USER GUIDE

KURZ SERIES 1440 DIGITAL PORTABLE AIR VELOCITY, TEMPERATURE METER

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SECTION 1

Description

The KURZ Series 1440 Digital Portable Air Velocity Meters are highly accurate easy-to-use, battery-powered instruments for measuring air velocity and temperature in heating, ventilation, air-conditioning (HVAC), industrial hygiene, occupational safety and health, and research applications. The Model 1441 also measures static pressure.

The Series 1440 instruments provide accurate measurements of extremely low velocities, with exceptional sensitivity and readability (down to ±6 fpm). KURZ solid-state "DuraFlow" velocity-sensing elements are extremely rugged, and their large size renders them immune from particulate contamination. The standard probe's -55°C to +125°C operating range permits use in a wide variety of industrial applications, with optional high-temperature probes to 250°C and 500°C.

KURZ Digital Portable Air Velocity Meters have unsurpassed accuracy and repeatability: ±2% accuracy for each full-scale range, and ±0.25% of full scale reproducibility over the wide temperature range of -20°C to + 55 °C. The large LCD display improves speed and accuracy of readout, and it is easily read outdoors. A linear, analog output voltage permits time history recordings with easy-to-interpret linear amplitude calibrations. The analog output is in engineering units, with a maximum of 0 to 2 VDC full scale.

KURZ Digital Portable Air Velocity Meters are convenient and accurate. They provide direct reading of air velocity through supply and return grilles and in ducts, and of static pressure and pressure drop across filters, without the tedious use of multiple probes and cumbersome hoses. They are used by consultants, contractors, and government and industrial OSHA and air pollution officials for developing, testing and balancing HVAC systems.

All Series 1440 systems come complete with a 13-inch long "DuraFlow" velocity probe marked every inch; a retractable, removable shield; digital readout meter; 8-foot probe cable; 115/230 VAC battery charger; rugged carrying case; and complete operating manual. A unique feature of the probe shield is that it can be reversed and slid down the probe cable to make a total probe length up to 20 inches.

SECTION 2

Principle of Operation

The basic sensing element of the Series 1440 Digital Portable Air Velocity meter is the KURZ Instrunments, Inc., "DuraFlow" probe. The "DuraFlow" probe consists of two integral sensors: a velocity sensor and a temperature sensor. The velocity sensor is a constant-temperature thermal anemometer which measures "standard" velocity (referenced to 25°C and 760 mm Hg), or mass flow, by sensing the cooling effect of the moving flowstream as it passes over the heated sensor. The velocity sensor is heated electrically by the control circuitry in the electronics package. The velocity sensor is rugged and large; it is not a fragile hot-wire and therefore is breakage resistant and insensitive to particulate contamination. The temperature sensor accurately compensates for a wide range of temperature variationse. The maximum temperature of the velocity sensor is 75°F above ambient temperature.

The probe is used directly to measure air velocity in open spaces, ducts, and supply and return openings. Static pressure measurements are obtained with the Model 1441, through use of the pressure attachment (PN 440004). The pressure attachment has a small orifice which directs air onto the velocity sensor in the probe. The air flow generated by the static pressure to be measured is proportional to the static pressure. Either negative or positive static pressures can be measured.

It should be noted that the velocity readings of all KURZ Air Velocity Meters are referenced to standard conditions of 25°C and 760 mm Hg pressure, and therefore directly measure the local mass velocity of the air. In order to obtain the actual velocity, a simple density correction may be used, as follows:

$$Vact = Vind \times p(s)/p(a)$$

where $p(s)$ = air density at standard conditions of 25°C and 760 mm Hg

$p(a)$ = actual air density at local temperature and barametric pressure

$Vact$ = actual air velocity in feet per minute, and

$Vind$ = indicated velocity on KURZ Air Velocity Meters

Normally, this correction is small and may be neglected for most work. In many applications, however, it is the mass velocity which is needed and no density calculation is required.

SECTION 3

Operating Instructions

All KURZ portable meters are shipped with the battery in a low-charge condition. With the range switch in the "OFF" position, charge the batteries before use. Plug the charger into the front panel receptacle labeled "CHARGER". Plug the other end of the charger into a 110 VAC wall socket. Charge the unit for a period of at least one hour before operating.

A charge of 12-16 hours is recommended to achieve a full charge. For operation at 230 VAC, move the switch on the charger to the 230 V position. The charger is intended for charging purposes only. Its use is not recommended during operation.

To check the battery voltage, turn the control knob to the "BATT OK" position. For proper operation, the indicator should read in excess of 9 volts. A fully-charged condition is approximately 10.7 volts. At full charge, the instrument can be operated for about 8 hours of typical use. For maximum operating time between charges, turn the system off between measurements.

To operate, plug the probe connector into the "PROBE" receptacle, preferably when the control switch is in the "OFF" position. Allow about 30 seconds for warmup.

If the instrument has two velocity range positions, select the higher range. Loosen the knurled nut on the probe shield and slide the shield toward the cable, exposing the sensor. Tighten the knurled nut to secure the probe shield. The air velocity meter is now operating and will respond to the slightest air movement. Set the control knob to the "FAST" position. If the digital indication is not stable, switch to the "SLOW" position. The "FAST" and "SLOW" positions have time constants corresponding to 1 second and 2 seconds.

You have a choice of continuous measurement in the "DISPLAY" mode, or you can stop the display from updating and hold a reading in the "HOLD" mode. Switch to the lower range, if provided, to obtain increased resolution at low velocities.

To measure temperature, set the control switch to the "TEMP" position. To make static pressure measurements (with the Model 1441 only) place the pressure attachment on the probe and align the lines on the probe and the attachment. Secure with the locking screw. Then set the control knob to the "inches of water" position.

If a longer probe is needed for your measurement, remove the probe shield; put it on the probe in the reversed position; and slide it down the cable. Lock the shield in position to make effective probe lengths of up to 20 inches.

Remember to set the control knob to "OFF" when putting the system back into the carrying case. Always slide the retractable probe shield over the sensor when the system is not in use, to avoid possible breakage. It is also recommended, to save battery time, to turn the instrument off when there are long periods between measurements.

SECTION 4

Applications

A. Air Velocities in Open Spaces or Single-Point Measurements

The 1440 Series Digital Air Velocity Meters are easily used to measure local air velocities in a wide variety of applications. Simply retract the probe shield and place the probe perpendicular to the expected air flow. Rotate the window in the probe tip such that the flow passes directly through it. You will notice that the output is not greatly affected by angular orientation of the probe, until a change of about ±40° to the direction of flow.

For extremely low velocities, it is recommended that the probe be firmly attached to a tripod, wall, beam or other structure, in order to eliminate movement of the probe.

In situations where air temperature is changing, allow the probe to come to temperature equilibrium before taking readings, thus allowing time for the temperature compensation features of the instrument to respond.

B. Ventilation Openings

The 1440 Series Air Velocity Meters can be conveniently used to obtain the velocity and total flow of supply and return openings or suction openings. In either case, place the probe close to the end and parallel to the surface of the opening, allowing the air to flow perpendicularly through the window in the probe tip.

