



# EMS520 MANUAL VOLUME 3

## Rev 1.7 Transceiver/Retro, Maintenance, Off Stack Calibration



APRIL 12, 2017

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## LIMITED WARRANTY

*EMS warranty is found in the CD supplied with monitor shipment. If you cannot find it or you have misplaced it contact EMS at [sales@emsct.com](mailto:sales@emsct.com) and request the current Limited Warranty document.*

### WARNINGS AND SAFETY GUIDELINES

#### GUIDELINES FOR USER SAFETY AND EQUIPMENT PROTECTION

This manual is intended to aid trained and competent personnel in the installation of this equipment. Only a technician or engineer trained in the local and national electrical standards should perform tasks associated with the electrical wiring of this device.

#### WARNINGS

- Under no circumstances will Environmental Monitor Service, Inc. be liable or responsible for any consequential damage that may arise because of installation or use of this equipment.
- All examples and diagrams shown in the manual are intended to aid understanding. They do not guarantee operation.
- Environmental Monitor Service, Inc. accepts no responsibility for actual use of this product based on these examples.
- Due to the vast variety of possible applications for this equipment, the user must assess the suitability of this product for specific applications.
- Make sure to have safety procedures in place to stop any connected equipment in a safe manner if the controller should malfunction or become damaged for any reason.
- Do not replace electrical parts or try to repair this product in any way.
- Only qualified factory trained service personnel trained in its operation should open the device's housing or carry out repairs.
- The manufacturer is not responsible for problems resulting from improper or irresponsible use of this device.
- You may cause an electric shock, fire or damage the equipment if you ignore any of these safety precautions.

Before you ship equipment to our factory please call or email our Service Response Center at 1-800-864-2814 ext 14. When you call in, our Customer Service Representative will determine a course of action.

**E-mail: [techsupport@emsct.com](mailto:techsupport@emsct.com)**

### **CLAIMS FOR DAMAGED SHIPMENTS**

Inspect all instruments thoroughly on receipt. Check material in the container (s) against the enclosed packing list. If the contents are damaged and/or the instrument fails to operate properly, notify the carrier and Environmental Monitor Service immediately.

The following documents are necessary to support claims:

Original freight bill and bill of lading

Original invoice or photocopy of original invoice

Copy of packing list

Photographs of damaged equipment and container

You may want to keep a copy of these documents for your records also.

Refer to the instrument name/EMS number, serial number, sales order number, and your purchase order number on all claims. Upon receipt of a claim, we will advise you of the disposition of your equipment for repair or replacement.

### **SHIPPING DISCREPANCIES**

Check all containers against the packing list immediately on receipt. If a shortage or other discrepancy is found, notify the carrier and Environmental Monitor Service immediately. WE will not be responsible for shortages against the packing list unless they are reported promptly.

EMS will not be responsible for shortages against the packing list unless they are reported within 3 days of receiving of your shipment.

## SECTION 1 INSTALLATION CONSIDERATIONS

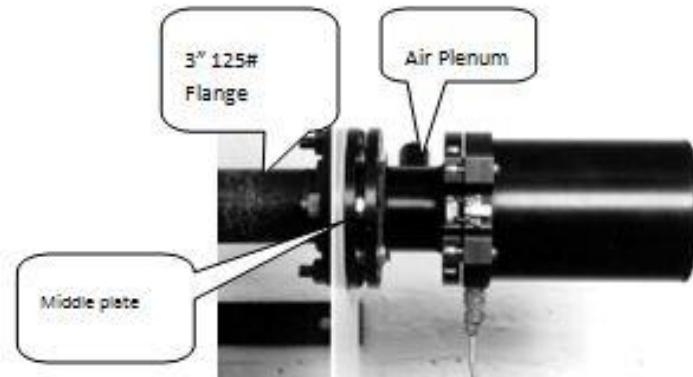
### BEFORE START UP

You must complete the following before start up is attempted.

- Check that all parts have the identical serial numbers.
- Measure and record flange -to-flange distance to verify it is the same as final check out sheet.
- If you are using a recorder, DAS, etc., **DO NOT CONNECT THEM NOW**. Outputs and inputs from other sources should be left off until system has been completely checked according to the following instructions. After system operation has been verified connect and test external connections.
- Read the instructions first to familiarize yourself with the instrument before attempting start up.
- The air purge and Weather cover system, Transceiver, Retro reflector, Service module must be installed and power applied.
- Control unit must be installed and wired to the service module and customers equipment as applicable.
- All wiring and mechanical installations must be complete per drawings provided in this manual. All wiring must be checked and power applied to both the control unit and the stack maintenance module.
- Beam Alignment procedure has been completed.

