

**HB-1146**  
REV. 11/00



**TYPE TTU-131/E**  
**CRYOGENIC**  
**SAMPLER**

**P/N-2702501**  
**INSTRUCTION MANUAL**

## DESCRIPTION

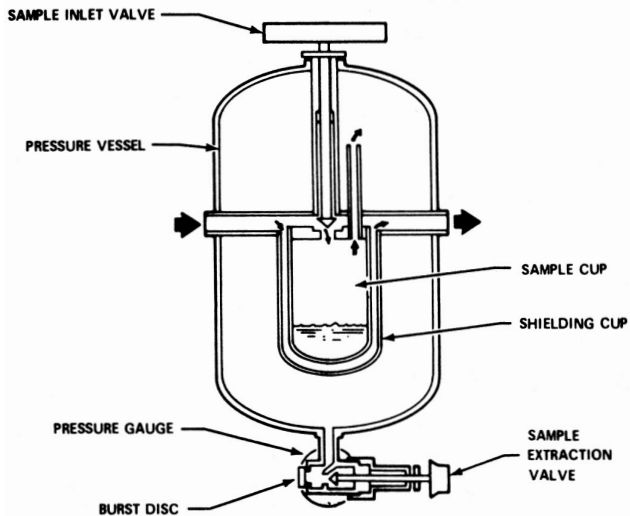
The Sampler is a small pressure vessel used to receive, vaporize and contain a representative sample of cryogenic liquid from a supply source for laboratory analysis.

In use, the Sampler is connected to the supply source with the Sampler hose, and cooled to the liquid temperature by purging with supply source liquid. The sample inlet valve is then opened and closed to fill the sampling cup.

## LEADING PARTICULARS

Military Designation	TTU-131/E	Operating pressure	500 psig
Part Number	2702501-11C TPED/DOT Certified	Inlet connection	1/2 inch male AN
		Outlet connection	3/8 inch male AN
		Weight (empty)	37 pounds
		Water Volume	4.4 liters

† It is the user's responsibility to comply with federal, state and local regulations for shipment of sampled gas and periodic pressure vessel retesting requirements.



**FLOW SCHEMATIC**

## **FUNCTIONAL DESCRIPTION**

Two cups, one inside the other, are located in the pressure vessel. The cryogenic liquid is allowed to flow between the shielding cup (outer) and the sampling cup (inner) until the sampling cup has reached the temperature of the liquid. The inlet valve is opened to admit the sample and then closed.

The pressure of precooling the Sampler cup before admitting the sample is to prevent concentrating impurities which could result from the boiling away of the cryogenic liquid as it enters the warm cup, leaving behind impurities which have higher boiling points.

## **OPERATION**

The Sampler is shipped certified **CLEAN FOR OXYGEN SERVICE** and may be put in service immediately without precleaning. The Sampler must then be cleaned before each subsequent sampling (see **REGULAR CLEANING**).

1. Remove the top of the case and remove the caps from the inlet and outlet connections.
2. Connect the fill hose to the supply source and to the Sampler inlet fitting. Check that the inlet valve is closed, then open the valve on the supply source to allow the liquid to flow through the Sampler, exhausting through the outlet fitting.

## NOTE

The instructions on the case call for a five-minute cooldown; actually cooldown time is a function of flow rate through the Sampler, and may be considerably longer if the supply source is at a low pressure. Increasing supply source pressure to 20 to 30 psig will hasten cooldown. In any case, continue cooldown until a steady stream of liquid jets from the outlet fitting.

3. Open the sampler inlet valve completely to allow liquid to enter the sampling cup. Immediately close the valve. Be sure the valve is completely closed.
4. Close the supply source valve, vent and disconnect the fill hose and replace the caps on the inlet and outlet fittings. Tighten caps.
5. Replace the top of the case and invert the case to permit the liquid in the sampling cup to flow into the pressure vessel.
6. Check the pressure gauge after 15-30 minutes. The gauge should indicate a maximum of 500 psig (-1, -3 & -11) or a maximum of 250 psig (-5). The Sampler is now ready for shipment to the analysis lab.

## NOTE

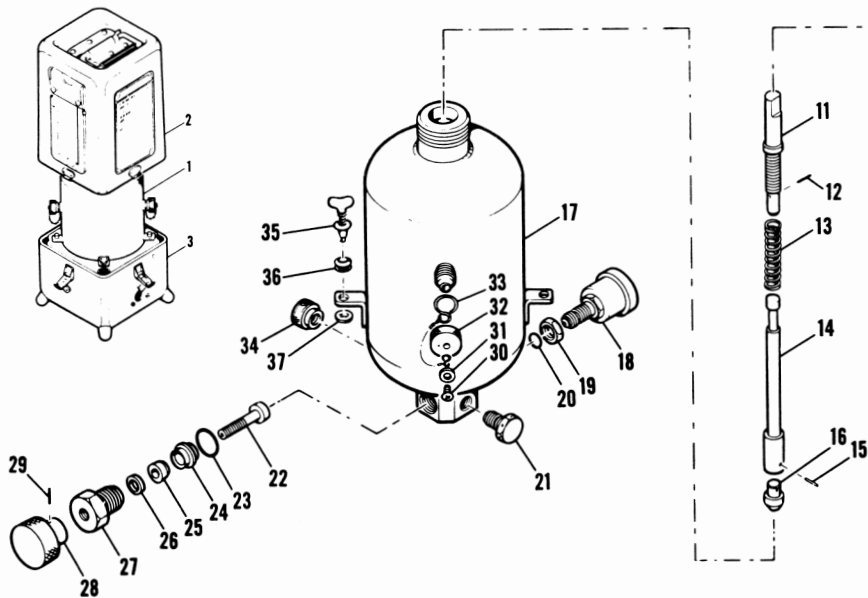
After taking the sample the case should be tagged with the details of the sampling - i.e., location and serial number of supply source vessel, date of sampling.

