

ADDENDUM

EPA CALIBRATION OF TURBIDITY INSTRUMENT

1. (Cont'd)

rotate cuvette to obtain an average reading. Set instrument to the correct NTU value of the standard and mark the cuvette and instrument so that orientation of the cuvette will be identical each time it is placed in the instrument.

2. Rinse and fill each additional cuvette to be matched with the same standard and rotate in the Nephelometer to obtain the correct NTU value of the standard and mark the cuvette as above.

3. If commercially available sealed liquid turbidity standards are used, they too may need to be matched to the cuvettes and standard as in 1 and 2 above. In some cases it may be necessary to match the instrument sample cuvette to the sealed cuvette, particularly when the optical properties of the cuvettes are different.

OPERATING INSTRUCTIONS

DRT-15

SERIES "A"

PORTABLE BATTERY OPERATED

TURBIDIMETER

H. F. INSTRUMENTS

ISSUE JULY, 1981

DRT-15 TURBIDIMETER
OPERATING INSTRUCTIONS

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EPA CALIBRATION OF TURBIDITY INSTRUMENT

It has come to our attention that some field measurements of turbidity for compliance with the Safe Drinking Water Act are being made without proper calibration of the Nephelometric instrument. Turbidity methodology in the EPA manual "Methods for Chemical Analysis of Water and Wastes" and "Standard Methods for the Examination of Water and Wastewater" direct the analyst to calibrate with a Formazin suspension or its approved equivalent with at least one standard on each instrument range used. This calibration should be performed each time turbidity measurements are made.

A problem has also been reported with the use of unmatched sample tubes (cuvettes). To avoid this problem, instrument calibration and sample measurements should be made in the same cuvette oriented in the Nephelometer instrument in the same relative position, or the cells used should be matched. Scratched or "fogged" cuvettes should be discarded and replaced with new cuvettes supplied by the appropriate instrument manufacturer. Cuvettes should be rematched on a regular basis following the procedure given below:

1. Rinse twice and fill a clean, dry, scratch-free cuvette with a turbidity standard of 1 NTU or less and place it in the Nephelometer with the instrument on the appropriate scale,

8. SPARE PARTS

	<u>CAT. NO.</u>	<u>DESCRIPTION</u>
(a)	50002	Reference Standard
(b)	50050	Cuvet
(c)	50009	Light Shield
(d)	70735	Source Lamp Assembly
(e)	21022	Photodiode
(f)	50105	Range Switch Knob
(g)	20710	Range Switch
(h)	50104	Reference Adjust Knob
(i)	20702	Reference Adjust Helipot
(j)	20749	Meter (modified)
(k)	21040	Optical Block Assembly
(l)	50046	P.C. Board Complete
(m)	20768	Charger Plug
(n)	70006	Battery
(o)	70048	Battery Charger
(p)	21120	Leather Case
(q)	20212	LED (battery indicator)
(r)	50015	Instruction Manual

Rev. 10/16/79

1. SPECIFICATIONS DRT-15

Ranges NTU (FTU, JTU)	4 Ranges 0-1, 0-10, 0-100, 0-200
Linearity	± 1% of Full Scale
Precision (Repeatability)	± 1% of Full Scale
Sensitivity	0.02 NTU change
Response	Virtually immediate in all ranges.
Power Supply	- 6 Volt Battery 2.6 amp. hours - 115V/60Hz Battery Charger supplied with unit for bat- tery charging or AC operation.
Controls	- Combination Rotary Switch for:- - Off - Range Selection - Reference Adjust, 10 Turn. - "Low Battery" Light goes on when bat- tery requires re- charging.
Reference Standard	- 0.12 FTU (Nominal)

1. SPECIFICATIONS DRT-15 (CONT'D)

Dimensions - 8.5" x 6" x 6.25"
(21.6cm) x (15.2cm)
x (15.9cm)

Weight - 5.25 lbs. (2.4 kilos)

2. PACKING LIST OF CONTENTS

<u>QUANTITY</u>	<u>CAT. #</u>	<u>DESCRIPTION</u>
1	50015	Instruction Manual
1	50002	Reference Standard 0.12 FTU (Nominal)
1	70048	Battery Charger suitable for 115V 60HZ
2	50050	Cuvets complete with screw top.
1	50009	Light Shield (Hood)
1	70006	Battery (Installed)

3. PRE-OPERATION CHECK OUT

- A. Extreme care should be taken when handling the reference standard or sample cuvetts as surface scratches or finger smudges will cause analysis errors. Handle these items by the top only.
- B. Check the mechanical meter zero when the instrument is off. Adjust only if necessary by means of the black screw on the meter face.

