MANUAL
FOR
MICROBAROGRAPH
MODEL 7010
7011
7012
7013
7014

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MANUAL NO: 7010-001
DATE: DEC 1985
ECN: 2409

ADDENDUM

TO

MECHANICAL INSTRUMENTS MANUALS

The mechanical instruments provided by Qualimetrics, Inc., with chart drum recorders, such as Models 3010, 4010, 5020, etc., are being revised. The spring driven and battery driven clocks are being phased out and will eventually become unavailable as a replacement item. Replacement parts for these clocks will also become unavailable as inventories are depleted.

A new solid state clock assembly is being introduced as the replacement for these electro-mechanical and mechanical clocks. The electronic clock is a self contained unit and allows switch selection of 1 day, 7 day, or 31 day operation without the need to change either gears or clock drums. The selector switch is located inside the clock drum and is accessible from the top of the drum. Two AA size batteries are required to drive the clock. These batteries are accessed by removing the drum. The drum is removed by grasping the drum cylinder and twisting it counter-clockwise. Observe the polarity markings on the battery holder whenever new batteries are being inserted.

When the clock is in operation, an LED will flash showing the chart speed selected. Installation of the clock into the instrument and placement of the chart onto the clock are unchanged.

CAUTION: These new solid state clocks are only usable with 26 hour and 176 hour charts. Do not attempt to use the clock with 24 hour and 168 hour charts.

MICROBAROGRAPH
MODEL 7010
7011
7012
7013
7014

1.0 INTRODUCTION

1.1 Qualimetrics Microbarographs are designed and manufactured to meet professional meteorological and industrial requirements. These instruments measure ambient barometric pressure indoors or outdoors and records the parameters onto strip charts.

1.2 Whenever outdoor ambient barometric pressure measurements are required, use the Qualimetrics Model 8120 Cotton Region, Louvered, Instrument Shelter with metal legs. The shelter will protect the instrument from the affects of solar radiation and will enable accurate data collection.

1.3 The various model numbers for the microbarograph indicate differences in the types of clock drum recorders. Specific chart paper is required for the different clock drum recorders due to differences in the rotation periods of the clocks. Model 7010 uses a 26 hour/176 hour spring driven clock, Model 8827. Model 7011 requires a 26 hour/176 hour battery power clock, Model 8833. The 7012 instrument has a 31 day, battery power clock, Model 8838. Models 7013 and 7014 both use 24 hour/168 hour clocks, part numbers M666067 and M666068 respectively. The 7013 clock is spring driven and the 7014 clock is battery powered.

1.4 For the microbarographs with 26 hour/176 hour clocks, use the appropriate chart paper, Models 70101 through 70104. The 31 day clock uses chart paper 70105 and 70106. Microbarographs 7013 and 7014 use the chart papers with part numbers from M699060 through M699063.

1.5 All of the microbarographs are now supplied with disposable cartridge pen tips. These pen tips are identified by part numbers 88101 for blue ink and 88102 for red ink.

2.0 SPECIFICATIONS

2.1

Sensor	14 cell 2.5" dia. aneroid
Magnification	2:1 inches of Hg
Temperature compensation	Aged bimetal strip
Accuracy	±0.15 mb (0.005" Hg)
Recording range	945-1045 mb

	(27.9-31.0" Hg)
Resolution	0.2 mb (0.005" Hg)
Chart graduations	0.5 mb (0.01" Hg)
Operating range	-1000 to +12000 feet
Clock Type:	
Model 7010	26/176 hour spring wound
Model 7011	26/176 hour battery
Model 7012	31 day battery
Model 7013	24/168 hour spring wound
Model 7014	24/168 hour battery
Pen type	cartridge, 88101 blue or 88102 red
Size	12.5"L x 11.5"H x 6"D (318 x 292 x 152 mm)
Weight/Shipping	10 lbs/15 lbs (4.5 kg/6.8 kg)

3.0 INSTALLATION

3.1 This instrument is thoroughly tested and fully calibrated at the factory and is ready for installation. Please refer to the return authorization card included in the packing box if damage has occurred. Also, notify Qualimetrics, Inc.