## TROUBLESHOOTING

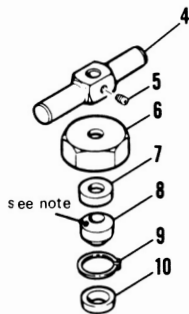
<u>Trouble</u>	<u>Probable Cause</u>	<u>Remedial Action</u>
Low or no rise on pressure gauge after sample is taken	1. Insufficient cooldown time	1. Repeat sampling procedure
	2. Loose fitting(s)	2. Tighten all fittings
	3. Sample extraction valve not completely closed	3. Check that valve is closed before taking sample
	4. Ice in sample inlet valve seat	4. Place Sampler in 250° F oven and purge with dry nitrogen gas
	5. Worn valve seats or seals in sample inlet and/or extraction valve	5. Replace worn components

## SAMPLE WITHDRAWAL

The sample is withdrawn by removing the case bottom and fully opening the extraction valve at the bottom of the Sampler. Purge the hose between the Sampler and the analyzer with gas from the Sampler before connecting the hose to the analyzer.



TYPE TTU-131/E CRYOGENIC SAMPLER



INDEX NO.	DESCRIPTION	INDEX NO.	DESCRIPTION
- 1	SAMPLER ASSEMBLY	- -	Extraction Valve Assembly consists of:
- 2	Case, upper	- 22	Extraction valve stem
- 3	Case, lower	- 23	O-ring
- 4	Handle	- 24	Bushing
- 5	Set screw	- 25	Packing
- 6	Cap	- 26	Spacer
- 7	Retainer, upper	- 27	Retainer
- 8	Valve packing	- 28	Handle
- 9	Snap ring	- 29	Pin
- 10	Retainer, lower	- -	Cap Assembly, inlet, consists of:
- 11	Valve stem	- 30	Screw
- 12	Pin	- 31	Washer
- 13	Spring	- 32	Cap
- 14	Sampling valve rod	- 33	S-hook
- 15	Pin	- 34	Cap Assembly, extraction valve outlet
- 16	Valve seat	- 35	Stud, wing head
- 17	Vessel Assembly	- 36	Grommet
- 18	Pressure gauge *	- 37	Retaining ring
- 19	Nut	- 38	Cap Assembly, outlet (not shown)
- 20	O-ring		
- 21	Burst Disc Assembly *		

NOTE: 8-32 NC TAPPED HOLE.  
REMOVE PACKING (8) BY  
INSTALLING SCREW INTO  
TAPPED HOLE AND PULLING  
OFF.

\* Specify pressure

## REGULAR CLEANING

Regular cleaning is required after each sample is taken to prepare the Sampler for the next operation and to check for leaks. Regular cleaning consists of purging the Sampler and hose with clean, dry, oil-free gas. If the Sampler is in oxygen service, use a source of oxygen per MIL-O-27210, Type 1; if in nitrogen service, use nitrogen per BBN-411, Type 1, Grade A.

1. Connect a gas source, filtered through a 10 micron filter, to the sample extraction valve; open the sample inlet valve and loosen the caps on the inlet and outlet fittings to permit leakage.
2. Set supply source regulator at 10 psig and purge Sampler for 10 minutes.
3. Tighten all fittings after 10 minutes and disconnect the supply source.
4. Connect a vacuum pump to the sample extraction valve and evacuate the Sampler to 100 microns, then close valve and disconnect pump.
5. Reconnect the supply source and pressurize the Sampler to 200 psig. Check the Sampler for leaks by applying a liquid leak detector around all fittings.
6. If no leaks are observed, run a sample analysis on the gas in the Sampler. If the sample shows contamination, perform PERIODIC CLEANING: if the sample meets cleanliness standards, bleed pressure to 25 psig and tag the Sampler with a tag stating the Sampler is clean and is pressurized with clean, oil-free gas, referencing the type of gas and the applicable specification (see above).

## PERIODIC CLEANING

Periodic cleaning differs from the regular cleaning in that it is performed to remove hydrocarbon contamination from the Sampler while regular cleaning is performed to remove all traces of the previous sample.

