18
TROUBLE SHOOTING	19
APPENDIX A.....	20



AVACASTER

AVACASTER TO BE OPERATED BY TRAINED AUTHORIZED OPERATORS ONLY. OPERATORS MUST FOLLOW THE OPERATION PROCEDURE FULLY.

AVACASTER MUST BE FIRED FROM EITHER AN APPROVED, REMOTE LOCATION OR AN APPROVED BLAST SHIELD. THE GUNNER MUST NEVER STAND BESIDE THE GUN DURING FIRING.

HIGHLIGHTS

The Avacaster is a fully engineered device.

Specific features include:

- Stainless steel pressure tanks to prevent corrosion
- Clean-out flanges on end of pressure tanks for easy cleaning and drying of device
- Simple change procedures for all seals
- Electric, whistle valve, and pneumatic triggers all with quick connect couplers
- One-way check valves inside the plumbing lines to prevent back firing
- Ammunition sits up in barrel outside the firing valve
- Reinforced ribbed aluminum barrels to prevent barrel whip
- Controls located conveniently on bulk head above the breach
- Inert rounds available for target registry and training
- Compatible with all CIL ammunitions
- 1.5 km effective firing range, which includes 615 meters elevation gain
- Custom mounts to fit your application. This allows comfortable position for loading
- Full on-site technical support for device set up, yearly maintenance, and training.

SAFETY

The Avacaster is a nitrogen powered Avalauncher designed for the safe and efficient delivery to the Intended target of Avalanche Explosive Rounds.

This manual addresses the safe and correct operation of the Avacaster.

The Avacaster has been designed for both Operator safety and Public safety. The handling of explosives is to be carried out by a Blaster of Record only as per Governmental and or OHS Jurisdictional regulations.

It is a requirement to follow all good and safe practices when handling Explosives.

The firing of the delivery system requires 2 people. One is called the Gunner or Blaster of Record and the other is called the gunner assistant

It is essential that all staff and public are clear of the barrel when any pressure checks or firing is being carried out.

Compressed gas cylinders must be handled as per supplier's recommendations or by jurisdictional regulations.

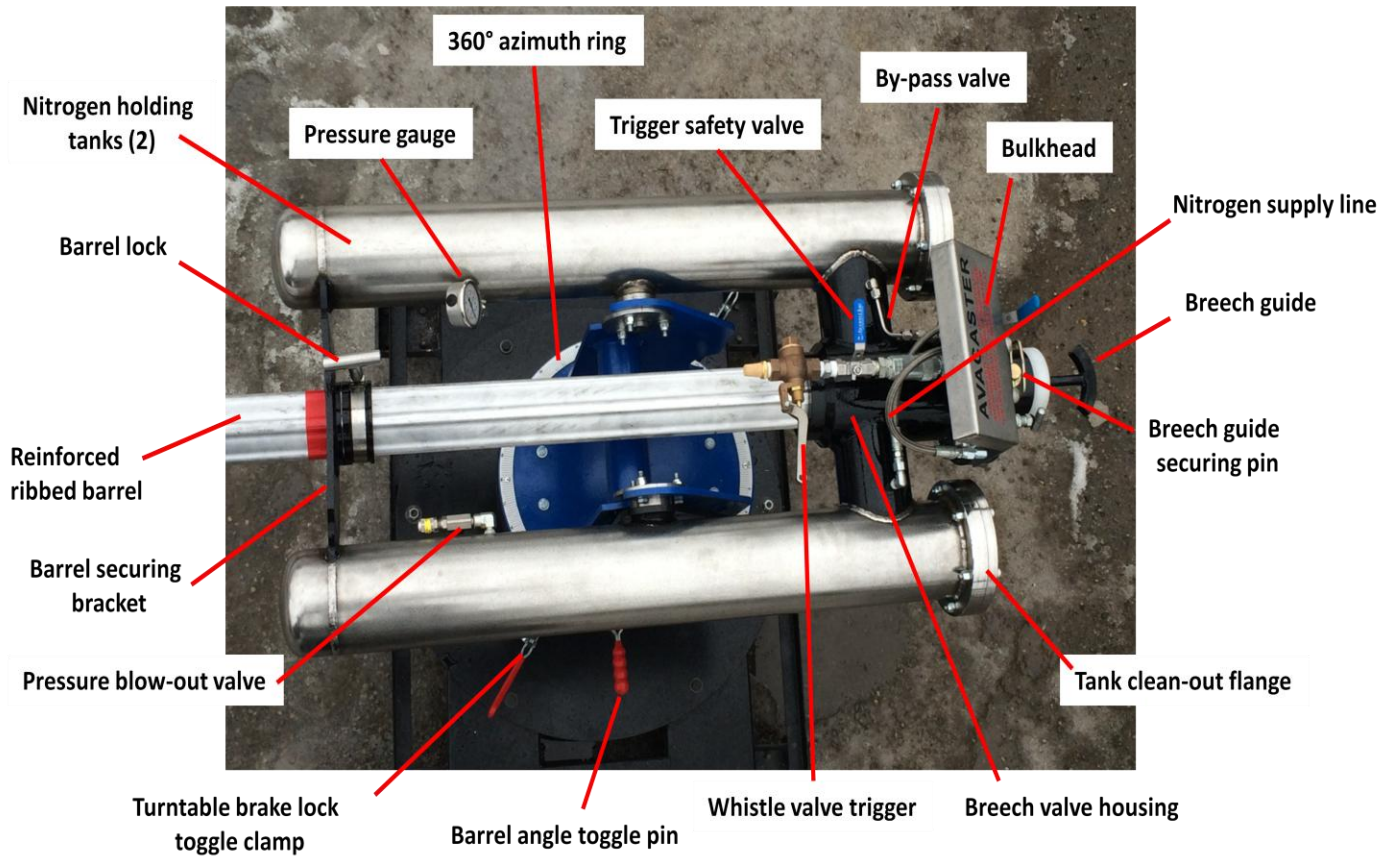
Maple Leaf Powder Company requires the operators of the Avacaster to follow these operation procedures fully!