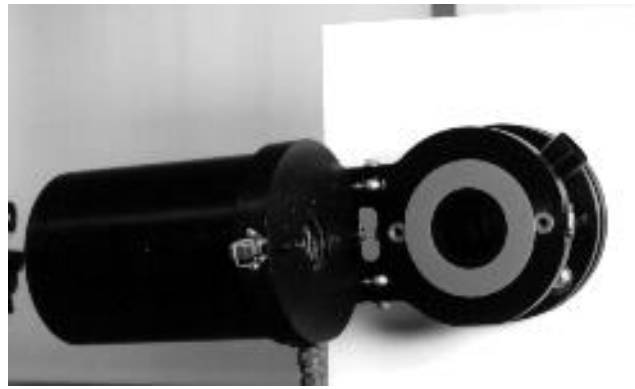
### **WARNING! CONTROL UNIT, TRANSCEIVER & RETRO SERIAL NUMBERS MUST MATCH.**

- 1) Before installing the Transceiver, Retro reflector or any type of weather cover remove the air plenum from both the Transceiver and retro reflector. Removal will make the installation easier and less chance of damage while mechanical attachment of the air plenums and optional weather covers when provided.
- 2) If the transceiver and retro reflector have been shipped from the factory with the air plenum attached, un-clip both hold down latches, swing open and lift up & off the hinge pins. Place the Transceiver and retro in a safe place.
- 3) The air plenum is attached to the customer supplied 3" pipe flange by four 2 1/2" long 5/8-11 bolts. Working from the 3" flange the correct assembly is; gasket then air plenum.
- 4) If you have weather covers remove the two (2)-weather cover hood hinge pins located on the upper right and left hand corner of the hood. The air plenum and weather cover are attached to the 3" pipe flange by four (4) 2 1/2" long 5/8-11 bolts. Working from the 3" flange the correct assembly is; gasket, weather cover mounting plate, gasket, mating flange & air plenum. Place the 5/8-11 bolt through the top hole of the middle plate. Place a flat washer between the middle plate and mating flange and pass the bolt through. Slip a split lock washer over the bolt and secure with a nut.  
Repeat for the remaining three mounting bolts.
- 5) Any wiring or air hoses can be connected now.



## TRANSCEIVER AND RETRO REFLECTOR ASSEMBLY

- 6) Attach the Transceiver and Retro reflector to the air plenum assembly by placing them on the hinge pins.
- 7) Close transceiver & retro and secure in place with the two hold down latches.
- 8) The air-purge blowers should be powered up at this time to prevent stack particulate from accumulating in the nipple and air-purge housing.



**Caution:** If installed location has a positive pressure the air-purge system must be used continuously during installation to prevent process gases from contaminating optical surfaces or over heating instrument electronics. If the system is shut off for more than momentary interruptions, the instrument may be damaged. Failure to provide continuous air-purge may void the warranty.

All wiring from the control unit to the transceiver should be completed at this time.

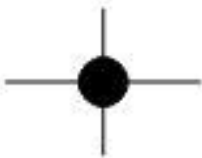
**NOTE: THE AIR PLENUM ASSEMBLY FOR BOTH TRANSCEIVER AND RETRO MUST BE INSTALLED AS BELOW, I.E. THE PINS ON THE LEFT SIDE POINTING UP!**



## BEAM ALIGNMENT PROCEDURE

Note: Alignment cannot be done unless the power is applied to the stack mounted service module. The control unit does not have to be connected or powered. For alignment accuracy, the stack should be at normal temperature.

- 9) If not already on, turn on the power to all air purge systems and service module.
- 10) Align the Reflector mating flange so it is plumb and parallel to the 3" 150# mounting flange. Use the 3 adjusting nuts on the air purge plenum flange until this is accomplished. The adjusting nuts have nylon locking inserts to prevent loosening by vibration.
- 11) Move to the Transceiver, and determine monitor alignment by looking through the viewing port located on the rear of the transceiver and observing whether the beam image is in the center of the cross hair (bulls-eye).