6. TROUBLE SHOOTING (CONT'D)Possible Cause (Cont'd)

Cold sample causes condensation on the container which effects the light reading being received by the detectors.

Unit has not been given sufficient time to stabilize at ambient temperature conditions after a change of temperature.

7. MAINTENANCE

The DRT-15 is not designed for field servicing. It should be returned to your local distributor or to H.F. Instruments for any service requirements. The exceptions are Battery Replacement. This can be done in the field provided the new Battery is hooked up in the same manner as the Battery being replaced. When a Source Lamp is replaced it must be realigned and should be done by an experienced Service Representative.

If the User wishes to carry out his own service a separate Service Instruction Bulletin is available from H.F. Instruments for this purpose.

4. OPERATION AND DESCRIPTION (CONT'D)

Standard value on the scale. The unit is now ready for use in all ranges.

The EPA Newsletter of January 1979 includes an updated method to be used for calibration of Turbidity Instruments. This refers to measurement of water samples where compliance with the "Safe Drinking Water Act" is required. This information is reprinted in the addendum section of these instructions.

To make a measurement of a water sample, clean one of the cuvetts and fill to within approximately ½" of top with the water sample. Place the top on the cuvet and carefully clean the outside surface of the cuvet, with a lint free wiper such as Kimwipes. Then place in the well with the rotary switch in the 200 range and place the light shield over the well. If the reading is below 1 then switch to an appropriate lower range for best readability.

If the instrument has been subjected to cold (below 10°C) and then brought indoors it should be allowed to warm up before use, since condensation may form on the various lenses. This can be aided by leaving the case open and the instrument on for approximately a half hour.

5. CALIBRATION PROCEDURES (CONT'D)

Check Steps 2, 3, 7 & 8 and re-adjust, if necessary.

NOTE: -- reference standards and sample cuvetts must be kept clean and free of scratches.
-- light shield should be in place at all times except when changing cuvetts.

The chassis can now be slid down into its position in the case and refastened to the case using the bottom screw.

NOTE: -- due to the linearity of the instrument, when it has been calibrated as outlined above the 200 range will be accurate.

6. TROUBLE SHOOTING

The following covers a list of Symptoms and Possible Causes.

Symptom

Meter does not respond when a sample is set into the well.

Possible Cause

Lamp is burnt out, lamp should be replaced and realigned.

Printed Circuit Board faulty. Replace Printed Circuit Board or I C Chip on Printed Circuit Board.

6. TROUBLE SHOOTING (CONT'D)Possible Cause (Cont'd)

In both of the above cases the instrument should be recalibrated. The lamp is an exceedingly long life lamp and therefore should only have to be replaced very infrequently.

Symptom

Reference Adjust Knob does not have enough run to adjust for the Reference Standard value.

Possible Cause

Scratched or rubbed Reference Standard Container or aged Reference Standard. Replace the Standard.

Faulty Printed Circuit Board, replace the Board and recalibrate.

Symptom

The needle will not stabilize when the Reference Standard is in the well.

Possible Cause

Light Shield is incorrectly placed over the well.

Battery has lost its charge. Low battery light is ON when battery requires recharging. When the battery is discharged the voltage will drop off causing the meter pointer to drift in one direction.

3. PRE-OPERATION CHECK OUT (CONT'D)

- C. Turn the rotary switch on to any range position in order to observe the condition of the battery. When sufficiently charged the red low battery light will be OFF. If the light is ON the battery should be charged over night before using the instrument on battery.

The battery when new usually requires, several cycles of discharging and recharging in order to obtain optimum rated life between charges.

The instrument may be used as a line operated unit while the battery charger is plugged in.

The turbidimeter provides up to 4½ hours of intermittent operation as a portable battery operated unit between recharges. (Approx. 3½ hours continuous).

This unit does not require any warm up time before taking readings. We recommend turning it off between readings in order to obtain longer battery life between recharges.

