



## **ADDENDUM**

# ***MODEL T750U CALIBRATOR***

**(Addendum to the T750 Operation Manual, P/N 08070)**

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# SAFETY MESSAGES

Important safety messages are provided throughout this manual for the purpose of avoiding personal injury or instrument damage. Please read these messages carefully. Each safety message is associated with a safety alert symbol, and are placed throughout this manual and inside the instrument. The symbols with messages are defined as follows:



**WARNING:** Electrical Shock Hazard



**HAZARD:** Strong oxidizer



**GENERAL WARNING/CAUTION:** Read the accompanying message for specific information.



**CAUTION:** Hot Surface Warning



**Do Not Touch:** Touching some parts of the instrument without protection or proper tools could result in damage to the part(s) and/or the instrument.



**Technician Symbol:** All operations marked with this symbol are to be performed by qualified maintenance personnel only.



**Electrical Ground:** This symbol inside the instrument marks the central safety grounding point for the instrument.

## CAUTION



This instrument should only be used for the purpose and in the manner described in this manual. If you use this instrument in a manner other than that for which it was intended, unpredictable behavior could ensue with possible hazardous consequences.

**NEVER** use any gas analyzer to sample combustible gas(es).

## Note

Technical Assistance regarding the use and maintenance of this instrument or any other Teledyne API product can be obtained by contacting Teledyne API's Technical Support Department:

Telephone: 800-324-5190

Email: [sda\\_techsupport@teledyne.com](mailto:sda_techsupport@teledyne.com)

or by accessing various service options on our website at <http://www.teledyne-api.com/>

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# ABOUT THIS MANUAL

This manual is intended for use in conjunction with the Model T750 Dynamic Dilution Calibrator Operation Manual, part number 08070.

## REVISION HISTORY

Date	Rev	DCN	Change Summary
2015 Jan 30	A	7051	Initial Release

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# 1. OVERVIEW

This addendum supplements the T750 Operation Manual, PN 08070, with details specific to the operation of the T750U portable calibrator. The T750U is a modified version of the T750 portable calibrator, equipped with a special ozone generator capable of producing stable ozone concentrations for Gas Phase Titration (GPT) calibrations and Ozone generation at much lower levels than the standard T750.

# 2. T750U SPECIFICATIONS

**Table 2-1: Dilution System**

Parameter	Specification
Flow Measurement Accuracy	± 1.0% full Scale
Repeatability of Flow Control	± 0.2% full Scale
Linearity of Flow Measurements	± 0.5% full Scale
Flow Range of Diluent Air	0 to 10 SLPM
Flow Range of Cylinder Gases	0 to 200 cc/min
Zero Air Requirements	10 SLPM @ 30 psi    Optional: 20 SLPM @ 30 psi
CAL Gas Input Port	1 (configurable)
Diluent Gas Input Port	1

**Table 2-2: NO<sub>2</sub> Generation (GPT modes)**

Parameter	Specification
Minimum Output	20 ppb LPM
Minimum Concentration:	3 ppb
Precision	± 2.0% (with GPTPS)

**Table 2-3: Ozone Generator Module**

Parameter	Specification
Maximum Output	4.5 ppm LPM
Minimum Output	20 ppb LPM
Minimum Ozone Concentration	3 ppb
Response Time	180 seconds to 98%
Optical Feedback	Standard

**Table 2-4: UV Photometer Option**

Parameter	Specification
Range	100 ppb to 10 ppm (selectable)
Precision	1.0 ppb
Linearity	1.0% of reading
Rise/Fall Time	<20 seconds (photometer response)
Response Time	180 seconds to 95% (system response)
Zero Drift	<1.0 ppb / 24 hours

**Table 2-5: Electrical and Physical Specifications**

Parameter	Specification	
AC Power	Rating 100-240 V~ 50/60 Hz, 1.5 A	Typical Power Consumption 115 V: 76 W 230 V: 80 W
Analog Outputs	1 user configurable output	
Analog Output Ranges (Test Channel)	10V, 5V, 1V, 0.1V (selectable)	
Analog Output Resolution	1 part in 4096 of selected full-scale voltage (12 bit)	
Standard I/O	1 Ethernet: 10/100Base-T 2 RS-232 (300 – 115,200 baud) 2 USB device ports 12 digital control outputs 12 digital control inputs 8 digital status outputs	
Optional I/O	1 USB com port 1 RS485 Multidrop RS232	
Operating Temperature Range	5-40°C	
Humidity Range	0 - 95% RH, non-condensing	
Environmental Conditions	Installation Category (Over Voltage Category ) II Pollution Degree 2 Intended for Indoor Use Only at Altitudes ≤ 2000m	
Dimensions (H x W x D)	9" x 17" x 21" (229 mm x 432 mm x 533 mm)	
Weight	46.6 lbs (21.14 kg) 3MFC 45.1 lbs (20.46 kg) 2MFC	

## 2.1. APPROVALS AND CERTIFICATIONS

The Teledyne API Model T750U portable calibrator was tested and certified for Safety and Electromagnet Compatibility (EMC). This section presents the compliance statements for those requirements and directives.