TERMS

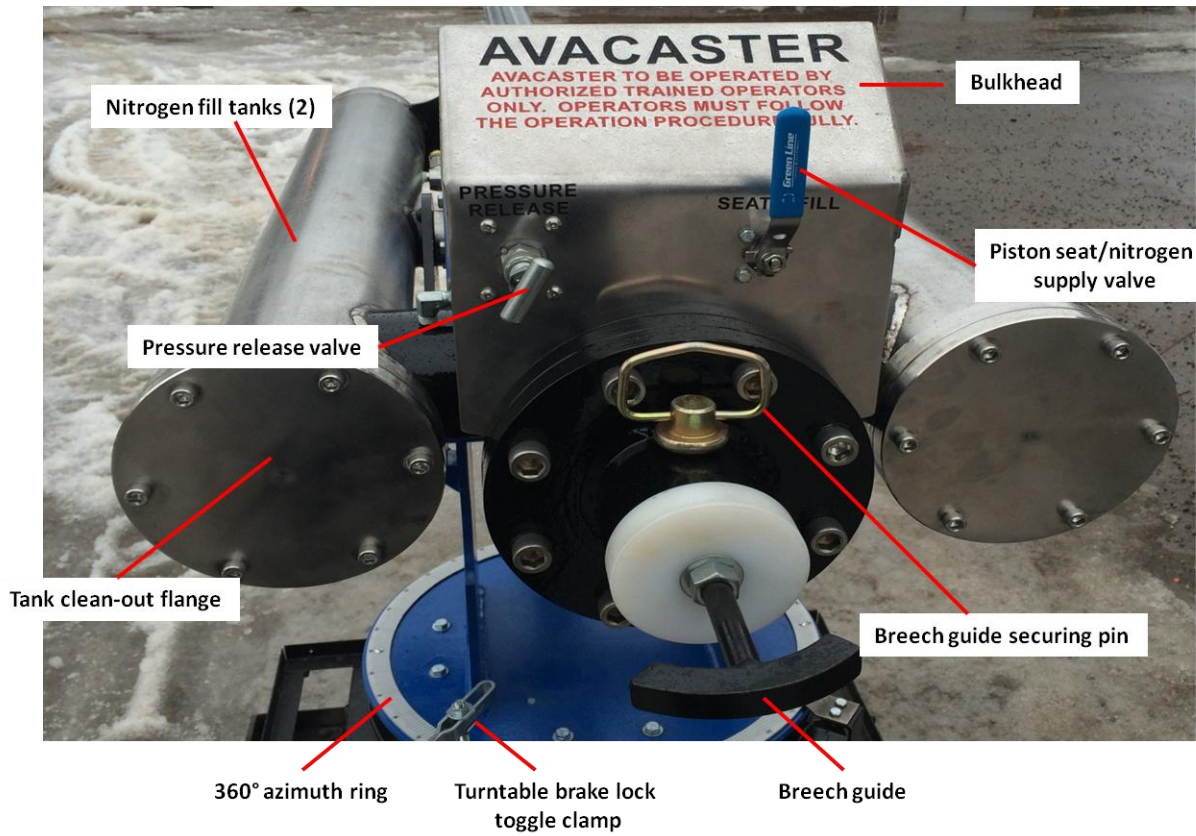
Barrel Clamp:	The locking clamp that retains the barrel in the Avacaster.
Blaster of Record:	A person approved by the statutory authority to handle and use explosives.
Breech:	The mechanism that opens to allow loading of the ammunition round into the Avacaster.
Breech Plug/Guide:	The assembly which is removable to allow the ammunition round to be inserted into the Avacaster.
Breech Valve:	This is the valve between the nitrogen pressure tanks and the barrel.
Turn Table:	The mechanism for rotating the Avacaster on its turn table.
Elevation Toggle Pin:	The mechanism for changing the elevation (angle) of the Avacaster.
Electric Remote Trigger Switch:	Electricity operated trigger to fire device from a safe remote location.
Firing Safety Valve:	The safety valve mounted in front of the trigger valve.
Firing Valve:	A squeeze, pull, or electric valve that is actuated to release the Avacaster pressure and fire the device
Gunner/Blaster of Record:	The Gunner is required to be a Blaster of Record of Explosives as they are handling the explosives used in the Avacaster. They are responsible for all staff and public safety while operating the Avacaster. The Gunner is also responsible for keeping a record of all firing.
Gunner Assistant:	The gunner assistant is required to help the a Blaster of Record.
Piston Seat/Nitrogen Supply Valve:	This is the valve located on the bulkhead that seats the piston and allows nitrogen to flow into the Avacaster pressure tanks.
Pressure Release Valve:	This is the valve located on the bulkhead that is used to release the pressure from the Avacaster pressure tanks.