When it is necessary to obtain the total flow, SCFM, of a supply or return opening having no grill, use the equation:

$$Q = A \times \overline{V}$$

where Q = quantity of air, in standard cubic feet per minute (SCFM)

A = area of the opening, in square feet

$\overline{V}$ = the area-weighted average air velocity, in standard feet per minute (SFPM).

To determine the average air velocity, divide the opening into a number of equal areas. Take a velocity reading at the center of each area, and numerically average the results. If the velocity profile is relatively flat, only a few areas need be taken. If the profile is non-uniform, several areas should be used. Generally, it is a good idea to make a rapid traverse across the duct in two dimensions to determine the uniformity of the air velocity. If the velocity is not constant at one measuring point, use the mean velocity between the upper and lower readings. Generally, the velocity profile is more uniform on suction openings than on supply openings.

If a supply opening is covered by a grill, it is suggested that the probe be placed about 1" in front of the grill to obtain the average velocity reading as above. The area, A, used in the above equation is the core area of the grill.

If information is given on the coefficient of discharge for a specific grill, the probe should be placed against the grill and centered over the open areas in the grill. Choose several grill openings to obtain an average air velocity. In this case, the total flow is:

$$Q = K \times A \times \overline{V}$$

where K = the given coefficient of discharge, and

A = area of the grill, as specified by the manufacturer

For openings covered by diffusers, please refer to the manufacturer's instructions for this particular type of diffuser. This information is usually available.

If a return or suction opening is covered by a grill and it is necessary to compute the total flow in the opening, the correct procedure is to take a number of readings at the center of equal areas, as in the case of having no grill, and determine the average velocity. The probe should be placed in the plane of the opening and close to the grill. The flow rate can be computed fairly accurately by the following equation:

$$Q = F \times A \times \overline{V}$$

where Q = flow rate, in standard cubic feet per minute

F = application factor (see following table)

A = designated area, in square feet, and

$\overline{V}$ = average velocity, in standard feet per minute

Grill Type	Application Factor, F	Designated Area
No Grill	1.00	Full Duct Area
Square Punched Grill	0.88	Free (daylight) Area
Bar Grill	0.78	Core Area
Steel Strip Grill	0.73	Core Area

For applications requiring higher accuracy, it is suggested that a duct extension be used, having a length of at least the largest dimension of the grill. This duct extension is placed against the grill, and the procedures for an open grill are followed to compute the flow rate. For highest accuracy, a smoothly tapered flow nozzle should be placed over the supply grill. The velocity profile at the exit jet of such a nozzle will be very flat.

C. Velocities and Flow Rates Inside Ducts

Since air velocities are rarely uniform across a duct, or even symmetric, it is usually necessary to submit to the time-consuming process of obtaining the average velocity within the duct. Whenever possible, choose a measurement location at least 10 duct-diameters downstream from the nearest elbow, tee, bend, valve, or flow obstruction.

The procedure is to divide the flow area into several equal areas and to take a velocity reading at the center of each area. The number of equal areas will increase as the velocity profile becomes more nonuniform. These readings are then averaged arithmetically to obtain the average velocity. The total flow rate is then:

$$Q = \overline{V} \times A$$

where Q = flow rate, in standard cubic feet per minute

$\overline{V}$ = average velocity, in standard feet per minute

A = area of duct, in square feet

A common procedure is to traverse the probe, once horizontally and once vertically, to obtain the proper velocity readings. Figure 4-1 shows non-dimensional probe traverse locations for equal-area readings in round and square ducts. To obtain faster results less points can be used, with a corresponding sacrifice in accuracy. Please note that locations #1 in Figure 4-1 have an area equal to four times the area of the other locations and are properly accounted for in the example which follows.

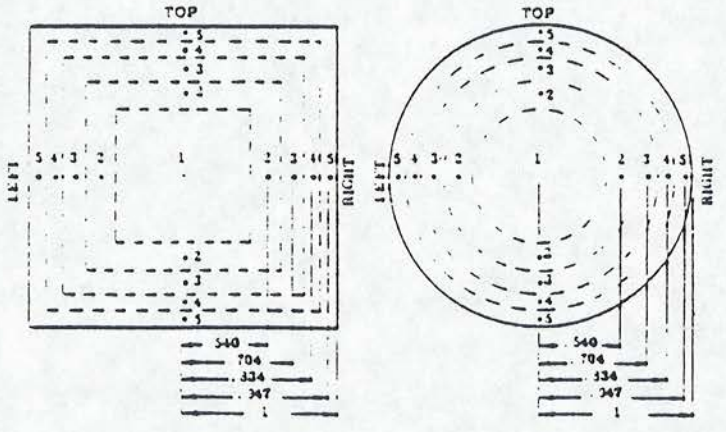


Figure 4-1 Equal-Area Traverses for Square and Round Ducts

To make the traverse, drill two 17/64"-diameter holes in the side of the duct, spaced 90° to each other. Be careful not to create a jagged hole which may disturb the measurements. Note that the probe is marked in 1-inch increments, starting from the center of the velocity sensor. The first mark, therefore, is one inch from the sensor, and the mark closest to the probe cable is 12 inches from the velocity sensor. For ducts having a diameter greater than about 6 inches, the probe shield must be removed. Use a ruler to position the probe at the appropriate location, using the marks on the ruler for reference. The probe is also scribed axially from one end to the other to allow the operator to align the probe window with the flow.

Since the window in the probe is about 15/16 inches long, it is not normally possible to obtain accurate velocity measurements near the traverse hole in the duct because of a possible leakage path through the hole to the outside of the duct. Such a leakage may affect the velocity reading. To obtain accurate measurements, insert the probe into the duct past the window in the probe. It is therefore suggested that the edge measurements near the two traverse holes be ignored and that the average velocity measurements taken at the opposite wall be substituted. This procedure involves very little error in the overall measurement. After the measurements are completed, be sure to seal the traverse holes.

The following numerical example illustrates the averaging process for a 6"-square duct:

	Location						
	1	2	3	4	5	6	7
Left	1200	1150	1100	1000	700	5150	1030
Right	1200	1140	1115	1020	700	5175	1035
Top	1200	1200	1175	1100	800	5475	1095
Bottom	1200	1175	1150	1050	800	5375	1075
Sum	4800	4665	4540	4170	3000	21175	4235
Average	1200	1166	1135	1043	750	5294	1059

Thus the average velocity is 1059 standard feet per minute (SFPM). The total flow is:

$$Q = A \times \overline{V} = 0.5 \text{ ft} \times 0.5 \text{ ft} \times 1059 \text{ SFPM, or}$$

$$Q = 264.75 \text{ SCFM}$$

C. Static Pressure Measurements

The static pressure (either positive or negative) within a duct system, filter or other pressurized or evacuated body can be easily measured by using the pressure attachment for the probe, as supplied with the Model 1441.

Drill a hole in the duct having a diameter no smaller than 17/64" and less than $\frac{1}{2}$"-diameter. Determine whether the duct is above ambient pressure (positive pressure) or below ambient pressure (negative pressure). This is easily done at high positive pressures, since a distinct jet of air can be felt with one's fingers if the duct is at positive pressure. If in doubt, take a limp piece of yarn, place it near the hole, and see whether it is pulled into the duct (negative pressure) or blown away from the duct (positive pressure).