### 2.1.1. SAFETY

IEC/EN 61010-1:2010 (3<sup>rd</sup> Edition), Safety requirements for electrical equipment for measurement, control, and laboratory use.

CE: 2006/95/EC, Low-Voltage Directive

### 2.1.2. EMC

IEC/EN 61326-1, Class A Emissions/Industrial Immunity

EN55011 (CISPR 11), Group 1, Class A Emissions

FCC 47 CFR Part 15B, Class A Emissions

CE: 2004/108/EC, Electromagnetic Compatibility Directive

### 2.1.3. OTHER TYPE CERTIFICATIONS

For additional certifications, please contact Technical Support.

## 3. OPERATIONAL MODES

The T750U ozone generator is designed to operate in two modes: a high range mode, which gives similar performance as a standard T750 ozone generator, and a low range, or “fractional” mode for producing low levels of ozone during a GPT calibration.

The low range mode is supported in the following T750U Generation (GEN) modes:

- AUTO (when generating ozone)
- GPTPS
- GPT
- GPTZ (accessed from the GEN menu, see the T750 operator’s manual for more details.)

The selection of low range generator operation is made automatically by the T750U software, based on the O<sub>3</sub> concentration and total flow specified. For O<sub>3</sub> output < 500 PPB • LPM, the low range operation is invoked.

### 3.1. AUTO

The AUTO mode can be used to generate ozone as a calibration gas for performing calibrations and calibration checks on ambient ozone analyzers.

When generating very low levels of ozone, ensure that the concentration-flow product is kept above the 20 ppb\*LPM minimum value. This value is the target concentration (in ppb) multiplied by the total flow value.

Example: To determine the minimum flow rate required to generate 3 ppb:

$$3 \text{ ppb} * X \text{ LPM} > 20 \text{ ppb} * \text{LPM}$$

or

$$X \text{ LPM} > (20 \text{ ppb} * \text{LPM}) / (3 \text{ ppb}) = 6.7 \text{ LPM}$$

Therefore, the flow rate should be a minimum of 6.7 LPM to generate 3 ppb.

These equations can be used to determine the minimum flow rate for any desired concentration.

### 3.2. GPTPS (GPT PRE-SET)

The GPTPS mode is used to fine-tune the ozone generator calibration to improve the accuracy of the O<sub>3</sub> concentration during a subsequent GPT. This function is only available if the optional O<sub>3</sub> photometer is installed in the instrument.

During a GPTPS calibration, the internal photometer is used to measure the O<sub>3</sub> output and the O<sub>3</sub> GEN DRIVE value is adjusted to achieve the specified O<sub>3</sub> concentration. Once the concentration has stabilized (as indicated by the ACTIVE LED switching from blinking to a solid lit state), the instrument will store the updated O<sub>3</sub> GEN DRIVE value for later use when performing an actual GPT.

The following parameters must be entered for GPTPS:

Parameter	Definition	Notes
NO Concentration (ppb)	NO concentration that will be used in subsequent GPT	During the GPTPS, there is no NO gas generated. Instead, zero air is allowed to flow through the dilution MFC at an increased flow rate to mimic the amount that would otherwise come from the Cal MFC. This is equivalent to the flow-rate that will be used during the GPT.
O3 Concentration	O3 concentration target	
Total Flow	Total output flow rate for subsequent GPT	The Total Flow parameter is used to calculate the Diluent flow required as follows: Diluent flow = Total Flow – O3 Gen Flow – NO Cal Gas Flow

The parameters entered for the GPTPS should be identical to the parameters that will be entered for the GPT. If a multi-point GPT is to run, then a separate GPTPS should be run for each O<sub>3</sub> concentration point.

### 3.2.1. GPTPS FREQUENCY

The GPTPS is an optional function used to increase the accuracy of the O<sub>3</sub> concentrations during a GPT. The GPTPS function is not required to be performed before each GPT; however, doing so will provide the best O<sub>3</sub> accuracy possible. If somewhat less precision can be tolerated from one GPT calibration to the next, then the GPTPS function can be run less frequently. The operator will need to determine the appropriate frequency based on their requirements.