Pressure Blow-out Valve:	The over pressure safety release mechanism.
Reinforced Ribbed Barrel	The aluminum tube the ammunition is delivered through.
Shot Pressure:	The pressure required to deliver the ammunition round to its target.
Solenoid Switch:	Magnetized electrical trigger valve.
Stub Barrel:	The extension in front of the nitrogen supply valve housing that receives the machined end of the barrel.
Whistle Valve Trigger:	Manual firing valve.

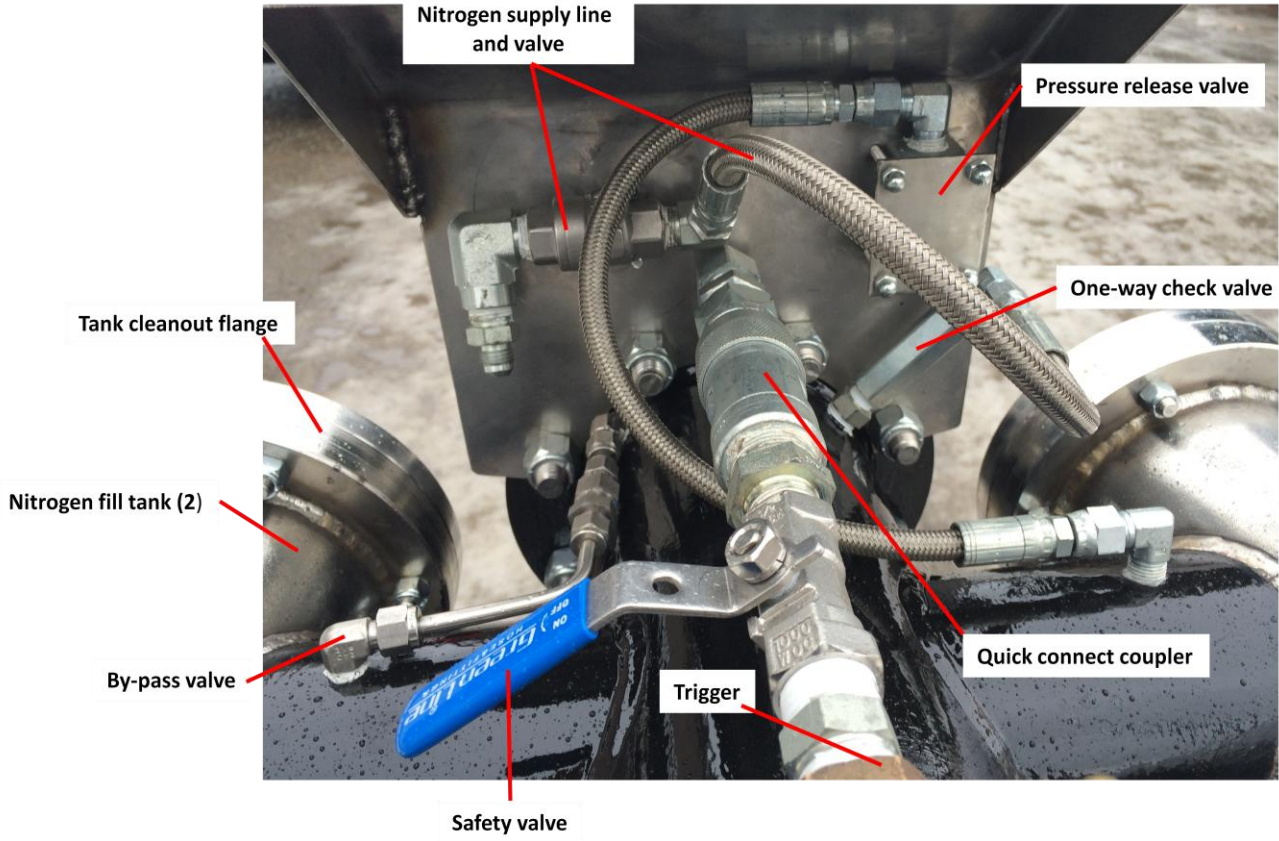
OVERVIEW



Bulkhead View



Behind Bulkhead View



ORDER OF OPERATION

Maple Leaf Powder Company requires the operators of the Avacaster Avalauncher to follow the operation procedures fully!