Slip the pressure attachment onto the probe as far as it will go, and rotate it until the scribe line on the pressure attachment lines up with the axial scribe lines on the probe. Lock the pressure attachment in position with the locking screw. You will note that a "+" mark is stamped into the barrel of the pressure attachment directly above the scribe line, and a corresponding "-" mark is on the opposite side of the barrel.

The pressure attachment has identical flow nozzles opposite each other. Each nozzle is fitted with a soft sponge gasket to enable sealing the pressure attachment against the duct in which the static pressure measurement is to be made.

To make the measurement, turn the range selector knob to the "INCHES OF WATER" position. Firmly place the pressure attachment nozzle over the hole drilled in the duct. If the static pressure in the duct is positive, place the pressure attachment against the duct such that the "+" mark is facing the operator. If the static pressure is negative, place the pressure attachment against the duct such that the "-" mark is facing the operator.

It should be realized that static pressure measurements cannot be relied upon for field evaluation of air handling system performance. For various reasons, pressure readings taken in the duct do not reflect the pressures associated with the fan's catalog rating. Refer to page 40.3 of Chapter 40 in the ASHRAE HANDBOOK for a thorough discussion.

NOTE: Static pressure ranges are provided on high temperature models. However, they cannot be used above 125°F. ambient temperature.

E. Temperature Measurements

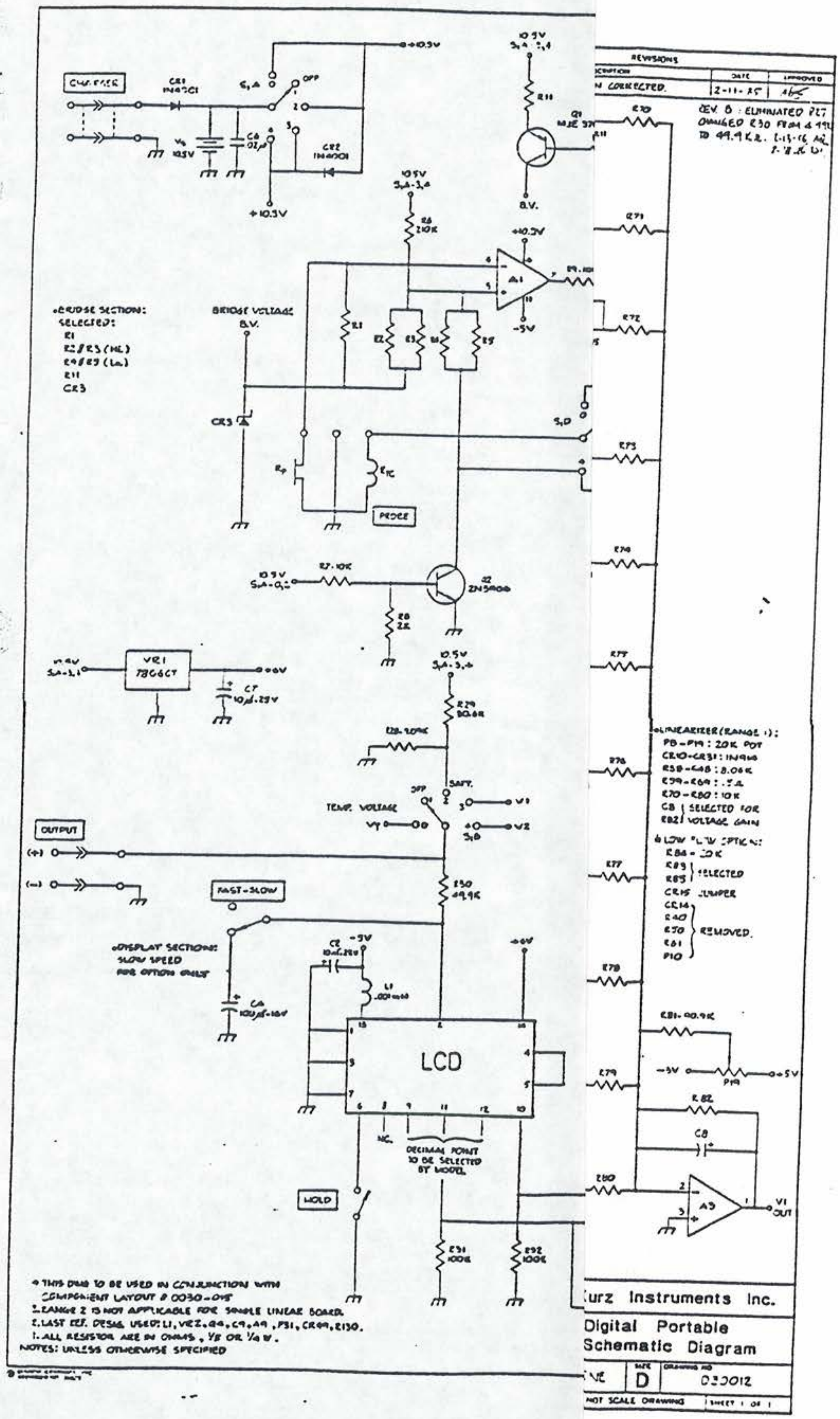
The temperature of the air within a duct can easily be measured with any of the KURZ Series 1440 Portable Air Velocity Meters by simply setting the control knob to the "TEMP" position.

In this mode of operation, the velocity sensor is not heated and is switched out of the circuit. The temperature sensor output which is used to temperature compensate the velocity sensor output in the velocity mode of operation is now used to drive the digital indicator to give a temperature reading.

F. Use With Recorders

All Series 1440 Portable Air Velocity Meters have an analog output signal available via jacks on the front panel. The voltage is proportional to velocity or temperature, depending upon the variable being read on the digital display.

The output signal level is directly related to engineering units of the measured variable, with a maximum of 2 VDC full scale. For example, a range of 0 to 200 fpm has an output of 0 to 2 V; a range of 0 to 100 fps has 0 to 1 V; 0 to 30 mps has 0 to 0.3 V; and 0 to 125 °C has 0 to 1.25 V. If the instrument has two velocity ranges, the output voltage always corresponds to the higher range.