### 3.3. GPTZ (GPT ZERO)

The GPTZ mode is used for obtaining the baseline NO and NO<sub>x</sub> readings for calculating the NO<sub>x</sub> converter efficiency. These readings are referred to as [NO]<sub>orig</sub> and [NO<sub>x</sub>]<sub>orig</sub>, respectively in the EPA calibration guidelines.<sup>(1), (2)</sup>

During GPTZ, NO gas is generated in the same manner as a GPT calibration, except that the O<sub>3</sub> generator lamp is un-energized, thus producing no O<sub>3</sub>. This allows accurate measurement of the baseline NO and NO<sub>x</sub> readings from the instrument under test.

#### 3.3.1. GPTZ VS AUTO GENERATION MODES

It may appear that the GPTZ and AUTO Generation modes are performing the same function: generating NO cal gas at a specified concentration and flow rate. However, there is an important difference in the flow configuration of these two modes.

In GPTZ mode, the total flow includes flow from the (un-energized) O<sub>3</sub> generator. This flow is not directly measured by the calibrator. The O<sub>3</sub> generator flow is measured at the factory and programmed into the T750U and assumed to be constant thereafter. Since pressure and temperature changes between the factory cal and the customer's ambient conditions cannot be accounted for, there may be small discrepancies between the actual O<sub>3</sub> generator flow and the assumed flow that is used in the dilution calculations that the T750U performs. Since these small flow discrepancies are present in both the GPTZ and GPT modes, they do not affect the accuracy of the converter efficiency calculations.

For the best overall dilution accuracy, such as for span calibrations, the AUTO mode should still be used.

#### 3.3.2. GPT

The GPT mode is used for performing the actual NO + O<sub>3</sub> titration used to produce the NO<sub>2</sub> test gas. This mode allows for the measurement of the [NO]<sub>rem</sub> and [NO<sub>x</sub>]<sub>rem</sub> readings referred to in the EPA calibration guidelines<sup>(1), (2)</sup>.

## 4. GPT SETUP

Careful consideration must be given to the various parameters involved in the setup of a GPT calibration, such as total flow, NO flow, NO concentration, O<sub>3</sub> concentration and NO gas bottle concentration.

These guidelines assume that the user has already established the target O<sub>3</sub> and NO concentrations based on other criteria.

### 4.1. FLOW SETUP

The following requirements should be used for determining total flow:

- Instrument's Flow Demand

The number and flow rate requirements of the instruments sampling from the output of the calibrator. The flow demand of all instruments connected to the test manifold, even those not directly involved in the testing, must be taken into account. The minimum output flow rate should be calculated as the sum of all instrument demand flows plus 10% minimum excess. <sup>(1)</sup>

- Target O<sub>3</sub> Concentration

The output flow must be chosen to keep the O<sub>3</sub> generator output above the minimum specification of 20 PPB LPM. The minimum flow rate ( $F_T$ ) can then be calculated using the following equation:

$$F_T \geq \frac{20 \text{ ppb} \cdot \text{LPM}}{O_3 \text{ Conc}}$$

- NO Flow Requirements

To achieve a reasonable response time during the GPT and to satisfy the EPA requirement<sup>(1) (2)</sup> that the residence time in the GPT reaction chamber be less than two minutes, the NO flow rate should be **greater than 40 cc/min**. Therefore, larger dilution flows may be required to achieve low concentrations of NO. An appropriate NO gas bottle concentration must be used in order to achieve this flow rate.

## 4.2. EXAMPLE GPT SEQUENCE

The following example shows the steps performed for a typical GPT calibration using the T750U. Note that this example assumes that a zero and span calibration has already been performed on the NO<sub>x</sub> analyzer per EPA guidelines (1).

Gas Bottle: 1.0 PPM NO

Step	Generation Mode		Notes	Values Obtained for Converter Efficiency Calculations <sup>(1)</sup>
<b>1</b>	<b>GEN-GPTPS</b>		Optional step. Used to increase the accuracy of the O <sub>3</sub> concentration during GPT generation mode.	N/A
	NO Conc	10 PPB		
	O <sub>3</sub> Conc	8 PPB		
	Total Flow	8 SLPM		
	Target NO Flow (calculated by T750U)	80 SCCM		
<b>2</b>	<b>GEN-AUTO-ZERO</b>		Optional step. Used to verify zero calibration of NO <sub>x</sub> analyzer.	N/A
	Total Flow	8 SLPM		
<b>3</b>	<b>GEN-AUTO-GPT</b>		Produces NO <sub>2</sub> test gas using GPT with the ozone generator ON. The O <sub>3</sub> lamp drive value is used from the previous GPTPS.	[NO] <sub>rem</sub> , [NO <sub>x</sub> ] <sub>rem</sub>
	NO Conc	10 PPB		
	O <sub>3</sub> Conc	8 PPB		
	Total Flow	8 SLPM		
	Target NO Flow (calculated by T750U)	80 SCCM		
<b>4</b>	<b>GEN-AUTO-GPTZ</b>		Delivers NO gas only for determining baseline (“orig”) NO and NO <sub>x</sub> values. Ozone generator is OFF.	[NO] <sub>orig</sub> , [NO <sub>x</sub> ] <sub>orig</sub>
	NO Conc	10 PPB		
	O <sub>3</sub> Conc	8 PPB		
	Total Flow	8 SLPM		
	Target NO Flow (calculated by T750U)	80 SCCM		