1 AVACASTER SETUP INSPECTION

Barrel must be inserted into Avacaster prior to adjusting elevation to ensure device is properly balanced.

- 1.1 Remove barrel receiver cap and inspect stub barrel for foreign objects (e.g., ice or grit). Wipe if necessary. (Fig. 1)



Figure 1

- 1.2 Ensure the barrel clamp is unlocked and free to move. (Fig. 2)



Figure 2

- 1.3 Open and inspect the breech, breech plug and breech locking ring for foreign objects (e.g., ice or grit) and remove if necessary. (Fig. 3)



Figure 3

- 1.4 Inspect the pressure blow out valve for foreign objects (e.g., ice or grit) and remove if necessary. (Fig. 4)

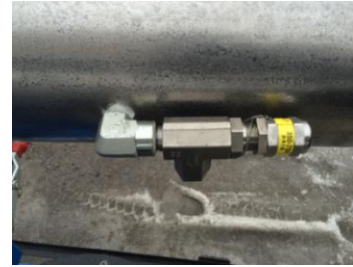


Figure 4

- 1.5 Inspect filling hose and filler socket for foreign objects (e.g., ice or grit) and remove if necessary. (Fig. 5)



Figure 5

2 *ATTACHING BARREL*

- 2.1 Remove the barrel from its storage tube. (Fig. 6)
- 2.2 Inspect the barrel for dents. If any are present refer to Trouble Shooting Guide.
- 2.3 Look through the barrel and ensure there are no foreign objects within. Remove any objects before continuing.
- 2.4 Slide the recessed end of the barrel into the end of the Avacaster through the barrel clamp and into the barrel receiver. Take care to avoid denting the end of the barrel. (Fig. 7)

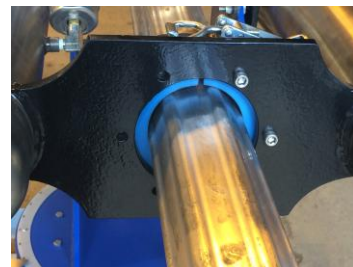


Figure 6



Figure 7

- 2.5 Check the barrel is fully inserted into the barrel receiver and the yellow indicator ring is not showing. (Fig. 8)
- 2.6 Close and lock the barrel clamp. Ensure the barrel is secure.

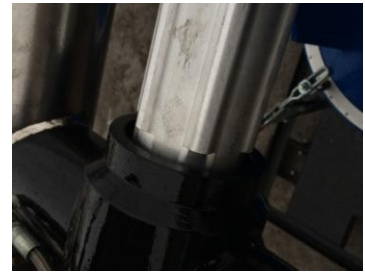


Figure 8

3 ATTACHING NITROGEN REGULATOR AND FILLING HOSE

- 3.1 Secure the cylinder to an appropriate support behind protection to prevent the cylinder from damage and falling as per supplier's instructions.
- 3.2 Open the cylinder valve slightly and close. This will clear the valve of any dust, water, or dirt which could be carried into the regulator and cause damage or an accident.
- 3.3 Screw the end of the nitrogen hose into the #6 JIC fitting on the backside of the bulkhead. Tighten fitting. No thread tape required. (Fig. 9)

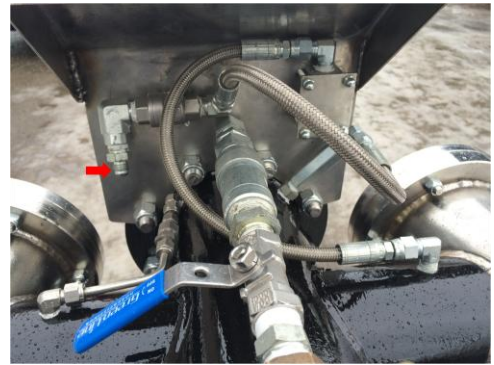


Figure 9 Nitrogen fill hose

4 **OPERATIONAL SAFETY CHECK/DRY FIRING PROCEDURE**

This operation is carried out by filling the Avacaster to 50 psi and firing, which is also called dry firing. This procedure is to be carried out twice. Check the operation of all components of the Avacaster and ensure it is in safe working order.