REVISIONS
CORRECTED. 2-11-85
REV. B : ELIMINATED R27
CHANGED R30 FROM 44.9K
TO 49.9KΩ.
CHARGER
CR1 1N4001
CR2 1N4001
+10.5V
S1A OFF
BRIDGE SECTION:
SELECTED:
R1
R2/R3 (HL)
R4/R5 (LL)
R11
CR3
BRIDGE VOLTAGE
B.V.
PROBE
R7-10K
R8 2K
Q2 2N3904
VR1 78G6CT
C7 10µf-25V
R29 80.6K
R28-20K
SAFT.
TEMP. VOLTAGE
OUTPUT
(+)
(−)
FAST-SLOW
DISPLAY SECTION:
SLOW SPEED
FOR OPTION ONLY
R30 49.9K
LCD
N.C.
DECIMAL POINT
TO BE SELECTED
BY MODEL
HOLD
R31 100K
R32 100K
LINEARIZER (RANGE 1):
P8-P19 : 20K POT
CR10-CR31 : 1N914
R58-R68 : 8.06K
R59-R69 : 7.5
R70-R80 : 10K
C8 } SELECTED FOR
R82 } VOLTAGE GAIN
LOW FLOW OPTION:
R84 - 20K
R83 } SELECTED
R85 }
CR15 JUMPER
CR14 }
R40 }
R50 } REMOVED.
R61 }
P10 }
R81-90.9K
−5V
+5V
P19
R82
C8
R80
A3
V1 OUT
* THIS DWG TO BE USED IN CONJUNCTION WITH
COMPONENT LAYOUT # 0030-018
2. RANGE 2 IS NOT APPLICABLE FOR SINGLE LINEAR BOARD.
2. LAST REF. DESIG. USED: L1, VR2, R4, C9, A9, P31, CR49, R130.
1. ALL RESISTOR ARE IN OHMS, 1/8 OR 1/4 W.
NOTES: UNLESS OTHERWISE SPECIFIED
Kurz Instruments Inc.
Digital Portable
Schematic Diagram
D
030012
NOT SCALE DRAWING
SHEET 1 OF 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	REPOSITIONED 20	4-4-95	AB / DF.
B	CHANGED R106 FROM 16.1 → 16.2KΩ ELIMINATED R27	2-15-96	AB / [illegible]

R	20 KΩ	2
R	10 KΩ	1
R	SELECTED	1
	1N914	2
OMETER	20 KΩ	1
HMT OPTION		

DESCRIPTION		QTY.
R	SELECTED (VOLTAGE GAIN)	1
	SELECTED (RANGE 2: ZERO + SPAN)	2
	40.9KΩ	1
	10 KΩ	9
	.5Ω	9
	15.3KΩ	1
	16.2KΩ	1
	20KΩ	1
	24.3KΩ	1
	30.1KΩ	1
	40.2KΩ	1
	60.4KΩ	1
	133 KΩ	1
	8.06KΩ	9
	20 KΩ	2
	10 KΩ	1
	1N914	10
OR	SELECTED	1
OR	.02 µf	1
METER	20KΩ	10
METER	2KΩ	2
P	LM324	5
N SOCKET		5
TS LIST FOR DOUBLE LINEAR BOARD		

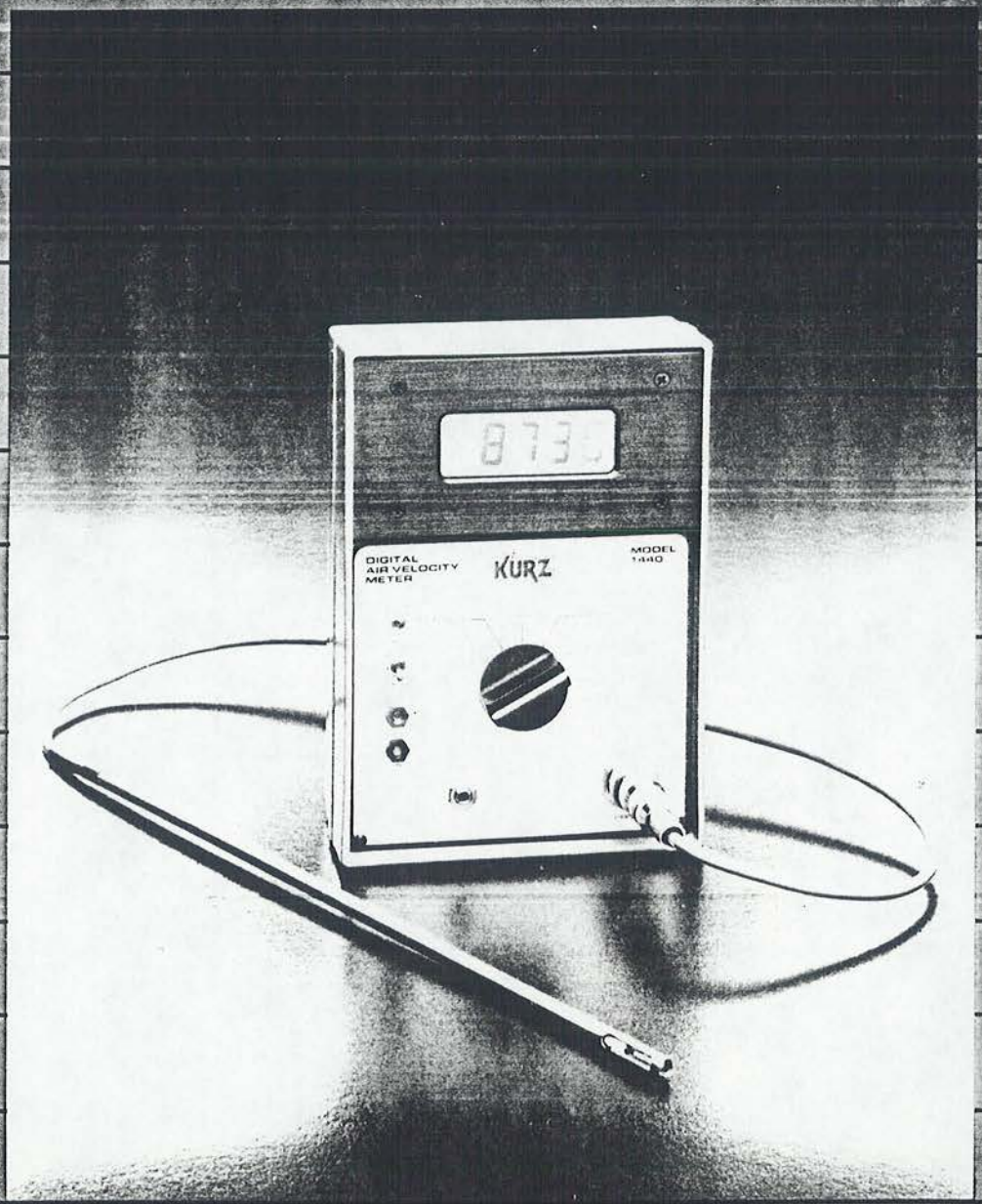
REF. DES.	DESCRIPTION	QTY
R82	RESISTOR SELECTED (VOLTAGE GAIN)	1
R34, R35	(RANGE 1: ZERO + SPAN)	2
R15, R17	(TEMP. : ZERO + SPAN)	2
R11	(BALLAST RESISTOR)	1
R1 – R5	SELECTED (TEMP. COMP. RESISTORS)	5
R81	40.9KΩ	1
R78	15.3KΩ	1
R57	15 KΩ	1
R56	16.2 KΩ	1
R55	19.1 KΩ	1
R54	22.6 KΩ	1
R53	26.7 KΩ	1
R51	44.2 KΩ	1
R50	61.9 KΩ	1
R49	133 KΩ	1
R38 – R48	8.06 KΩ	11
R31, R32	100 KΩ	2
R29	80.6 KΩ	1
R28	9.09 KΩ	1
R26, R59 – R69	.5Ω	12
R24, R52	33.2 KΩ	2
R23	715Ω	1
R14, 18, 22, 36, 37	20 KΩ	5
R13	30.1 KΩ	1
R12	1 KΩ	1
R10	1.2 KΩ	1
R9	2 KΩ	1
R7, 9, 16, 25, R33, R70 – R80	10 KΩ	17
R6	RESISTOR 210 KΩ	1
CR4 – CR7 CR10 – CR31	DIODE 1N914	26
CR3	DIODE SELECTED	1
CR2	DIODE 1N4001	1
C8	CAPACITOR SELECTED	1
C4	100 µf, 16V	1
C3, C6	.02 µf	2
C2, C7	CAPACITOR 10 µf - 25V	2
P5	POTENTIOMETER 10KΩ	1
P3, P4, P6 P8 – P19	POTENTIOMETER 20 KΩ	15
P1, P2	POTENTIOMETER 2 KΩ	2
Q4	TRANSISTOR 2N4126	1
Q2, Q3	TRANSISTOR 2N3904	2
Q1	TRANSISTOR MR 370	1
VR2	VOLTAGE REGULATOR LM336-2 5V	1
VR1	VOLTAGE REGULATOR 7806 CT 6V	1
L1	INDUCTOR 1000 µH 5%	1
A1 – A5	OP. AMP LM324	5
	DIP 14 PIN SOCKET	5
	MOLAR 2 PIN MALE CONNECTOR	1
	ROTARY SWITCH: 2 POLES, 6 THROWS, 2 WAFERS	1
	DIGITAL PORTABLE PCB	1
PARTS LIST FOR SINGLE LINEAR BOARD		