4. OPERATION AND DESCRIPTION

To operate the turbidimeter, switch to the 1 range and place the Reference Standard (0.12 FTU) in the well. With the light shield in place over the well adjust the "reference adjust" knob to cause the meter to read the Reference

5. CALIBRATION PROCEDURES (CONT'D)

The following steps for calibrating MUST be performed in the indicated sequence to avoid excessive interaction between adjustments:

STEPS	RANGE	REFERENCE STANDARD IN WELL	PROCEDURES
1	"OFF" 100	----	-- set meter to "0" (mechanically). -- focus and align light source.
2	100	100 NTU	-- adjust 100 trim-pot to give full scale reading.
3	10	10 NTU	-- adjust 10 trim-pot to give full scale reading.
4	1	0.12 NTU	-- 1 trimpot at mid point.
5	1	0.12 NTU	-- reference adjust at mid point (5 turns from either extreme).
6	1	0.12 NTU	-- adjust "coarse 0" trimpot to give reading of 0.12 approximately.
7	1	0.12 NTU	-- adjust "ref. adj." to give reading of 0.
8	1	1.0 NTU	-- adjust 1 trimpot to give full scale reading.

4. OPERATION AND DESCRIPTION (CONT'D)CRITICAL MEASURING AREA

The critical measuring area of the sample containers is the 3/4" wide band starting 5/8" above the bottom. Keep this area clean and free of scratches or abrasion. Handle by the top part only. (See Figure 1)

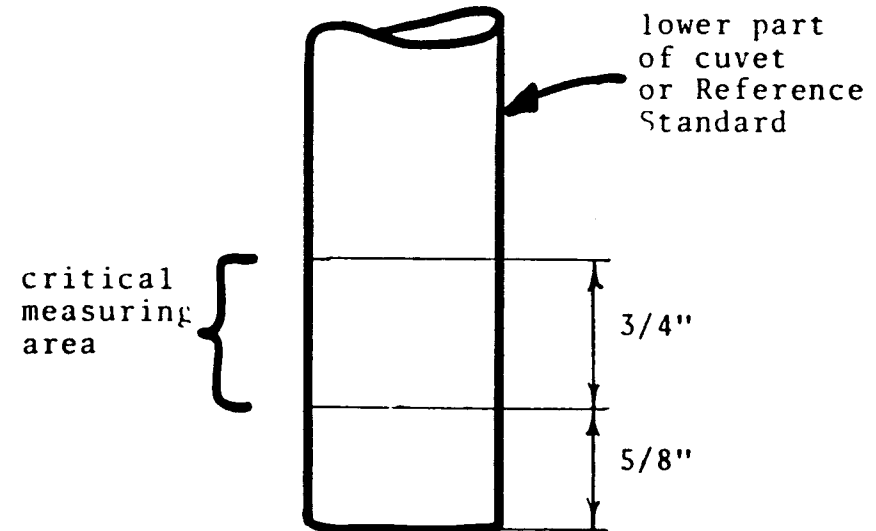


FIGURE 1
DRT-15

5. CALIBRATION PROCEDURES

The DRT turbidimeters have been carefully calibrated at the factory and normally do not require recalibration. However, if a lamp or other component is replaced or for some other reason a recalibration is desired this can be accomplished as follows:

The following carefully prepared Formazin or equivalent standards are required in 3 standard screw top cuvetts.

100 FTU, 10 FTU, and 1 FTU nominal values with the actual value clearly marked on the top.

Remove the chassis from the leather case so that the calibration trim pots can be adjusted with a small screw driver.

To remove the chassis, first remove the screw from the bottom (underside) of the leather case. The chassis can then be lifted out of the case.

When the chassis has been lifted out of the case (refer to Figure 2) you will see three trim pots grouped together and the fourth by itself. The three grouped together are reading from the top 1, 10, 100 ranges and the one by itself on the bottom is the 0 trim pot.