Seal and operation check

- 4.1 Ensure the breech plug/guide is inserted and the breech locking pin is fully in place.
- 4.2 Aim the gun in a safe direction and raise the barrel using the elevation toggle pin.
- 4.3 Open the nitrogen cylinder valve **SLOWLY** to allow pressure to gradually build up in the regulator thus preventing damage and/or injury. Never lean over the regulator while opening the cylinder valve. (Fig. 10)
- 4.4 Check the connections between the cylinder and regulator for leaks. A leak is evidenced by a hissing sound. If a leak occurs close the cylinder valve and consult the nitrogen regulator's operator instructions (Appendix A).
- 4.5 Set the line pressure on the nitrogen regulator to 350 psi.
- 4.6 Open the piston seat/nitrogen supply valve and listen to hear the piston seat.
- 4.7 Allow the pressure to build on the valve pressure gauge to 50 psi. (Fig. 11)
- 4.8 Watch the valve pressure gauge for 30 seconds to see if it maintains 50 psi. If it falls at a fast rate consult the Trouble Shooting Guide.
- 4.9 Adjust the pressure on the valve pressure gauge to 50 psi by opening the pressure reducing valve.
- 4.10 Listen for leaks from the all plumbing and watch for major pressure drops on the gauge. If a major



Figure 10



Figure 11

pressure drop occurs consult the Trouble Shooting Guide.

- 4.11 Ensure the breech is closed and locked. (Fig. 12)
- 4.12 Before the gun is discharged ensure the firing area is clear of public and staff.
- 4.13 OPEN the firing safety valve or insert the safety key into the handheld electric switch.
- 4.14 Push and hold the electric firing switch or pull the firing lanyard. The Avacaster will now fire.
- 4.15 After firing, remove the safety key from the handheld electric switch. (Fig. 13)
- 4.16 Perform a second dry fire.



Figure 12



Figure 13

5 CHARGING THE AVACASTER FOR FIRING

Close the Breech

- 5.1 Ensure the breech pin is in place. (Fig. 14)
- 5.2 Set the Avacaster to the required direction and elevation. (Fig. 15)



Figure 14



Figure 15

- 5.3 Open the piston seat/nitrogen supply valve. Allow pressure to build up in the tanks to desired level. If not, check Trouble Shooting section. (Fig. 16)

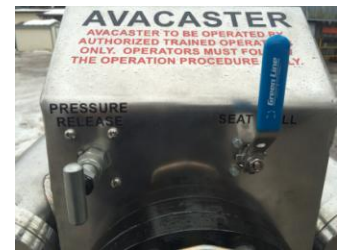


Figure 16

6 LIVE FIRING PROCEDURE

Firing Sequence

- 6.1 Receive final clearance for target, flight path, overshoot areas, and avalanche run out zones.
- 6.2 Verify that the firing valve is in the "closed" or "off" position. (Fig. 17)
- 6.3 Verify that the safety valve is in the "open" position.
- 6.4 Verify that the remote trigger system is deactivated and secure.
- 6.5 Prime Avacaster to 50 psi.
- 6.6 Close the safety valve. (Fig. 18)
- 6.7 Site Avacaster to proper deflection and elevation for desired shot point.
- 6.8 Remove breech pin and breech.
- 6.9 Call out "Breech out." (Fig. 19)
- 6.10 Loader visually inspects that round is properly assembled.



Figure 17



Figure 18



Figure 19

6.11 Start the round into the breech of the Avacaster. (Fig. 20, 21)

6.12 Remove the transport safety pin (Classic round) or the transit strap (DeltaLancer) from the round and retain to verify number of rounds fired.



Figure 20



Figure 21

6.13 For Classic round, Loader Calls out "Safety pin out. Bore-Rider pin secure. Arming wire secure."

6.14 For DeltaLancer round, Loader Calls out "Transit Strap out. Bore-Rider pin secure. Turbine secure. "

6.15 Gunner advances round into the Avacaster breech, then into the barrel by advancing the breech guide into the breech. (Fig. 22)



Figure 22

6.16 Call out "Breech in, Breech pin in."

6.17 Recheck deflection and elevation. (Fig. 23)

6.18 Recheck clearance for target and Avacaster run out zones.

6.19 Assistant leaves loading area and moves behind protective barrier.

6.20 Gunner calls out "ALL CLEAR" and waits for response from assistant.

6.21 Gunner fills pressure vessel to desired pressure and double checks pressure data.



Figure 23

- 6.22 Gunner opens safety valve.
- 6.23 Gunner leaves loading area and moves behind protective barrier.
- 6.24 Gunner calls out "Ready to Fire."
- 6.25 Gunner calls out "Fire."
- 6.26 Gunner activates trigger system to fire.
- 6.27 Gunner and assistant wait behind barrier until firing noise has completed. Both try to observe the pressure plate, turbine, or round in flight to target.
- 6.28 Gunner and assistant try to observe projectile flight to watch detonation or help pinpoint landing area in case of a dud.
- 6.29 Close trigger (if applicable) and remove safety key from electric switch.
- 6.30 Leave safety valve open.
- 6.31 Open supply line until the piston seats and Avacaster is filled with 50 psi.
- 6.32 Close safety valve.
- 6.33 If the last shot has been fired in the mission, the last step of seating the piston to 50 psi should still be carried out. This keeps snow, ice, water, and dirt out of the breech assembly.

Z POST FIRE MISSION RECORD

Record following information:

- Date and time
- Who fired the Avacaster
- Shot number, pressure, elevation, and results
- Wind and temperature

- Number of duds, if any, and probable causes
- Additional comments pertinent to mission.

