



**TELEDYNE
INSTRUMENTS**

Advanced Pollution Instrumentation

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Service Note

94-007
2 May, 2007

M400 3 POINT IZS PROM RETROFIT INSTRUCTIONS PROM 410B9C03.0-0

TOOLS REQUIRED:

- #2 Cross Point Screwdriver
- #2 Bladed Screwdriver

PROCEDURE:

Remove the cover to the Analyzer. Remove the V to F/CPU assembly by loosening the captive screw. Tilt the V to F/CPU assembly and remove the existing prom (See attached.) Replace with a new prom. Now reseal the V to F/CPU assembly and retighten the captive screw.

CALIBRATION:

1. Please follow the Quick Cal Procedure to verify operation of the M400. (See attached.)
2. Analyzer is now ready for normal operation.
3. Replace old addendum with the new addendum (attached).

QUICK CALIBRATION - MODEL 400

NOTE: IF YOU HAVE THE IZS OPTION, YOU MUST CONNECT A SOURCE OF DRY AIR TO BOTTOM OF CHARCOAL CANISTER!

1. PLACE DVM ON RECORDER OUTPUT (IF ON 0-5V RANGE). WATT 25 MINUTES AFTER POWER ON.
2. SET O₃ REFERENCE TO 4,500MV +50MV. USE R7 ON OPTICAL BENCH DETECTOR PREAMP ASSY.
3. CALIBRATE A-D AND D-A CONVERTERS.
PRESS "SETUP", "MISC", "D/A", "CAL"
DISPLAY READS DAC #0:60mV WHEN IN 0-5V RANGE. IF ON 0-IV SETTING, DISPLAY READS #0:10mV PRESS UNDER "UP" OR "DOWN" UNTIL DVM READS 60mV ± 2mV OR 10mV +.5mV IF 0-IV SELECTED.
4. PRESS "ENTER".
DISPLAY READS DAC #0=4500MV OR DAC #0:1080mV IN 0-IV RANGE. PRESS UNDER "UP" OR "DOWN" UNTIL DVM READS 4500mV ± 2mV OR 1080mv +1mv.
5. PRESS "ENTER".
DISPLAY READS ZR:60=57mV OR ZR:10 = 10mV IN 0-IV RANGE.* ADJUST R27 ON V-F BOARD UNTIL DISPLAY READS ZR: 60=60mV OR ZR:10 = 10mV IN 0-IV RANGE.
6. PRESS "ENTER".
DISPLAY READS GN:4500 = 4495 OR GN:1080 = 1084 IN 0-IV RANGE.* ADJUST R31 ON V-F BOARD UNTIL DISPLAY READS GN:4500 = 4500mV
OR GN:1080 1080mV.

*AS AN EXAMPLE VARIABLE CHANGES WITH ADJUSTMENT

QUICK CALIBRATION - MODEL 400

7. PRESS "ENTER".
ANALYZER GOES THRU AND CALIBRATES ALL DACS AUTOMATICALLY.
8. PRESS "EXIT" 1 TIME.
9. SET UP DARK CURRENT.
 - A. PRESS "DARK" "CAL". ANALYZER WILL GO THRU AN AUTOMATIC CALIBRATION OF THE DARK CURRENT.
 - B. AFTER CAL IS COMPLETE, PRESS "VIEW" AND CONFIRM DARK OFFSET IS $125\text{mV} \pm 50\text{mV}$.
 - C. PRESS "EXIT" 4 TIMES.
10. ATTACH ZERO SCRUBBER TO EXHAUST PORT FITTING.
11. CALIBRATE INSTRUMENT AT SPAN.
 - A. INPUT GAS TO INSTRUMENT AT VALVE ON REAR PANEL.
 - B. PRESS "SETUP", "IZSC", AND ENTER PASSWORD. PRESS "SPAN" AND ENTER SPAN GAS VALUE.
 - C. PRESS "ENTER" AND "EXIT" 2 TIMES.
 - D. SELECT TEST FUNCTION "O3 MEASURE".
 - E. INPUT SPAN GAS AND ALLOW TO STABILIZE 5 MINUTES.
 - F. PRESS "CALM" AND ENTER PASSWORD.
 - G. PRESS "SPAN" AND "ENTER".
 - H. PRESS "EXIT" 2 TIMES.
 - I. PRESS "SETUP", "MISC", 11 03", "SLOPE" TO READ SLOPE.