3.2 The Microbarograph is shipped in a dual fiberboard container. The inner container is packed with styrofoam panels to protect the instrument from damage during shipment. The outside container is also filled with foam chips for further protection. Save all packing materials in case the instrument must be returned for repair or replacement.

3.3 The following instructions (Steps 3.3 to 3.6) apply to the spring wound clock. Remove the clock and winding key from the packing box. The key is taped into the top styrofoam panel. The clock is shipped from the factory with the seven day gear attached. The one day gear is located on the clock drum.

3.4 Select the desired chart time period (one or seven days). The clock comes standard with two gears for selecting chart speed. The 26 hour gear is a large diameter and has 22 teeth, while the 176 hour gear has the smaller diameter, and 18 teeth. Similarly, the 24 hour gear has 21 teeth and the 168 hour gear has 17 teeth. Be sure to install the correct gear over the corresponding shaft. If a gear is incorrectly installed, or if both gears are installed at the same time, severe damage may occur to the clock mechanism. Insert the key into the top of the clock, through the sliding door opening. Wind the clock in the direction of the arrow (counterclockwise) approximately seven turns. Do not force the winding key. The clock will automatically start keeping time. Remove the key and close the sliding door.

3.5 Remove the chart clip from the side of the clock drum. Select the appropriate chart and fill in the station number and date the chart was started. Place the right hand margin of the chart in line with the right side of the chart clip notch. Wrap the chart around the drum in a clockwise motion. The left-hand edge of the chart should overlap the right-hand edge. Place the chart clip over both layers of the chart and seat it in the notch. The lower edge of the chart should be flat against the base flange of the clock.

3.6 Place the clock over the main shaft and secure it with the knurled nut. Go to Step 3.14 for further instructions.

3.7 The following instructions (Steps 3.7 to 3.13) apply to the 1.5 VDC battery operated clock. Remove the clock from the packing box. Carefully remove the drum from the clock mechanism by twisting the drum counter-clockwise and lifting up on the drum.

3.8 Select the chart time interval and install the correct gear. The instrument is supplied with the seven day gear installed. Remove the black rubber hole plug and install the one day gear if desired. The one day gear is located inside the clock mechanism. Do not use both gears at the same time or severe damage may occur to the clock mechanism. Place the hole plug into the empty gear hole.

3.9 Use a 1.5 VDC "D" cell battery to operate the clock. Place the battery in the battery holder with the negative end facing the knurled screw or black wire. Alkaline batteries are recommended for colder environments and longer life. The clock will automatically begin operating.

3.10 Replace the clock drum over the clock mechanism and rotate. The notch in the top of the drum must be aligned with the slot in the base of the clock. Engage the 3 base plate pins and rotate the drum clockwise, locking the two pieces together.

3.11 Place the chart paper on the clock drum as described in Step 3.5.

3.12 Remove the two hex nuts from the clock shaft. Place the clock/clock shaft assembly through the base of the instrument and tighten both hex nuts. Be sure that the spacer bushing is between the instrument base and the clock assembly.

3.13 Turn the clock assembly so that the pen is set to the correct time mark.

3.14 Remove the shipping clip on the pen. If no pen is already attached, install a cartridge pen onto the pen arm and remove the protective cap exposing the pen tip. Place the pen onto the chart using the pen lift lever mounted on the base of the instrument.

3.15 The span of the barograph has been factory adjusted for a 100 mb range. The only operational adjustment required is to compensate for altitude. Loosen the knurled screw on the side of the altitude adjustment assembly and adjust the knurled nut on top for the correct barometric pressure reading. A correct reading can be obtained from a local airport or weather forecast center. The knurled screw on the pen arm can be used for fine adjustments. Be sure to tighten the knurled screw after making the adjustments.