8 *DISASSEMBLY PROCEDURES*

Remove the regulator and hose

- 8.1 Turn the nitrogen cylinder valve to the “closed” or “off” position.
- 8.2 Relieve the pressure in the regulator by turning the adjusting knob counter-clockwise fully out.
- 8.3 Remove the filler hose from the filler socket by pushing the filler socket collar ring backwards. This will unlock the filler hose end and then it can be removed.
- 8.4 Loosen the regulator by turning counter-clockwise and continue turning until the regulator is disengaged from the cylinder valve.
- 8.5 Store the regulator and filling hose carefully with inlet and outlet connections covered to avoid contamination and damage.
- 8.6 Replace cylinder cap on cylinder if supplied (as per cylinder supplier’s recommendations).
- 8.7 Store the nitrogen cylinder as per supplier’s recommendations.

Remove the Barrel

- 8.8 Unlock the barrel clamp, rotate the barrel to loosen the seal, and remove the barrel from the Avacaster.
- 8.9 Place the barrel into its storage tube, care should be taken not to damage the barrel in this process.
- 8.10 Replace the barrel receiver cap onto the barrel receiver. (Fig. 24)
- 8.11 Cover the Avacaster and tie down. (Fig. 25)



Figure 24



Figure 25

TROUBLE SHOOTING

Problem	Possible Cause	What to Do
Small dent on the receiver end of barrel	Hitting barrel receiver when inserting barrel	Dress outside and inside of barrel to remove minor Damage
Dent in barrel large enough to see from inside	Mishandling	Replace Barrel Call your Avacaster Service Center
Valve pressure gauge fails to rise	Nitrogen cylinder empty	Replace with full cylinder
	Nitrogen regulator is not set correctly	Repeat steps 3.1 to 3.4
	Filling hose not connected correctly	Repeat steps 3.1 to 3.4
	Leak in pipe work	Call your Avacaster Service Center
Sound of leak from pipe work	Fitting becoming loose with heating and cooling	Call your Avacaster Service Center
	Crack in pipe work or gauge	Call your Avacaster Service Center
	Main valve not seating	Call your Avacaster Service Center
Major pressure drop on tank pressure gauge	Pressure release valve open	Close valve
	Leak in pipe work	Call your Avacaster Service Center
	Valve not seating	Call your Avacaster Service Center
Valve gauge fails to rise	Unidirectional safety valve iced up	Warm and de-ice
	Unidirectional safety valve damaged	Call your Avacaster Service Center
Tank gauge still drops pressure	Pressure release valve open	Close valve
	Leak in pipe work	Use spanner to gently tighten fitting
	Safety blow out valve tripped	Reduce pressure in Avacaster below 300 psi and valve will re-set itself.
	Valve not seating	Call your Avacaster Service Center

APPENDIX A

Operating Instructions for BOC Nitrogen High Pressure Regulator used in the Refrigerant Flush System
Model Number: N2RT50HP
Developed in conjunction with BOC Gases Australia Limited
Manufactured by Gasgep Pty Limited Melb.

This Nitrogen regulator has been designed for use in the BOC Refrigerant Flush System, with 0-3500 kPa (high pressure) regulated output for use with the new T50 Valve Cylinders.

Please follow the instructions provided for correct use.

SAFETY PRECAUTIONS

- Compressed gas cylinders must be handled with care and should be stored and secured in an upright position in a secure place where they will not be knocked over.
- Store and use cylinders in a well ventilated area and ensure they are not subjected to ambient temperatures above 55°C or any source of radiant heat.
- Close the cylinder valve whenever the cylinder is being moved, not in use or empty.
- Cylinders should only be filled by the cylinder owner or with written permission of the cylinder owner in accordance with AS2030.1 and State Dangerous Goods Regulations.
- Read and understand the instructions and labels which accompany your compressed gas equipment and cylinder. Further information is available in the BOC Gases' Material Safety Data Sheet (MSDS) No. 030 available on request from the BOC Customer Service Centre.
- Additional information for compressed gases can be found in AS4332 "The Storage and Handling of Gas Cylinders".
- Check the cylinder label for fill pressure. Only Nitrogen gas cylinders with a fill pressure of 5Mpa at 15 degrees C (20 Mpa max. inlet) should be connected to this regulator.
- Always remove the regulator before moving or transporting the cylinder (see "Closing the cylinder & removing the regulator" section of this leaflet).
- Never hold the regulator to lift the cylinder.

OPERATING INSTRUCTIONS

Attaching the regulator to the cylinder

1. Secure the cylinder to prevent the cylinder from falling.
2. Open the cylinder valve slightly and close. This will clear the valve of any dust, water or dirt which could be carried into the regulator and cause damage or accident.
3. Fit the regulator into the valve and hand tighten. Do not use a spanner or over tighten as this will damage the connector o-ring.
4. Open the cylinder valve S-L-O-W-L-Y to allow pressure to gradually build up in the regulator thus preventing damage and / or injury. Never lean over the regulator.
5. Check the connections for leaks. A leak is evidenced by a hissing sound. If a leak occurs refer to the "Faulty Operation and Maintenance" section of this leaflet.