1. Disassemble the sample inlet valve and remove the burst disc and pressure gauge. Cap the ports from which the burst disc and gauge were removed.
2. Remove the inlet fitting cap; check that the outlet fitting cap is tight.
3. Place the Sampler upside down with the sample extraction valve in the top vertical position; open this valve.
4. Fill the Sampler through the inlet fitting with trichlorethylene per MIL-TT-27602. The Sampler is full when the trichlorethylene flows from the sample extraction line.
5. Close the valve, cap the inlet port, and thoroughly agitate the Sampler to clean all internal surfaces.
6. Open the valve and remove all caps. Drain the solvent by repeatedly inverting the vessel until solvent ceases to flow.
7. Rinse the burst disc, pressure gauge and inlet valve in clean solvent and dry with dry nitrogen gas.

8. Reassemble the Sampler; use new O-rings on the pressure gauge adapter and in the extraction valve (items 20, 23) .
9. Perform REGULAR CLEANING.

### REPLACEMENT OF BURST DISC

The burst disc (item 21) is not repairable: in the event of a burst disc rupture, unscrew and discard the burst disc and install the replacement.

### PARTS LIST (see center-fold illustration)

INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY.
- 1	2702501-11C	Sampler Assembly, TPED/DOT Certified (See Note No. 2 below)	1
		<b><u>Spare Parts</u></b>	
- 2	2702325-001	Case Assembly (spare)	1
- 4	2702334-001	Handle	1
- 5	8006263-115*	Set Screw, MS51973-50	1
- 6	2702311-001	Cap	1
- 7	2702307-001	Retainer, upper	1
- 8	2702305-001*	Valve packing	1
- 9	8006263-153	Snap Ring, N003679	1
- 10	2702308-001	Retainer, lower	1
	2702320-001	Sampling Valve Assembly, consists of:	1
- 11	2702310-001	-Valve stem	1
- 12	8006263-910	-Pin, Stock No. N003683	1

- 13	2702319-001	-Spring	1
- 14	2702309-001	-Sampling valve rod	1
- 15	8006263-904*	-Pin, Stock No. N003671	1
- 16	2702306-001*	-Valve seat	1
- 17	2702505-1,-5	Vessel Assembly (Reference only)	1
- 18	2605442-001	Pressure gauge	1
- 19	8006263-102	Nut, AN924-4C	1
- 20	2601425-904*	O-ring	1
- 21	2600054-005*	Burst Disc Assembly	1
	2702321-001	Extraction Valve Assembly, consists of:	1
- 22	2702322-001*	-Extraction Valve Stem	1
- 23	2601425-016*	-O-ring	1
- 24	2702313-001	-Bushing	1
- 25	2702314-001*	-Packing	1
- 26	2702318-001	-Spacer	1
- 27	2702312-001	-Retainer	1
- 28	2700311-003	-Handle	1
- 29	8006263-911*	-Pin, Stock No. N003702	1
	2700523-001	Cap Assembly, Inlet, consists of:	2
- 30	8006263-101	-Screw, AN530C8R6	1
- 31	8006263-107	-Washer, AN960D8L	1
- 32	2700310-001	-Cap	1
- 33	2601365-001	-S-hook	1
	8006263-301	-Chain, Safety	1
	2700036-001	-Gasket, Cap	1
- 34	2700523-001	Cap Assembly, Extraction valve outlet <b>(same as inlet cap above)</b>	1
- 35	8006263-303	Stud, wing head, N003703	2
- 36	8006263-302	Grommet, N003703	2
- 37	8006263-304	Retaining ring, N003685	2

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2700523-003	Cap Assembly, outlet, consists of:	1
8006263-101	-Screw, AN530C8R6	1
8006263-107	-Washer, AN960D8L	1
2700310-003	-Cap	1
2601365-001	-S-hook	1
8006263-301	-Chain, Safety	1
2700036-003	-Gasket, Cap	1
8006263-907	Receptacle, Camloc, Stock NO. N003676	2
8006263-908	Bumper, Rubber Foot	4
8006263-909	Latch, Link-Lock	4
2702390-001	Spare Parts Kit	1
2702501-021	Sampler Handbook, Cosmodyne HB 1146, (Included with purchase of Sampler)	1
	<b><u>Accessories</u></b>	
2601215-001	Cryogenic fill hose, commercial	1
2702476-001	Hose, Fill, Military Version, LOX	1
2702476-003	Hose, Fill Military Version, LIN	1

**NOTES:**

1. P/N 2702501-11C, Sampler Assembly, is supplied with case and handbook.
2. Designed, manufactured, and tested in compliance with the European Council Directive equipment (TPED, 1999/36/EC); and in accordance with EN 1251-1 Cryogenic
3. \*Included in spare parts kit.
4. Military Version fill hose includes MS hose and Ordnance coupling with adapter.
5. All items on this list are normally in stock, oxygen cleaned, (where applicable) and ready for service.

SERVICE RECORD

Sampler Serial No. \_\_\_\_\_ Service (Nitrogen, Oxygen, etc.) \_\_\_\_\_

DATE	MAINTENANCE PERFORMED



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