THE SLOPE SHOULD BE .9 TO 1.1.

QUICK CALIBRATION - MODEL 400

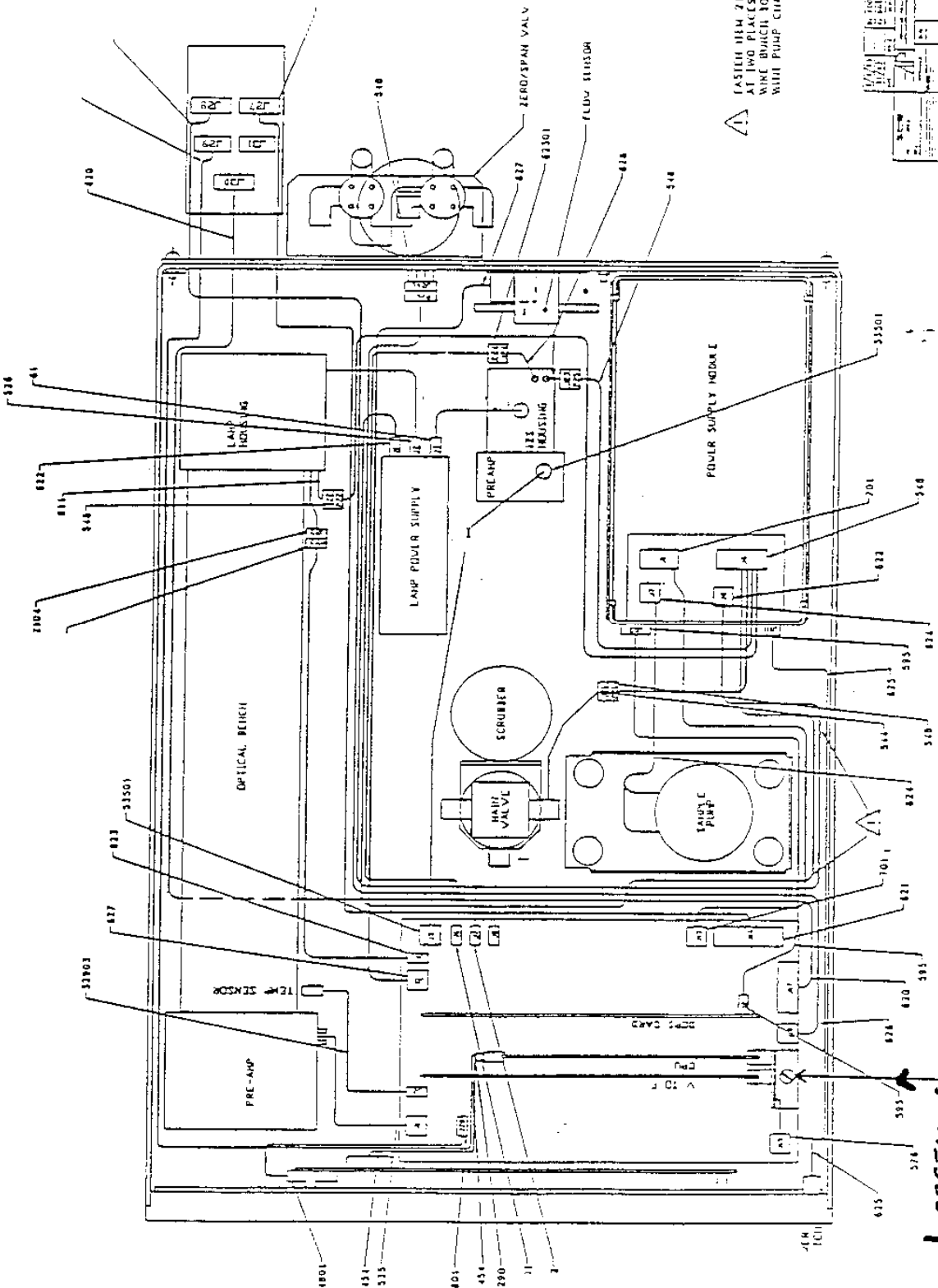
12. CAL INST. AT ZERO.
 - A. INPUT ZERO AIR.
 - B. ALLOW UNIT TO STABILIZE FOR 5 MINUTES.
 - C. PRESS "CALM" AND ENTER PASSWORD.
 - D. PRESS "ZERO" AND "ENTER".
 - E. PRESS "EXIT" TWICE.
 - F. TO SEE OFFSET, PRESS "SETUP" "MISC", "03", "OFFSET".
OFFSET WILL BE DISPLAYED. THE OFFSET SHOULD BE 0
±10 PRESS "EXIT" 4 TIMES.