Closing the cylinder & removing the regulator

1. After use turn the cylinder valve to the "close" or "off" position.
2. Relieve the pressure in the regulator by turning the adjusting knob clockwise fully in. This will release any residual gas in the regulator.
3. Loosen the regulator by turning counter-clockwise and continue turning until the regulator is disengaged from the cylinder valve.
4. Store the regulator carefully with inlet and outlet connection covered to avoid contamination and prevent damage.
5. Replace cylinder cap on cylinder if supplied with one.

APPENDIX B – Avacaster Hosing

All hosing used on the Avacaster is rated for the intended purpose. Please see our spec sheets and pictures below:



Appendix B cont.

Hoses

14

Extended Life XR16SC

SAE 100R16/EN 857 2SC | High Pressure



Tight Bends & Flexible

- Meets or exceeds the performance requirements of: SAE 100R16; EN 857 2SC
- Meets Flame Resistance USMSHA Designation
- Meets Higher EN/DIN Pressures
- SAE J11942/U.S. Coast Guard

Application

High-pressure service needing abrasion resistance, tight bends and flexible. For petroleum- and water-based hydraulic fluids. Excellent impulse performance and flexibility exceeding SAE 100R2 and SAE 100R16 standards.

Inner Tube

Nitrile

Reinforcement

Two braids of high-tensile steel wire

Cover

Extra abrasion, oil and weather resistant synthetic rubber

Temperature Range

-40°F to 212°F (-40°C to 100°C)

Fitting Reference

All fittings compatible with the XR16SC™ hose family are listed in Section 1 (starting on page 54) of the catalog.

Branding

Example: Continental ContiTech Extended Life XR16SC-08 SAE 100R16/EN 857 2SC 1/2" (DN12) W.P. 5000 psi (34.5 MPa) MSHA 2G IC-14C/37

Descriptive #/ Product #	SAP #	Hose Size ID		Hose OD		Max. Working Pressure		Min. Bend Radius		Min. Burst Pressure		Weight lbs./ft.	USCG Approved
		In.	DIN Dash Size	In.	mm	psi	MPa	In.	mm	psi	MPa		
XR16SC-04	20693982	1/4	06	0.54	13.70	5800	40.0	2.0	51	23200	160.0	0.18	H
XR16SC-06	20693983	3/8	10	0.70	17.70	5000	34.5	2.5	64	20000	137.9	0.27	H
XR16SC-08	20693984	1/2	12	0.81	20.60	5000	34.5	3.5	89	20000	137.9	0.36	H
XR16SC-10	20693985	5/8	16	0.95	24.20	4000	27.6	4.0	102	16000	110.3	0.41	H
XR16SC-12	20693987	3/4	19	1.10	28.00	3500	24.1	5.0	127	14000	96.5	0.55	H
XR16SC-16	20693988	1	25	1.40	35.50	3000	20.68	6.0	152	12000	82.74	0.83	H

ARMORCOAT™ ARC16SC

SAE 100R16/EN 857 2SC | High Pressure



- Meets or exceeds the performance requirements of: SAE 100R16; EN 857 2SC
- Meets Flame Resistance USMSHA Designation
- Meets Higher EN/DIN Pressures
- Abrasion Cover

Application

High-pressure service with tight bends for petroleum- and water-based hydraulic fluids where maximum abrasion resistance is required. Excellent impulse performance and flexibility exceeding SAE 100R2 and SAE 100R16 standards.

Inner Tube

Nitrile

Reinforcement

Two braids of high-tensile steel wire

Cover

Black synthetic rubber with ARMORCOAT™

Temperature Range

-40°F to 212°F (-40°C to 100°C)

Fitting Reference

All fittings compatible with the ARC16SC hose family are listed in Section 1 (starting on page 54) of the catalog.

Branding

Example: Continental ContiTech ARMORCOAT™ ARC16SC-04 SAE 100R16/EN 857 2SC (Abrasion cover) 1/4" (DN06) W.P. 5800 psi (40 MPa) MSHA 2G-IC-14C/43

Descriptive #/ Product #	SAP #	Hose Size ID		Hose OD		Max. Working Pressure		Min. Bend Radius		Min. Burst Pressure		Weight lbs./ft.
		In.	DIN Dash Size	In.	mm	psi	MPa	In.	mm	psi	MPa	
ARC16SC-04	20731686	1/4	06	0.52	13.2	5800	40.0	2.0	51	23200	160.0	0.17
ARC16SC-06	20731831	3/8	10	0.67	17.0	5000	34.5	2.5	64	20000	137.9	0.26
ARC16SC-08	20730593	1/2	12	0.81	20.6	5000	34.5	3.5	89	20000	137.9	0.35
ARC16SC-10	20733777	5/8	16	0.92	23.4	4000	27.6	4.0	102	16000	110.3	0.40
ARC16SC-12	20733779	3/4	19	1.08	27.4	3500	24.1	5.0	127	14000	96.5	0.54
ARC16SC-16	20731835	1	25	1.40	35.5	3000	18.6	6.0	152	12000	74.5	0.83



Hoses

Fittings

Equipment & Accessories

Assemblies

Installation & Maintenance

Appendix

Appendix B cont.