### 4.3. TYPICAL NO<sub>x</sub> ANALYZER RESPONSE

The chart below shows the typical response of a low level NO<sub>x</sub> analyzer, such as a T200U, when subjected to the GPT sequence described above.

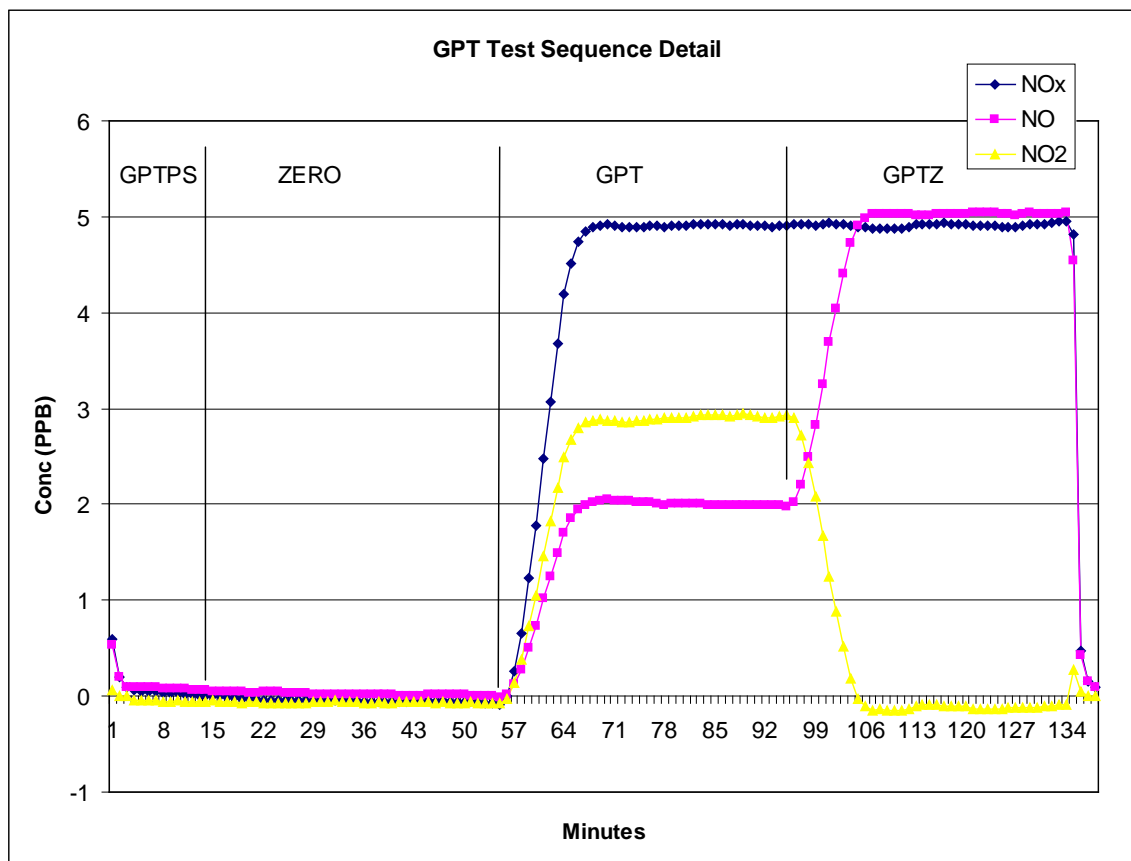


Figure 1. NO<sub>x</sub> Analyzer Typical Response to GPT Test Sequence



## 5. PNEUMATIC DIAGRAMS

The pneumatic diagrams shown below can be used as an aid for troubleshooting.