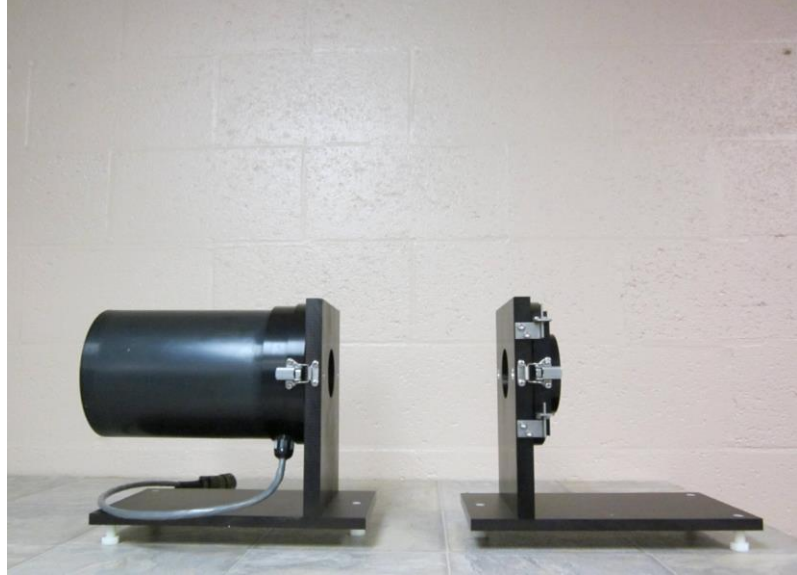




## SECTION 3 OFF STACK ZERO CALIBRATION







This procedure may be used if: A clear stack condition is not possible and the zero appears to be incorrect or if the flange to flange distance on site are different than the original factory set up.

1. Remove the transceiver and retro reflector from the hinge pins, remove the service module and install the system on E.M.S. Opacity portable off stack test stands (**p/n 2788**) and at the correct flange to flange distance plus 11 inches. The additional 11 inches compensates for air plenum spacing, as the air plenums are not used for the off stack zero calibration. This measurement is referred to as "plenum to plenum measurement".
2. Clean transceiver and retro windows.
3. Clean Transceiver and Retro front lenses
4. Install Transceiver and Retro on their respective stands. Connect all the system components and apply power.
5. Align the Transceiver



6. Follow instruction for "Clear stack calibration" found in Vol 6. Section 3 SSM manual.
7. If "routine Clear stack calibration" had to be performed proceed to cal zero reflector adjustment.

## ROUTINE CLEAR PATH ADJUSTMENT

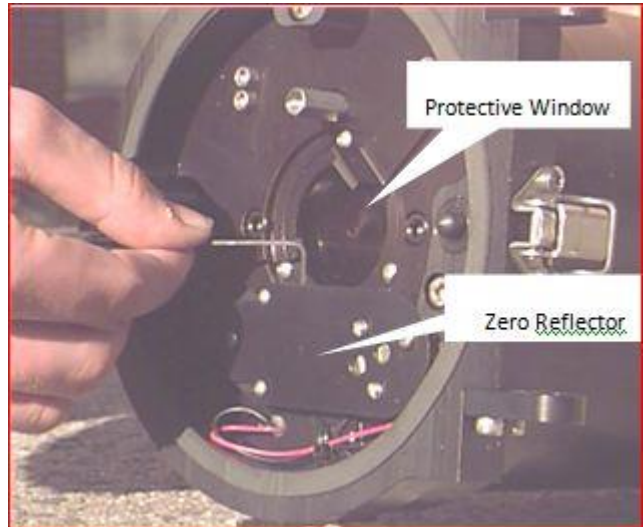
<ul style="list-style-type: none"> <li>• clear condition across the monitor path length is needed before adjustments can be made.</li> <li>• Navigate to the setup screen, when asked for password enter 5566</li> </ul>	
<ul style="list-style-type: none"> <li>• Scroll down to "clear value, span value page" and press  to input clear value percentage.</li> <li>• Once desired clear stack value is entered, press  to store value.</li> </ul>	
<ul style="list-style-type: none"> <li>• Clear stack procedure is now complete</li> <li>• press  to return to main display screen</li> <li>• Note: it is common to have to adjust cal zero iris after clear stack procedure is performed. Refer to zero reflector adjustment procedure. EMS Vol. 4 section 6</li> </ul>	

Environmental Monitor Service, Inc. is available to assist you, call our service department at (203) 935-0102 or Email: [techsupport@emsct.com](mailto:techsupport@emsct.com) for details and to schedule start up.

## CAL ZERO REFLECTOR ADJUSTMENT

After a clear or off stack zero has been performed the cal zero reflector needs to be adjusted.

1. Find and record the zero offset value found in the Tech Setup, Tech Setup Screen 1, "Zero Cal Value".
2. On the SSM observe the correlated opacity on the digital display.
3. Swing open the transceiver.
4. Initiate a zero with the F1 button on the SSM to raise the zero reflector into place. Observe and record the zero value after 30 seconds. Press the F1 button until the zero reflector returns to its resting position.
5. If required, insert a 1/16" Allen wrench into the adjustment set screw located on the top of the zero reflector. Turn the set screw clock-wise 1/8 turn.
6. Remove the Allen wrench and initiate a zero (step 4) and after 15 seconds observe the reading is moving toward the desired value. (If value is away from desired repeat step 4 turn set screw C.C.W.)
7. Repeat steps 4 -6 each time making small 1/8-turn increments until the desired value is reached. Cycle 2-3 times more waiting 15 to 20 seconds between cycles to assure unit repeats desired value +/- 0.5% Opacity. Swing transceiver into operate position and secure in place. Record the zero final value.