Chemical Resistance Tables

The following is a representative list of fluids and manufacturers and a general guideline for the use and compatibility of Continental ContiTech hose and fittings.

Rating Scale

E = Excellent resistance X = Not recommended Blank = No Data
 G = Good resistance - = Testing recommended

Chemical Name	Hose								Fittings and Adapters				
	PTFE (Teflon®)	CR (Polychloroprene)	NBR (Nitrile)	Nitrile/PVC	CPE	CSM	Urethane	Nylon	Carbon Steel	Stainless Steel 304	Stainless Steel 316	Aluminum	Brass
Nitrobenzene (Under 100°F)	E	X	X	X	G	X	X	-	G	G	G	G	E
Nitroethane	E	X	X	X	E	G	-	-	E	E	E	E	E
Nitrogen	E	E	E	G	E	E	E	E	E	E	E	E	E
Nitrogen Fertilizer Solution													
Nitrogen Oxide up to 50% (Under 100°F)		E	E	G	E	E	-	E	E	E	E	-	X
Nitromethane (Formable)	E	X	X	X	-	-	-	E	E	E	E	E	E
Nitropropane		X	X	X	-	-	-	E	E	E	E	E	E
Nitrous Oxide (Gas)	E												
N-Octane		X	G	-	E	X	-	-	E	E	E	-	E
Nuto H													
Nyloc 20 (WG), 30 (WG)		-	E	-	-	-	-	-	E	E	E	E	E
Nyloc FR Fluid		-	E	-	-	-	-	-	E	E	E	E	E
Nyloc FR200 Fluid		-	E	-	-	-	-	-	E	E	E	E	E
O-14B (NATO)													
Octyl Alcohol	E												
Oil (SAE, Under 100°F)	E	E	E	E	E	G	E	E	E	E	E	E	E
Oil Synthetic Blends													
Oil Crude	E	X	G	-	-	-	-	-	E	E	-	-	-
Oleic Acid (Under 120°F)	E	G	G	G	E	G	E	E	G	G	E	E	G
Oleum 25%													
Oleum Spirits (to 70°F)	E												
Olive Oil	E	X	G	G	G	X	-	-	G	E	E	E	G
Orthodichlorobenzene													
OS 45 Type III (OS45)	E	E	G	-	-	-	-	-	-	-	-	-	-
OS 45 Type IV (OS45-1)	E	E	G	-	-	-	-	-	-	-	-	-	-
OS 70		E	G	-	-	-	-	-	-	-	-	-	-
Oxalic Acid (5%, Hot and Cold)		G	G	-	-	-	-	G	X	G	E	E	X
Oxalic Acid	E	X	X	X	E	G	X	X	X	G	E	G	X
Oxalic Acid (10% Boiling)		X	X	-	-	-	-	-	X	X	X	X	X
Oxalic Acid (10%)		G	G	-	-	-	-	G	X	G	E	E	X
Oxygen (200°-400°F)		X	X	-	-	-	-	-	-	-	-	-	-
Oxygen Cold		E	G	-	E	-	-	E	G	E	E	E	E
Oxygen Gaseous	E	-	-	-	-	-	-	-	-	-	-	E	-
Ozone (Dry)	E	G	X	G	E	G	E	G	E	E	E	E	E
Ozone (Wet)	E	-	X	-	-	-	-	-	X	G	E	G	-
Pacemaker Types 150T, 300T, 500T (Clgpl)			E	-	-	-	-	-	-	-	-	-	-
Paint	E	X	-	-	-	X	X	G	-	E	E	E	E

Underline is cover compound rating only. Many factors, such as temperature, concentration and length of exposure, are relevant to how chemical exposure affects the tube and cover or fitting material. The fluid manufacturers recommended maximum operating temperature should be carefully observed. Exceeding the manufacturer's recommended maximum temperature can result in fluid breakdown and cause harm or shorten life of tube and cover materials. There may be instances where the hose cover could be adversely affected by fluids which would not chemically affect the hose tube. Conversely, some fluids with an adverse affect on the tube of the hose may not have a deteriorating effect on the hose cover. It is recommended that the user test the hose/fluid compatibility to their own standards. Since no industry standards exist for chemical resistance, the Compass Chemical Resistance Guide for Elastomers is used whenever possible. Teflon® is a registered trademark of DuPont.

Hoses

Fittings

Equipment & Accessories

Assemblies

Installation & Maintenance

Appendix