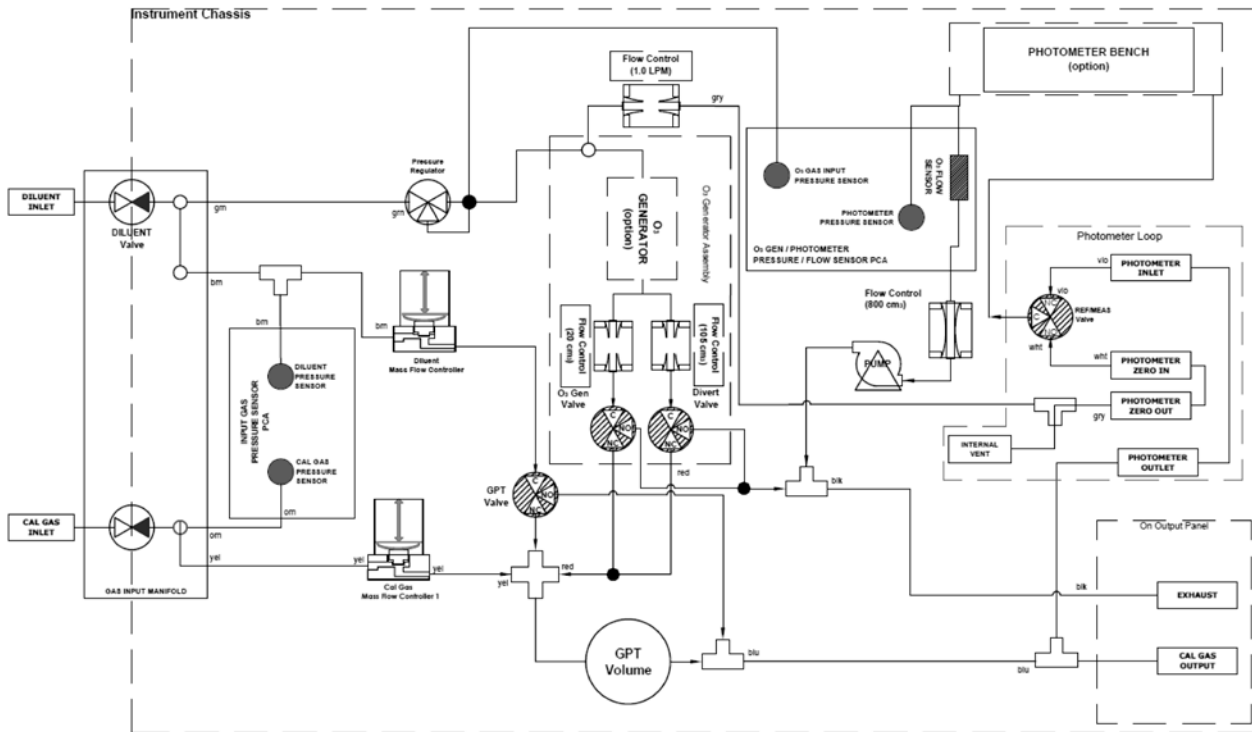


Figure 2. T750U Pneumatic Diagram, Base Configuration

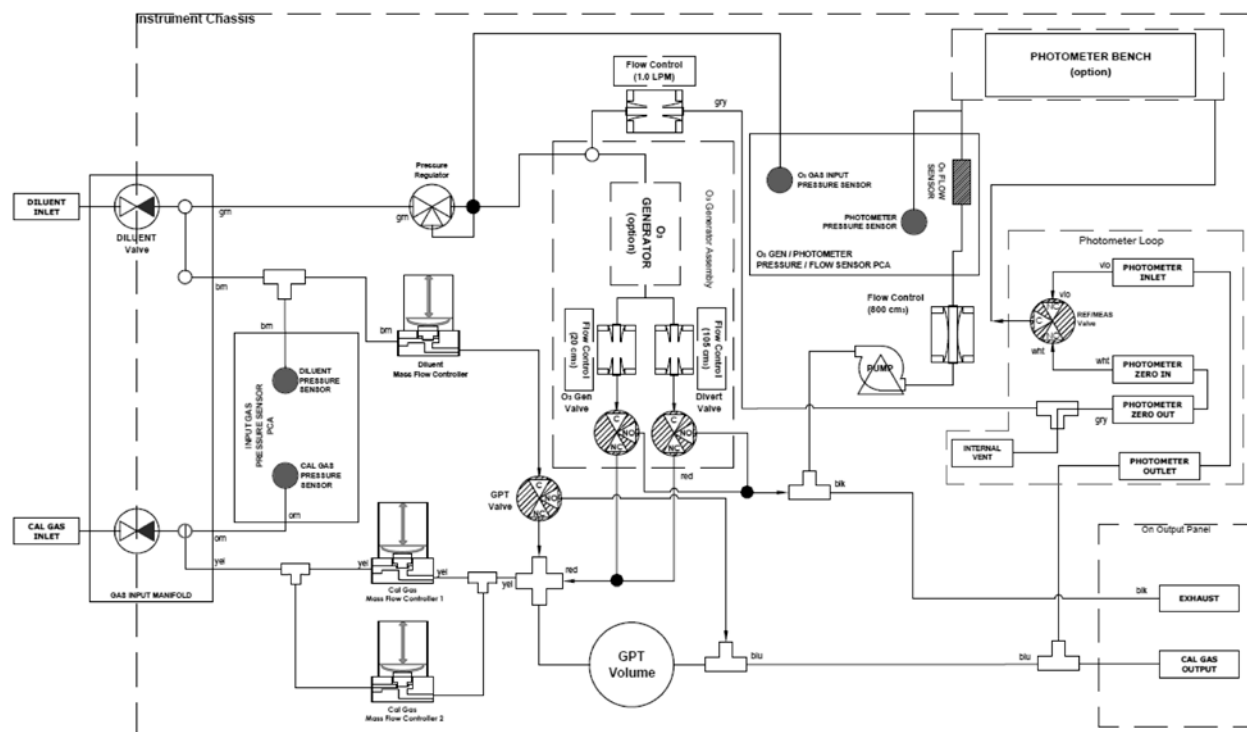


Figure 3. T750U Pneumatic Diagram, with Three MFC Option

## 6. REFERENCES

1. 40 CFR part 50 Appendix F, “Measurement Principle and Calibration Procedure for the Measurement of Nitrogen Dioxide in the Atmosphere (Gas Phase Chemiluminescence)”
2. E. C. Ellis, “Technical Assistance Document for the Chemiluminescence Measurement of Nitrogen Dioxide,” EPA-E600/4-75-003, Environmental Monitoring and Support Laboratory, Research Triangle Park, NC 27711.

## LIST, SPARE PARTS, T750U

(08206A, DCN7055)

Item number	Product name
019320100	CBL, GROUND STRAP (4") RT/RT (PA)
051800200	ASSY, HARNESS, T750 (KB)
058430001	FT 40 FITTING BODY, SILCOSTEEL COATED
FT0000040	BLKHD, SS, 1/4" TUBE TO 1/4" TUBE (KB)
Y5843000P	FT 40 FITTING BODY, SILCOSTEEL COATED
067300100	PCA, AUX-I/O BOARD, ETHERNET
067390000	CBL, CPU ETHERNET TO AUX I/O PCA(PA)
067410000	CBL, CPU USB TO FRONT PANEL, T-SERIES(PA)
067600200	OPTION, USB COM PORT
067300200	PCA, AUX-I/O BOARD, ETHERNET & USB
067380000	CBL, CPU COM TO AUX I/O PCA
073210000	PCA, PRES/FLOW Board, 2-P (FREESCALE)
074820000	CABLE, HDMI, T-SERIES(PA)