3. ALL DIODE TO BE ASS[...]
2. SWITCH REMOVED FO[...]
1. THIS DWG TO BE USE[...]
SCHEMATIC DIAGRAM[...]
NOTES: UNLESS OTHERW[...]

REPLACED DWG.# 144030-002 & 144030-018

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES ± / ± / ± /	Kurz Instruments Inc.
APPROVALS / DATE	Digital Portable Component Layout
SCALE 5/1	SIZE D DRAWING NO 031001
DO NOT SCALE DRAWING	SHEET 1 OF 1

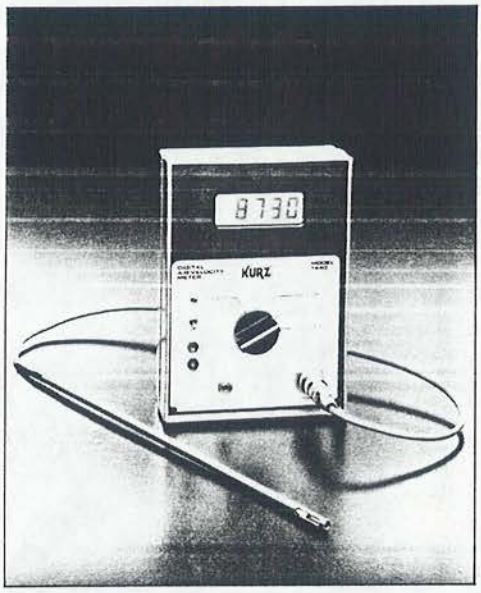
SERIES 1440 DIGITAL PORTABLE AIR VELOCITY AND TEMPERATURE METER



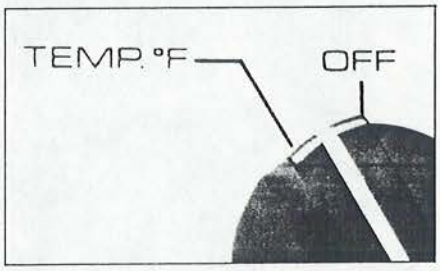
KURZ
INSTRUMENTS INC.

WITH A RUGGED KURZ SENSOR THIS DIGITAL PORTABLE AIR VELOCITY METER IS LIGHT YEARS AHEAD OF THE COMPETITION

The Kurz Series **1440 Digital Portable Air Velocity and Temperature Meter** ... there's none finer in the world.



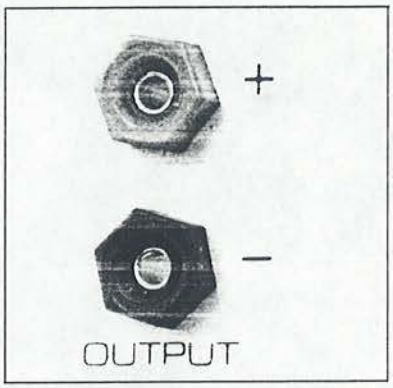
The **1440** is an ideal marriage of analog and digital technologies. Employing two analog voltage offset type linearizers, one with 11 stages, the other with 9, the **1440** provides a fast (20 Mhz) analog linearization of the sensor signal. One linearizer section is used for each of the two ranges.The linear output signal is scaled as it is brought into the standalone digital voltmeter/digital display module you view while using the **1440.**



All **1440** models include a temperature range. When temperature is selected the **1440** relies on the exceptional qualities of the platinum RTDs used in the Kurz ***"DuraFlo"***™ sensor. Qualities such as linear temperature response, outstanding stability and repeatability.

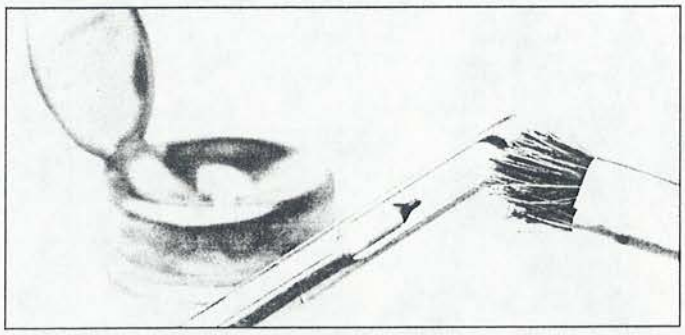
All models of the **1440** Series Include:

- Foam Padded Instrument Carrying Case
- Integral Ni-Cad Batteries
- Battery Charger (115VAC/60Hz)
- Probe Extender/Shield
- Static Pressure Measurement Adaptor (Selected Models)
- NBS Calibration Certificate and Calibration Data



Two female banana jacks on the front panel of the **1440** allow easy hookup of strip chart recorders, analog to digital interfaces for computer interfacing, dataloggers, etc. The linear output ranges between 0-2 Vdc, but is scaled in engineering units to match the range selected. For instance, when 0-100 feet per second is selected, the linear output will be 0-1 Vdc. When the 0-200 feet per second range is selected, the linear output will be 0-2 Vdc. When the 0-125° Celsius range is selected, the linear output will be 0-1.25 Vdc.

A SENSOR RUGGED ENOUGH TO CLEAN WITH A BRUSH

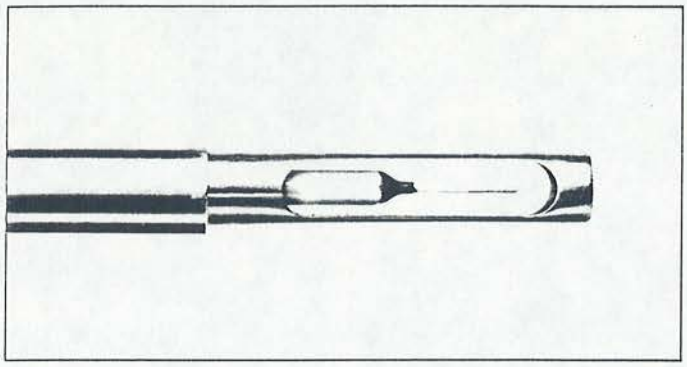


No other digital portable air velocity meter has or will have a sensitive sensor this rugged. Rugged enough to clean with a brush, yet sensitive enough to measure puffs of air as slow moving as 10 feet per minute, 50 times slower than you walk across a room.