 13. IZS REF ADJ. (IF UNIT DOESN'T HAVE IZS FEEDBACK, SKIP TO STEP 14).
 - A. SELECT TEST FUNCTION "IZS REF=XXXXMV".
 - B. PRESS "SETUP", "MISC", "11 03", "GEN", AND ENTER PASSWORD.
 - C. PRESS "ADJ" AND ALLOW 03 GEN TO STABILIZE FOR 15 MINUTES.
 - D. LOOSEN UV LAMP HOLD-DOWN SCREWS AND ADJUST THE IZS LAMP BY TURNING IT UNTIL THE IZS REF IS $2,500\text{mV} \pm 100\text{mV}$. RETIGHTEN IZS LAMP SCREWS.
 - E. IF NECESSARY, ADJ. R7 OF FEEDBACK DETECTOR ON IZS TOWER UNTIL
IZS REF = $2,500\text{MV} \pm 25\text{mV}$.
 - F. PRESS "EXIT" 5 TIMES.
- NOTE: USE THE LAMP ROTATION AS A COARSE ADJUSTMENT AND THE POT AS A FINE ADJUSTMENT.

QUICK CALIBRATION - MODEL 400

14. CAL IZS

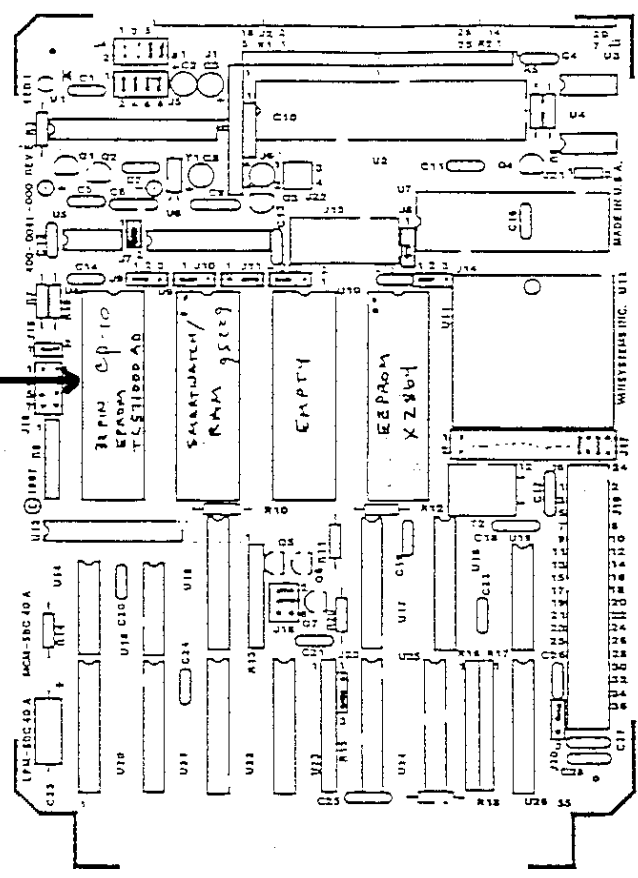
- A. PRESS "SETUP", "MISC", "03", "GEN", AND ENTER PASSWORD
- B. PRESS "CONC" AND ENTER 400
- C. PRESS "EXIT" 4 TIMES
- D. PRESS "CAL-S" AND ENTER PASSWORD
- E. ALLOW TO STABILIZE 15 MINUTES OR UNTIL DRAWING STRAIGHT LINES.
- F. PRESS EXIT TWICE
- G. PRESS "SETUP", "MISC", "03", "GEN", AND ENTER PASSWORD
- H. PRESS "CAL"
- I. AFTER APPROX. 1 HR, CALIBRATION WILL END. PRESS "EXIT" 4 TIMES
- J. PRESS "CAL" AND ENTER PASSWORD. AFTER 10-15 MINUTES, UNIT SHOULD STABILIZE AND 03 OUTPUT SHOULD BE STABLE.