079490000	ASSY, INPUT MANIFOLD
056440000	ASSY, VALVE (VA23) (B/F)
056450000	ASSY, VALVE (VA67) (B/F)
079480000	INTAKE MANIFOLD, BLOCK, T750
FT0000008	STRAIGHT, SS, 1/8" TUBE TO 1/8" MALE NPT (KB)
FT0000012	STRAIGHT, SS, 1/4" TUBE TO 1/8" MALE NPT (KB)
FT0000015	ELBOW, SS, 1/8" TUBE TO 1/8" MALE NPT (KB)
FT0000066	PORT CONNECTOR, SS, 1/4" TUBE TO 1/8" TUBE (KB)
FT0000213	TEE-TTM, SS, 1/4", 4TTM2-316 (HK)
080070000	ASSY, PWR DISTRIBUTION
058800000	ASSY, THERMISTOR, OVEN
079720000	PCA, DC Power Distribution Board
080080000	SHIELD, PWR SUPPLY
081430000	ASSY, FAN 1" (FA16)
080410000	ASSY, BB CHASSIS, T750 (KB)
079170000	CHASSIS, BASE PLATE, T750
080300000	ASSY, FRONT PANEL, T750
067900000	LCD MODULE, W/TOUCHSCREEN(PA)
079190000	FRONT PANEL, PLATE, T750
079370000	BEZEL, TOUCH SCREEN, T750
HW0000397	HANDLE, 7/16 x 9/32 OVAL, 8-32, 4" x 1"H (VMI)
HW0000756	HINGE, TOP PANELS, RIGHT, T750
HW0000763	HINGE, TOP PANELS, LEFT, T750
080310000	ASSY, REAR PANEL, T750
040010000	ASSY, FAN REAR PANEL (B/F)
FA0000012	FAN, BRUSHLESS, 12VDC, 60MM
058021400	PCA, MTHRBRD, GEN 5-ICOP, CAL (PA)
067240000	CPU, PC-104, VSX-6154E, ICOP *(PA)
068810000	PCA, LVDS TRANSMITTER BOARD
079180000	REAR PANEL, PLATE, T750