LARGE DIGITAL DISPLAY

This is the 1440 digital display shown actual size. Pin this brochure to the wall and you'll note you can easily read the 7/10" characters from across the room.

YOU CAN'T GET THIS SENSOR ANYWHERE ELSE



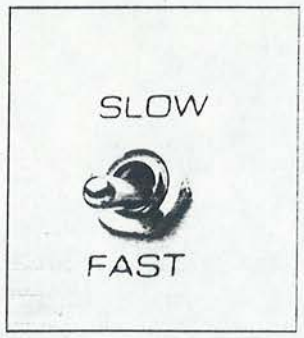
Just as a factory automation computer is useless without good sensors, so too a digital air velocity meter is worthless without a rugged, sensitive, repeatable, temperature and barometric pressure compensating sensor. Only Kurz has such a sensor. A sensor constructed of NBS reference grade platinum. A sensor that performs with platinum's legendary stability, linearity and repeatability.

Physically, the Kurz ***"DuraFlo"***™ sensor is mounted inside a protective window at the tip of a 13″ long x 0.25″ diameter 316 stainless steel probe. Probe lengths from 3″ to 48″ are optionally available. A standard cable length of 8 feet is provided between the probe and the **1440.** Cable lengths up to 50 feet are available at the time of order. (Because the cable is part of the sensor circuit it must not be altered. To do so invalidates the instrument's calibration. Therefore, select the cable length you want prior to ordering the instrument.) Coiled retractable cables are also available but do not allow use of the standard probe extender provided with the **1440.** Probe extenders are optionally available in lengths of 24″, 36″ and 48″ for use with straight cables.

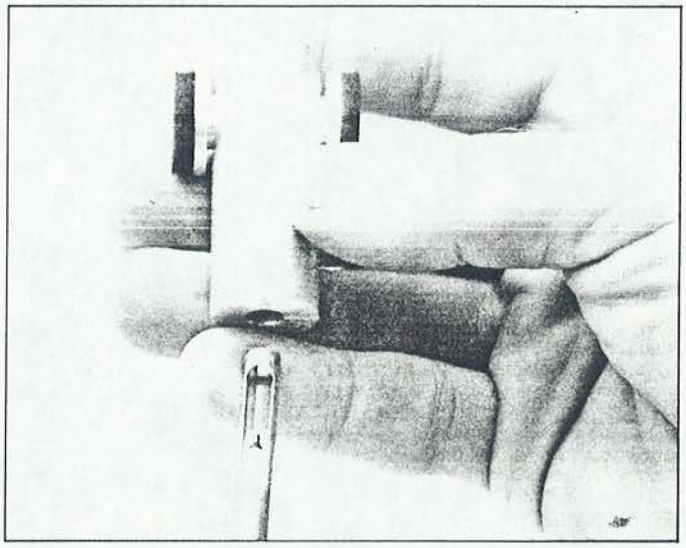
NBS TRACEABLE CALIBRATION

Unlike competitive products, NBS traceable calibration is included in the price of Kurz air velocity meters. You will receive a Calibration Certificate as well as data showing output voltage versus air flow for Air at standard temperature and pressure. For larger users, complete bench top wind tunnels are available for in house calibration work. See the Kurz **400** Series brochure.

EXTRA FEATURES MAKE FOR MAXIMUM UTILITY



A SLOW/FAST toggle switch allows you to select the speed at which the digital display is updated. When flow is turbulent, select the SLOW position so that the display is updated every 3 seconds. This minimizes the distracting effect of rapidly changing digits. When flow is steady and laminar, the FAST position may be used. In the field readings sometimes jump around. When the same instrument is checked in a wind tunnel where there is a precise, controlled laminar flow of air, it shows a rock steady digital indication. Remember that in the real world flow is often turbulent. The Kurz 1440 is designed to be a highly accurate and sensitive instrument, allowing you to measure and characterize rapidly changing air flows. All thanks to the Kurz ***"DuraFlo"***™ sensor.



Selected models of the **1440** include a static pressure measurement adaptor that fits over the end of the air velocity probe. The adaptor has opposing ports and identical nozzles just inside those ports. There are alignment scribe lines on the probe for correctly positioning the adaptor. The static pressure adaptor effectively turns the **1440** probe into a calibrated flowmeter. By pressing the rubber seal on one of the ports against a hole drilled in your HVAC ductwork, you can measure up to 5″ water column static pressure (above that of the local surrounding barometric pressure). This additional feature makes the **1440** especially attractive to users with HVAC and air balancing applications.

Call your Local Kurz Representative or a Factory Applications Engineer today. We'll be happy to discuss more about why the **1440** is the world's finest digital air velocity meter.

SPECIFICATIONS

ACCURACY VS. TEMPERATURE CHART

		ACCURACY, VELOCITY		ACCURACY, STATIC PRESSURE % F.S.	ACCURACY, TEMP.
°C	°F	% READING	% F.S.		
– 20 TO 60	– 4 TO 140	± 2%	½%	± 2%	± 2°F
61 TO 125	142 TO 257	± 3%	1%	NA	± 2°F
126 TO 250**	259 TO 482**	± 4%	1%	NA	± 3°F
251 TO 500***	484 TO 932***	± 5%	1%	NA	± 4°F

* Static pressure accuracy applies only to -20°C to 60°C range ** "HT" models (high-temp rating) *** "HHT" models (extra-high-temp. rating)

REPEATABILITY
± 0.25% of full scale for each range

RESPONSE TIME
Probe: .01 second; display 1 second and 3 seconds. Output jacks .1 second typical, 35 milliseconds optional.

POWER
One amp hr. nickel-cadmium battery with 115 Vac, 60 Hz charger, operates up to eight hours between charges. For spare/replacement battery packs specify part number BAT 00060.

NET WEIGHT OF METER AND PROBE
Approx. 2.75 lbs./1.25 kg.

SHIPPING WEIGHT
Approx. 7 lbs./3.2 Kg.

CONTROLS
Fast/slow response, hold, velocity and temperature range, battery test switch on front panel. Fast position, 1 second, Slow position, 3 seconds.

DIMENSIONS
Meter: 2.3″ x 5.2″ x 7.2″ approx.; Carrying case: 3.3″ x 12″ x 17″ approx.

METER READOUT
Custom, ruggedized with .7″ LCD display, shock-proof.

PROBE
Standard sensor is ceramic, platinum and epoxy. HT sensor is ceramic, platinum and HT epoxy. HHT sensor is all ceramic. Probe is 316SS, 13″ long, marked inch by inch along axis. SS probe shield can be used as a probe extender to 20″. Options to 48″ are available. (Probe extender unuseable at HT & HHT temperatures)

WARRANTY
1 full year parts and labor

IMPORTANT NOTICE
Specifications are subject to change without notice. Kurz Instruments reserves the right to make engineering changes and product improvements at any time and without prior notice. Consult your local Kurz Representative or a Factory Application Engineer for information regarding current specifications.