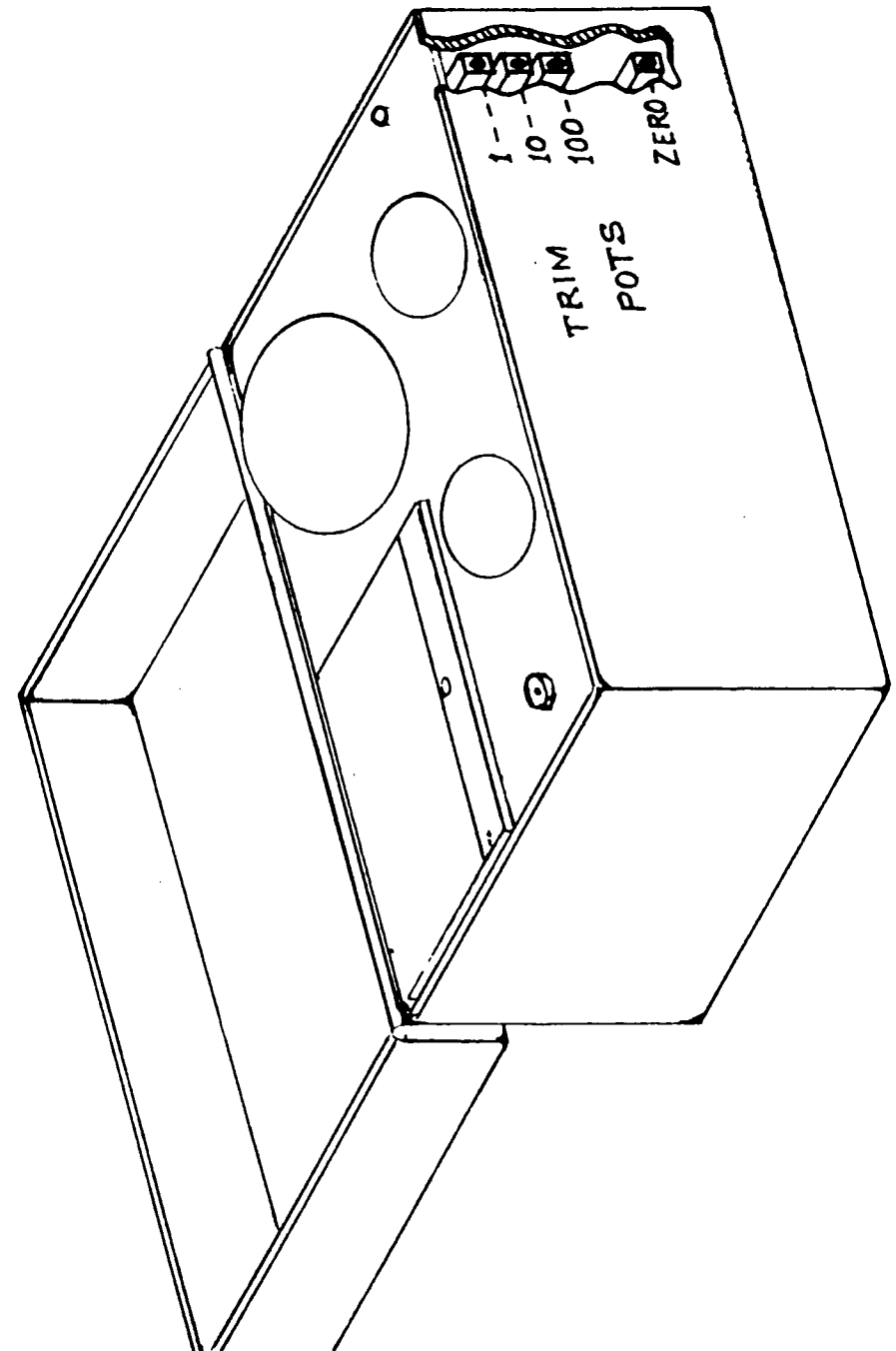


FIGURE 2
DRT-15
SERIES "A"

TECHNICAL NOTE DRT-15A MANUAL

HF scientific, inc. has always believed in selling a quality product. We realize that a manual for electronic instruments is very important to the end user. Most often they are the only source nearby for information and guidance. That is why we take many hours structuring our manuals.

Unfortunately, the DRT-15A manual has not been updated in recent years because the instrument has not been manufactured by HF scientific since August 1981.

We took steps to ensure that the parts and accessories were available for seven years after the last production date. It is no longer economically productive for us to support this instrument.

We apologize for any inconvenience this may cause. We hope that although the manual is not aesthetically perfect or technically correct it will still serve as a useful tool for you.

To allow our prior customers to trade-up to the most recent technology in our line of instrumentation, HF scientific offers a 10% trade-in discount toward the purchase of a new instrument.

Sincerely,

HF scientific, inc.

Rick Beckenhauer
Technical Service Manager