## LIST, SPARE PARTS, T750U

(08206A, DCN7055)

Item number	Product name
CN0000073	POWER ENTRY, 120/60 (KB)
FA0000013	FAN, GUARD, 60MM
HW0000287	HOLE PLUG, 3/4", NYLON, M450H NEMA (VMI)
HW0000458	RIVET, SNAP PLASTIC, FAN, LONG
HW0000063	HOLE PLUG (VMI)
HW0000759	GROMMET EDGING, 1/8", PLASTIC w/ METAL CORE
080430000	ASSY, PORTABLE CASE, T750
079530000	BRACKET, COVERS LANDING
079360000	BRACKET, SIDE RAIL
HW0000685	LATCH, MAGNETIC, FRONT PANEL (KB)
080420000	ASSY, CARRY CASE, T750
080970000	OUTER MASK, PORTABLE, CAL
080640000	OPTION, OZONE, CAL T750 *
073210100	PCA, PRES/FLOW Board, 1-P (FREESCALE)
079220000	ASSY, GPT CHAMBER, T750
018710100	FOAM, SINGLE GPT VOLUME, M700/M702
IN0000001	INSULATION
028240000	REACTION CHAMBER, GPT, M700, M702 (PA)
FT0000051	TEE-TTT, T, 1/4" TUBE TO 1/4" TUBE TO 1/4" TUBE (PA)
FT0000151	CROSS, T, 1/4" TUBE TO 1/4" TUBE AND 1/8" TUBE TO 1/8" TUBE
079230000	ASSY, GPT VALVE, T750
016590100	ASSY, GPT VALVE
FT0000011	STRAIGHT, B, 1/4" TUBE TO 1/8" MALE NPT (KB)
FT0000016	ELBOW, B, 1/4" TUBE TO 1/8" MALE NPT (KB)
VA0000020	VALVE, 3-WAY, SS (PA)
079240000	ADAPTER PLATE -GPT VALVE
079300200	ASSY, O3 GEN, W/PCB, T750U
000940400	CD, ORIFICE, .004 BLUE (KB)
000941600	CD, ORIFICE, .002
054870000	ASSY, SEALING BOLT, CAL O3GEN
054870100	SEALING BOLT, CAL O3GEN (KB)
OR0000034	ORING, 2-011V FT10 (PA)
054880000	RETAINER, LAMP, O3 GEN, M700E/M703E(KB)
063110000	PCA, DC HEATER/THERM, 100W
079290000	ASSY, O3 GEN DRV, T750
041660000	PCA, UV LAMP P/S, w/HW269 SPACER
041660100	PCA, UV LAMP P/S, O3 GEN, *
079280000	BRACKET, O3 UV LAMP PCB
080090000	SHIELD, O3 PCA
HW0000327	HEATSINK CLIP, TO-220 (VMI)
HW0000356	PAD, THERMAL, TO-220, W/ ADHV (VMI)
079310100	HOUSING, O3 GEN, T750U
079320000	BASE, O3 GEN, T750

## LIST, SPARE PARTS, T750U

(08206A, DCN7055)