SELECT THE MODEL THAT BEST SUITS YOUR NEEDS

MODEL NO.	RANGE	UNITS
1440-4	0-200	Feet Per Minute
	0-6000	Feet Per Minute
	0-200	Degrees Fahrenheit
1440-5	0-200	Feet Per Minute
	0-12000	Feet Per Minute
	0-200	Degrees Fahrenheit
1440M-4	0-2	Meters Per Second
	0-30	Meters Per Second
	0-125	Degrees Celsius
1440M-5	0-2	Meters Per Second
	0-60	Meters Per Second
	0-125	Degrees Celsius
1441-4	0-6000	Feet Per Minute
	0-5	Inches, Water
	0-200	Degrees Fahrenheit
1441-5	0-12000	Feet Per Minute
	0-5	Inches, Water
	0-200	Degrees Fahrenheit
1443-4	0-6000	Feet Per Minute
	0-200	Degrees Fahrenheit
1443-5	0-12000	Feet Per Minute
	0-200	Degrees Fahrenheit
1443M-4	0-30	Meters Per Second
	0-125	Degrees Fahrenheit
1443M-5	0-60	Meters Per Second
	0-125	Degrees Celsius

NOTE: All options may not be available for high temperature (-HT) and very high temperature (-HHT) models. Consult factory.

OPTIONS

- Teflon coated probe sensor, add –TFE
- High temperature probe (250°C), add –HT
- Very high temperature probe (500°C), add –HHT
- Retractile cable, add –R (cannot be used with probe extender or high temperature models).
- Special probe lengths (3″ to 48″)
- Special probe shields (24″, 36″, 48″)
- Special probe cable lengths (up to 50 feet)
- Continuous operations, add –CO
- 230 VAC/50 Hz wall type battery charger, add –X
- Soft vinyl carrying case with belt loop
- Carbon glass epoxy probe in lieu of stainless steel. Non-conductive probe allows measurements between circuit board and other operating electrical equipment. Add-CP (carbon probe) to model no.

SPECIFICATION SHEET NO. 1440-4/87 B.P.

KURZ INSTRUMENTS INC.

CALL A KURZ APPLICATION ENGINEER FOR IMMEDIATE SERVICE

1-800-4-AIRFLO

NATIONWIDE **(1-800-424-7356)**

2411 GARDEN ROAD
MONTEREY, CA 93940
(408) 646-5911
USA TELEX 172275
FAX (408) 646-8901

AIR VELOCITY TECHNOLOGY LIGHT YEARS AHEAD OF THE COMPETITION

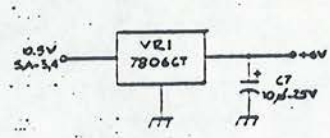
ENGINEERING CHANGE ORDER/REQUEST

KURZ INSTRUMENTS INC.

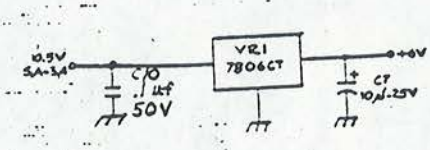
ORIGINATED BY: DEPARTMENT: DATE:

D) ADD A .1 uf CAP TO THE INPUT OF VR1 (C10).

FROM:

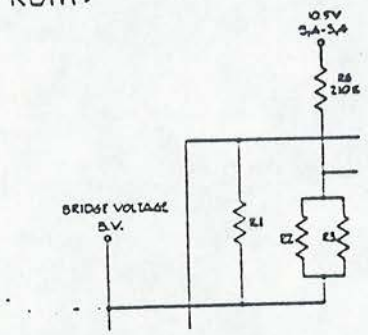


TO:

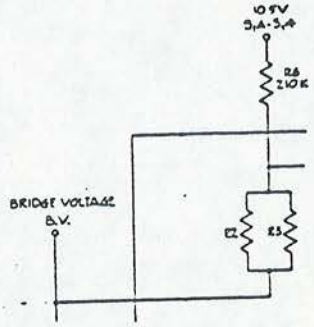


E) DELETE R1

FROM:



TO:



2) DIGITAL PORTABLE COMPONENT LAYOUT

A) DELETE FROM PARTS LIST SECTION Q3, R9, R10, R1

FROM:

Q2, Q3	TRANSISTOR 2N3904	2

TO:

Q2	TRANSISTOR 2N3904	1

FROM:

R7, 9, 16, 25, 27 R33, R70-R80	RISISTOR 10KΩ	17

TO:

R7, 16, 25, 27 R33, R70-R80	RESISTOR 10KΩ	16

FROM:

R10	RESISTOR 1.2KΩ	1

TO:

(BLANK)

FROM:

R1-R5	RESISTOR SEL (TEMP COMP. RESISTORS)	5

TO:

R2-R5	RESISTOR SEL (TEMP COMP. RESISTORS)	4

B19032 REV B

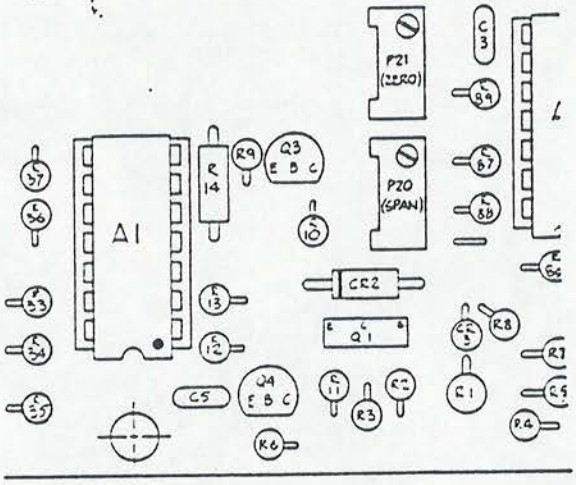
ENGINEERING CHANGE ORDER/REQUEST

KURZ INSTRUMENTS INC

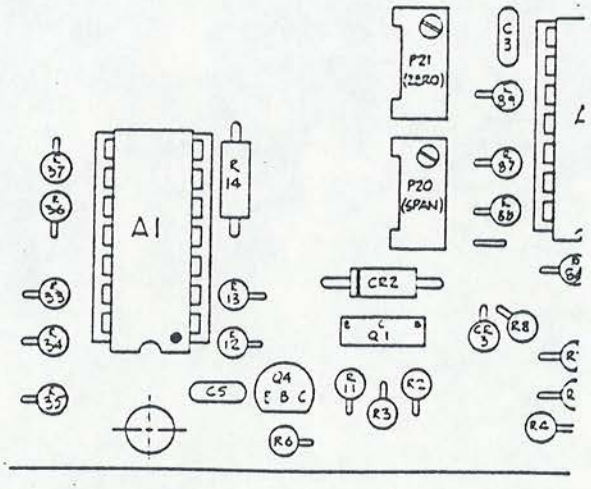
ORIGINATED BY: DEPARTMENT: DATE:

B) CHANGE Q1
FROM:
Q1 TRANSISTOR MJE370 1
TO:
Q1 TRANSISTOR MJE520 1

D) REVISE DRAWING
FROM:



TO:



3) R1 WHICH WAS DELETED ON THE ASSEMBLY WILL BE REPLACED BY A 10Ω,25W METAL RESISTOR THAT WILL BE MOUNTED ON THE FACE PLATE.