FASTEN ITEM 21 TO CHASSIS WALL AT TWO PLACES WITH CABLE DE WIRE BRIDGE TO PREVENT CONTACT WITH PUMP CHASSIS.

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Remove & Replace



OPERATOR'S MANUAL ADDENDUM

MODEL 400 PHOTOMETRIC OZONE ANALYZER WITH ONE PRECISION POINT AND ONE SPAN POINT IZS

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NOTE: THIS MODEL 400 MANUAL ADDENDUM IS USED IN CONJUNCTION WITH THE
MODEL 400 MANUAL.

8 / 1 0 / 9 4

1.0 GENERAL DESCRIPTION.

THE API MODEL 400 PHOTOMETRIC OZONE ANALYZER WITH IZS OPTION IS MODIFIED TO ENABLE ONE: ZERO AND TWO SPAN POINT CALIBRATION AUTOMATICALLY ON TIMED BASIS, THROUGH REMOTE RS-232 OPERATION, OR EXTERNAL CONTACT CLOSURE.

THE MODEL 400 03 ANALYZER IS MODIFIED AS FOLLOWINGS:

1. MODIFIED THE SETUP-IZSC MENU BY REPLACING THE MENU CHOICES OF WAIT, TIME, AUTO, DYN, SPAN, SHFT, AND IZS WITH THE CHOICES OF IZS, WAIT, SPAN, DYN, SEQ1, SEQ2, AND SEQ3. THE TIME, AUTO, AND SHFT FUNCTIONS ARE-MERGED INTO SEQ1, SEQ2, AND SEQ3 TO DEFINE THE AUTO-CAL SEQUENCES.

2. THERE ARE THREE SEPARATE AUTO-CALIBRATION SEQUENCES CALLED SEQ1, SEQ2, AND SEQ3. EACH SEQUENCE CAN GENERATE ANY ONE OF SEVEN DIFFERENT COMBINATIONS OF ZERO, LOW(25 * OF CONCENTRATION UNDER SETUP-IZSC-SPAN MEM), OR HIGH(100 %) SPAN POINT.

COMBINATIONS: 1)DISABLED
 2)ZERO
 3)ZERO-LO
 4)ZERO-HI
 5)ZERO-LO-HI
 6)LO
 7)HI
 8)LO-HI

2.0 OPERATION.

THE ZERO AND TWO SPAN POINT CALIBRATION CAN BE INITIATED AUTOMATICALLY ON A TIMED BASIS, REMOTE RS-232 OPERATION, OR EXTERNAL CONTACT CLOSURE.