Item number	Product name
079500000	INSULATOR, OZONE GENERATOR, T750
080990000	ASSY, O3 GEN LAMP (OP48)
OP0000048	OZONE LAMP, 1 INCH
081440000	ASSY, VALVE (VA24)
VA0000024	VALVE, MANIFOLD, 3-WAY CLIPPARD
FL0000001	FILTER, SS (PA)
FT0000014	ELBOW, B, 1/8" TUBE TO 1/8" MALE NPT (KB)
FT0000202	NIPPLE, B, 1/4" TUBE TO 10-32 (KB)
FT0000317	ELBOW, B, 10-32 MALE VITON TO 1/8" TUBE (KB)
FT0000327	ELBOW VITON, SS, 1/8" TUBE TO 10-32
FT0000446	TEE-TFM, B, 1/8" T TO 10-32 F TO 10-32 M
FT0000451	CAP, B, 1/8", MINIATURE BESWICK
OR0000001	ORING, 2-006VT *(KB)
OR0000048	ORING, 2-112S
OR0000077	ORING, 2-018V
VA0000076	REGULATOR, 0-50 PSI
FT0000149	PLUG (HEX SOCKET), 1/8" MALE NPT
HW0000150	CLAMP, HOSE, NYLON, 1/4" K62 "AA" (VMI)
080650000	OPTION, OZONE AND PHOTOMETER, T750 *
009910100	CBL, GROUND STRAP, 4", RT/QC (PA)
047020100	ASSY, PUMP, PU63, 10" leads
046980000	BRACKET, PUMP MOUNT, OZONE SENSOR(KB)
PU0000063	PUMP, 12V DC BRUSHLESS
073210200	PCA, PRES/FLOW Board, 2-P 1-F (FREESCALE)
079200000	ASSY, PHOTOMETER INPUT LOOP
055220000	ASSY, VALVE W/CONN, VA 59
FT0000189	FERRULE, TEFZEL, 1/8" (KB)
FT0000190	NUT, DERLIN, 1/8" (KB)
VA0000059	VALVE, 3-WAY, 12VDC *
079210000	BRACKET, PHOTOMETER INPUT LOOP
079220000	ASSY, GPT CHAMBER, T750
080110000	MASK, PHOTOMETER INPUT LOOP
FT0000036	TEE-TTT, SS, 1/4" TUBE TO 1/4" TUBE TO 1/4" TUBE (KB)
FT0000056	TEE-TTT, SS, 1/8" TUBE TO 1/8" TUBE TO 1/8" TUBE (KB)
FT0000085	PORT CONNECTOR, SS, 1/4" TUBE TO 1/4" TUBE (KB)
FT0000134	BLKHD, SS, 1/4" TUBE TO 1/8" TUBE (KB)
FT0000321	PORT CONNECTOR, SS, 1/8" TUBE TO 1/8" TUBE
079270000	ASSY, OPTICAL BENCH, T750
005100000	RETAINER, TUBE, M400/E M700E/M703E (KB)
041200000	PCA, DET PREAMP w/OP20
04120000V	PCA, DET PREAMP, BENCH, M400E, 703E *
041240001	MANIFOLD, DETECTOR, (PA)
041270000	LAMP BLOCK, (KB)

## LIST, SPARE PARTS, T750U

(08206A, DCN7055)

Item number	Product name
041280000	LAMP SPACER, (KB)
041300000	EHXAUST MANIFOLD, (PA)
041440000	PCA, DC HTR/TEMP, BENCH
041660500	AKIT, PCA, UV LAMP P/S O3/CAL *
042010000	ASSY, SAMPLE THERMISTOR
003290000	THERMISTOR, BASIC (VENDOR ASSY)(PA)
047760000	ASSY, UV LAMP, BENCH, 400/700/703 *
047750000	LAMP, SOURCE, M400E/M703E, LOW MERCURY
049290000	CLIP, THERMISTOR HOLDER
055370000	DETECTOR COLLAR, PET VERSION(KB)
079520000	ABSORPTION TUBE, QUARTZ, T750
FT0000013	STRAIGHT, T, 1/8" TUBE TO 1/8" MALE NPT (KB)
FT0000191	TEE-TTM, B, 1/4" BARB TO 1/4" BARB TO 10-32 (KB)
FT0000279	HEX EXTENSION, B, 10-32 MALE TO 10-32 FEMALE (KB)
OP0000014	QUARTZ DISC .75 DIA X 1/16", (PA)
OP0000031	WINDOW, QUARTZ, 1/2" DIA, .063" THICK (PA)
OR0000026	ORING, 2-110 S604-70
OR0000039	ORING, 2-012V (PA)
OR0000089	ORING, 2-016V
079300200	ASSY, O3 GEN, W/PCB, T750U
FT0000332	ORIFICE, B, .009, 10-32 MALE TO 10-32 FEMALE (KB)
079510000	BRACKET, PHOTO MOUNT, T750
FT0000037	STRAIGHT, SS, 1/8" TUBE TO 1/8" TUBE (KB)
FT0000121	STRAIGHT, SS, 1/4" TUBE TO 1/8" TUBE (KB)
FT0000157	ELBOW, SS, 1/8" TUBE TO 1/8" TUBE (KB)
FT0000224	CAP, SS, 1/4" (KB)
079340000	MFC SUBPLATE, T750
081020000	DOM, w/SOFTWARE, T750
FT0000068	TUBE INSERT, SS, 1/4" (KB)
HW0000758	HOLE PLUG, 1-5/16" (FS)
HW0000760	BUSHING SPIL .250 PVC BLACK
HW0000761	BUSHING SPIL .218 PVC BLACK
HW0000766	PLUG, SQUARE, 1/2" CUT OUT
065720000	CBL, DIVERT VALVE RETROFIT, 700U/750U