4) REF NOTE- BRIDGE VOLTAGE AT NO FLOW SHOULD BE APPROXIMATELY 3.00 VDC.

B 19032 REV B

SECTION 6

Maintenance

A. Battery Life

As with all rechargeable nickel-cadmium battery systems, the batteries will have longer life if they are not allowed to become overly discharged. It is recommended that the batteries be kept fully charged whenever possible and that the battery voltage be checked from time to time while using the instrument. Simply set the control knob to the "BATT OK" position and read battery voltage on the display. At full charge, the reading will be about 10.7 volts. Minimum voltage for instrument operation is about 9 volts. When the batteries are fully charged, the instrument can be typically used for about eight hours unless high flow rates are measured for extended periods of time. It is recommended that the instrument be turned off between measurements.

Temporary degradation, peculiar to nickel-cadmium batteries, may cause a decrease in operating period between recharges. If this occurs, let the batteries discharge to below 9 volts and then fully recharge them. This should correct the temporary degradation.

B. Probe

Although the relatively large diameter of the velocity sensor renders it immune to particulate contamination in most environmewnts, continuous use in dirty environments may necessitate periodic cleaning. Clean the sensor with a camel's hair brush and clean water, followed by an alcohol rinse. The sensor should be dry before resuming operation.

Always cover the probe with the probe shield when not using the system, to protect the sensor from contact with foreign objects or contaminants. Store or transport the meter and probe in the convenient foam-padded carrying case to prevent shock damage.

USERS SHOULD NOT THAT PROBES ARE NOT INTERCHANGEABLE. Each probe is matched, for temperature compensation and calibration, by circuit components in the instrument with which it was delivered. Accurate measurements can be made only when an instrument is used with the probe with which it was delivered.

C. Calibration

Calibration should be checked periodically (normally annually), depending on accuracy requirements and extent of instrument use. The meter may be returned to Kurz Instruments Inc., or to an authorized service center for recalibration. Calibrations are traceable to the Nation Bureau of Standards (NBS). Be sure to include the battery charger, static pressure atachment (Model 1441 only) and probe as well as the user's name, address and phone number to expedite the recalibration process. Allow four to six weeks "turnaround" time.

Air velocity calibration systems are available from KURZ Instruments Inc. (see Series 400 Specification Sheet). These calibrators will enable you to check calibration and to recalibrate any Kurz air velocity meter, or even those of other manufacturers. Any other attempts to recalibrate will void the warranty on your instrument. Consult our factory or your local representative about our Model 400 Air Velocity Calibration Systems.

KURZ INSTRUMENTS INC.
2411 Garden Rd.
Monterey, CA 93940
(408) 646-5911
(800) 4-AIRFLO

ENGINEERING CHANGE

REQUEST ☐
ORDER ☒

KURZ INSTRUMENTS INC

ORIGINATED BY: J. CAREAGA DEPARTMENT: DRAFTING DATE: 11-5-86

DOCUMENTATION AFFECTED

DOCUMENT NO'S	REVISION	TITLE
~~D30012~~	A	DIGITAL PORTABLE SCHEMATIC DIAGRAM
D31001	C	DIGITAL PORTABLE COMPONENT LAYOUT

REASON FOR CHANGE:
THE 4440 IS COMING INTO CALIBRATION WITH THE STANDARD DIGIPORT BRIDGE CIRCUIT. THERE IS NEARLY 4.000 VAC OSCILLATING VOLTAGE ON THE BRIDGE. THERE IS A 1 MHZ SIGNAL ORIGINATING FROM THE 6V REGULATOR.

IMPACT OF CHANGE ON:
☐ COST ☒ PERFORMANCE
☐ SCHEDULE ☐ FUNCTION
☐ OTHER _____

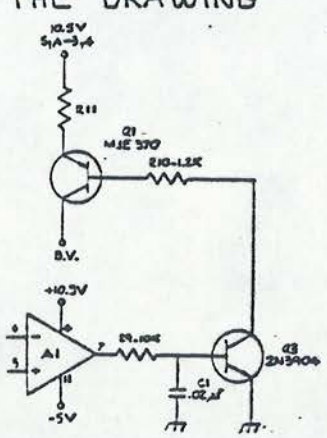
DESCRIPTION OF CHANGE:

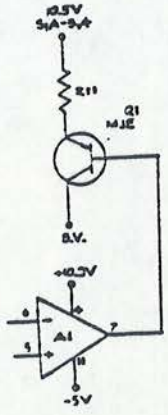
1) DIGITAL PORTABLE SCHEMATIC DIAGRAM

A) DELETE: Q3 2N3904
C1 .02 uf
R9 10K
R10 1.2K

B) CHANGE Q1 FROM: MJE370 TO: MJE520

C) REVISE THE DRAWING
FROM: TO:





ECR REQUEST NO.

ECO: A4410047002
Open ☑ Closed
Date: NOV 5 1986

REVIEWER: ☑ APPROVED ☐ REJECTED SIGNATURE: [signature] DATE: 11-13-86

REVIEWER: ☐ APPROVED ☐ REJECTED SIGNATURE: DATE:

REASON:

DISPOSITION OF PARTS:	REQ'D	APPROVALS	SIGNATURES	DATE
☑ FUTURE BUY/MAKE ☐ STOCK ITEMS	✓	ENGINEER	[signature]	11/14/86
☑ ON ORDER ☐ FIELD UNITS		PRODUCTION		
☐ IN WORK ☐ ALL UNITS		QA		
☐ COMPLETED ASSY ☐ SERVICE		OTHER:		
☐ OTHER: _____	EFFECTIVITY DATE:			

ECO NO.: A4410047002 — PAGE 1 OF 3

B10032 REV B

REQUEST FOR READER'S COMMENTS

Kurz Instruments, Inc. attempts to provide instruction manuals which meet the needs of all Kurz instrumentation users. This response form allows you to participate directly in our documentation process.

We will appreciate your suggestions for improving this manual. Please confine your comments to its usability, accuracy, readability, organization and completeness.

1. Model No. of your instrument: _____

2. Publication date of manual: _____

3. Specify by page any errors you found: _____
   _____
   _____

4. Does the document cover the information you require? Is it at the right level? What other documentation do you need? _____
   _____
   _____

5. Did you have difficulty understanding any wording or descriptions? Where? _____
   _____
   _____

6. Please rate this document on a scale of 1 to 10, with 10 being the best rating: _____

NAME _____ DATE _____
TITLE _____
COMPANY/DEPT _____
ADDRESS _____
CITY _____ STATE ___ ZIP _____
PHONE _____

SECTION 8

Warranty

All products manufactured by Kurz Instruments, Inc. carry a warranty against defective parts and workmanship to the original purchaser for a period of one year after date of delivery. Damage caused by heat or corrosives, misuse, or negligence is not covered by this warranty.

"DuraFlow" probes are not interchangeable and are not covered by warranty. Please inspect and verify that the unit is operational upon receipt of all Kurz products. All units are shipped after NBS-traceable calibration.