## SECTION 4 MICRO-TURN AUDIT KIT

### USING THE ON LINE ZERO REFLECTOR (OPTION)

The "Micro-turn" 200 on - line test and audit system P/N 1232 may be used for:

- Opacity audit
- Linearity checks and adjustments
- System accuracy verification
- Service on line or off stack

The "Micro-turn" 200 on - line test and audit system P/N 1232 contains a test reflector, three neutral density filters, filter certification certificates and carrying case. The Micro-turn 200 on-line test reflector is inserted over the transceiver lens.



### FILTER CERTIFICATION

QA/QC testing by EMS of the filters at an interval of not more than 6 months is recommended. Filter certification, replacement or additional Neutral Density Filters are available from EMS.

EMS Neutral Density Filters for Micro-turn 200 are calibrated on a Perkin-Elmer Lambda Series 6 / PECSS Spectrophotometer per Federal Environmental Protection Agency specifications. These specifications are contained in the Code of Federal Regulations 40 CFR 60, Appendix B, Performance Specification 1, Attenuator Calibration. The filters are scanned over the visible region from 380 to 780 nanometers in one nanometer steps and the resulting transmittances of the filter are weighted to the Source C Human Eye Response by multiplying each value by its associated response factor. The corrected values of transmittance are converted to % Opacity and the value is recorded on the filter and associated chart.

PREVENTIVE/CORRECTIVE MAINTENANCE SCHEDULE

**Daily:**

Check Zero/Span marks are within specification (+/- 2%)

Check for fault conditions

**Monthly or as required:**

Clean transceiver and retro windows

Check alignment, correct if necessary

Check air filters replace if necessary

**Quarterly:**

All daily and monthly checks

Perform COM Audit per EPA regulation 40 CFR, 60 App. B, PS-1.

Replace air filters

Check all air hoses and clamps for tightness and wear, correct as necessary

Check weather cover gaskets for leakage

Check all bolts for tightness

Check all electrical connections are secure

Check air blower for excessive noise

Assure that airflow switch is operating properly

**Yearly:**

Clear stack or off stack zero

All quarterly checks

Remove transceiver and retro, clean air plenum

Replace any worn hoses and gaskets

Clean inner optics if necessary

Check all system operations

**General**

Corrective and preventive maintenance schedules should be adjusted according to site specific conditions to ensure the maximum availability of accurate measurement data. Routine checks should be implemented to:

Observe and correct the operation of the air-purge system giving particular attention to keeping the optical path within the mounting flanges clear of dirt build-up.

Observe and correct the operation of peripheral accessory equipment such as recorders, computers, etc.

Observe and correct the stack zero measurement whenever a clear stack condition exists. Care should be exercised to ensure that both transmittance and opacity measurements are at their prescribed values.

Verify that instrument operating manuals are available and that maintenance logs are properly maintained and reviewed.

**Every 3-5 Years:**

EMS recommends periodical, depending on the severity of the sensor locations 3-5 years between overhaul of our opacity system to keep them working at their optimal level. Overhauls become necessary do to the fact that over time dust, out gassing of electronic parts, removing protective covers, etc., manifest itself as overall optics degradation causing more frequent adjustments and poor performance of the opacity monitor.

To schedule call EMS service department 203.935.0102 ext 14 or email; [techsupport@emsct.com](mailto:techsupport@emsct.com)

## SECTION 6 SPARE PARTS

CONTACT THE FACTORY FOR RECOMMENDATIONS. EMAIL: [techsupport@emsct.com](mailto:techsupport@emsct.com). PH. 203-935-0102 EXT14.

### Digital systems Recommended Spare Parts 08/31/17

**Startup of new system Recommended spare.**

Serial numbers are required to insure order is correct.

Contact EMS for a customized quote for your facility.

	P/N	DESCRIPTION
<b>1</b>		<b>All system</b>
1 per 4 inst. Or 1 per plant	3107	LED XT DP Source Assembly, serial number dependent.
1 per 4 inst. Or 1 per plant	1466	Transceiver/Retro reflector latch, spring & gasket repair kit.
1 per 4 inst. Or 1 per plant	2684	24VDC, 25W, 1A Output Din-Rail Mount Power Supply.
<b>2</b>		<b>Recommended spares PS-1 and Procedure 3 requirements.</b>
10 per 4 inst. Or 1 per plant	3193	SSM520 Assembly
11 per 4 inst. Or 1 per plant	2788	Opacity Portable off stack zero test kit.
12 per 4 inst. Or 1 per plant	3195	Zero reflector 19.8mm iris assembly with rotary solenoid, reflector tape and zero arm for Opacity Transceiver.
13 per 4 inst. Or 1 per plant	2935	Spare Retro Assembly Drop on pin type 3-15Ft. With aperture kit.