2.1 AUTO-CALIBRATION ON A TIMED BASIS.

WITHIN EACH SETUP-IZSC-SEQX MENU, THERE ARE FIVE SETTINGS:

- 1) THE AUTO-CAL MODE(ENABLE- OR DISABLE).
- 2) THE STARTING DATE.
- 3) THE STARING TIME OF DAY.
- 4) THE NUMBER OF DAYS BETWEEN EACH AUTO-CAL SEQUENCE;(0-365 DAYS)
- 5) THE -NUMBER OF HOURS AND MINUTES BETWEEN EACH AUTO-CAL SEQUENCE;(00:00-23:59)

NOTE: THE PROGRAMMED START TIME MUST BE A MINIMUM OF 5 MINUTES LATER THAN THE REAL TIME CLOCK.

EXAMPLES OF POSSIBLE SEQUENCES ARE AS FOLLOWING UNDER ANY ONE OF THREE AVAILABLE SEQX.

EXAMPLE 1: TO PERFORM ZERO-SPAN(100 %) CALIBRATION ONCE PER DAY AT 10:30 PM, 12/20/93.

- 1)MODE: ZERO-HI
- 2)STARTING DATE: 12/20/93
- 3)STARTING TIME: 22:30
- 4)DELTA DAYS: 1
- 5)DELAY: 00:00

EXAMPLE 2: TO PERFORM ZERO-LOW SPAN CALIBRATION ONCE PER DAY RETARDING 15 MINUTES EVERYDAY STARTING AT 11:30 PM, 12/20/93.

- 1)MODE: ZERO-LO
- 2)STARTING DATE: 12/20/93
- 3)STARTING TIME: 23:30
- 4)DELTA DAYS: 0
- 5)DELAY: 23:45

EXAMPLE 3: TO PERFORM ZERO-LOW-HIGH SPAN CALIBRATION ONCE PER WEEK STARTING AT 11:30 PM, 12/20/93

- 1)MODE: ZERO-LO-H!
- 2)STARTING DATE: 12/20/93
- 3)STARTING TIME: 23:30
- 4)DELTA DAYS: 7
- 5)DELAY: 00:00

EXAMPLE 4: TO PERFORM ZERO-SPAN ONCE PER DAY AT 10:30 PM AND ZERO-LOW-HIGH SPAN ONCE PER WEEK STARTING AT 11:30 PM, 12/20/93.

- 1)SELECT ANY *ONE* OF SEQX AND PROGRAM AS EXAMPLE 1.
- 2)SELECT ANY OTHER SEQX AND PROGRAM AS EXAMPLE 3. AVOID SETTING TWO OR MORE SEQUENCES AT THE SAME TIME OF THE DAY.

NOTE: ANY NEW SEQUENCE WHICH IS INITIATED WHETHER FROM A TIMER, THE RS-232, OR THE CONTACT CLOSURE INPUTS WILL OVERRIDE @ SEQUENCE WHICH IS IN PROGRESS.

2.2 REMOTE RS-232 OPERATION.

THE COMMAND "C ASEQ x", WHERE x IS 1, 2, OR 3, WILL INITIATE ANY ONE OF CORRESPONDING AUTO-CALIBRATION SEQUENCE IF IT IS PROGRAMMED AND ENABLED.

2.3 EXTERNAL CONTACT CLOSURE.

IF POSITIVE TRANSITION OCCURS ON EXT-ZERO-CAL, THE CPU WILL INITIATE THE ZERO CALIBRATION. LIKEWISE EXT-SPAN-CAL WILL INITIATE THE SPAN(HIGH) CALIBRATION. IF BOTH EXT - ZERO - CAL AND EXT-SPAN-CAL ARE ON POSITIVE TRANSITION SIMULTANEOUSLY, THEN IT WILL INITIATE THE LOW(25 %) SPAN POINT CALIBRATION. THE EXTERNAL CONTACT CLOSURE SHOULD BE CLOSED FOR AT LEAST 1 SECOND.

NOTE: THE MODIFIED MODEL 400 WILL OPERATE THE SAME AS A STANDARD M400 AND SUPPORTED THE SAME FOR 0 - 10 PPM OPERATION AND IS DESCRIBED IN THE STANDARD M400 MANUAL.