3.16 Close the lock the instrument cover. If the instrument is located outdoors, it should be placed into an Instrument Shelter, such as Model 8120, to protect it from rain and dust. The shelter provides free circulation of air at all times. The microbarograph must be shielded from solar radiation. Direct solar radiation on the instrument may cause temperature errors. For best and most accurate results, place the microbarograph into an instrument shelter and install over short grass. If used indoors, any convenient place is suitable.

3.17 Replace the pen tip cap whenever the instrument is to be stored for long periods of time to prolong the pen life.

4.0 THEORY OF OPERATION

4.1 The barometric pressure element is a multiple aneroid cell that has been completely evacuated. One end is attached to the pen linkage while the other is attached to the instrument base. Ambient pressure fluctuations will cause the aneroid to expand or contract. These changes are mechanically linked to the pen arm. The 100 mb span can be adjusted upward or downward to cover a different altitude by simply rotating the knurled knob attached to the altitude adjustment assembly. Slight pressure adjustments are accomplished by adjusting the knurled screw on the pen arm.

4.2 A bimetal strip is located between the aneroid cells and the pen arm to compensate for changes in ambient temperature.

4.3 The clock is self-contained and revolves around a stationary center shaft. Both the spring wound clock and 1.5 VDC battery clock have a gear change option of one or seven days. The 31 day clock has only a single gear. The 31 day clock is only available in 1.5 VDC battery operation.

4.4 The 26 hour/176 hour clock chart paper is designed to allow the user to change charts after the time period of interest without overwriting existing data.

5.0 CALIBRATION

5.1 Calibration of this instrument is a very delicate operation. Only a qualified instrument technician with precision instruments should attempt this procedure. If assistance is required, please contact the Qualimetrics Customer Service Department.

5.2 Place the instrument into a test chamber at a constant pressure and vary the temperature. Loosen the small screw on the bimetal strip assembly and adjust the slide assembly until the changes in temperature do not affect the barometric pressure readings.

5.3 Make the span adjustment using the following procedure. Place the instrument into a test chamber and bring the pressure to a reading close to the bottom of the chart scale. Note the readings. Vary the pressure to the high end of the chart. If an error in the span is observed, adjust the linkage on the pen pivot shaft. Shorten the pen pivot shaft to increase pen travel. Repeat this step until no further adjustments are required. Make only small adjustments, measuring the shaft length for each test.

5.4 The clocks have an internal adjustment for speed on the escapement mechanism. Moving the adjustment arm toward "+" will speed up the clock, while moving it toward "-" will slow it down.

5.5 To open a 1.5 VDC battery operated clock, twist the clock drum counter-clockwise and lift upward. The adjustment will be on the clock mechanism.

5.6 To open a spring wound clock, remove the three screws on the side of the drum and lift it off. The adjustment is also on the clock mechanism.

5.7 Calibration of the clocks can be made by a reputable time piece repair person or by the Qualimetrics Customer Service Department.

6.0 MAINTENANCE

6.1 The instrument should be routinely maintained preventing dust and dirt build-up. Whenever a chart change is required, simply brush the dust and dirt from the instrument. This type of preventive maintenance will provide long reliable recorder operation. At routine intervals, 3 to 6 months, clean all pivot points with solvent and with a small brush apply a light coat of instrument oil.

6.2 Alkaline batteries should be used for battery operated clocks. Change batteries every six months.

6.3 The clock mechanism should be cleaned and adjusted by a time piece repair person, annually.

6.4 For instruments equipped with the V-point pen tips, the flow of ink may be started by drawing a piece of cellophane, or smooth, lint-free paper, between the nibs of the point to clean and wet the inner faces. Thin material should be used to prevent the nibs of the point from being permanently bent or separated. It should be inserted into the slot only one-half and depth of the slot. The pen should be held away from the chart with the pen bar during the cleaning operation. The material should be drawn through the nibs with a motion directed away from the ink reservoir and toward the point. Cartridge pens require no maintenance other than replacement whenever the trace becomes to faint to read or stops writing altogether.

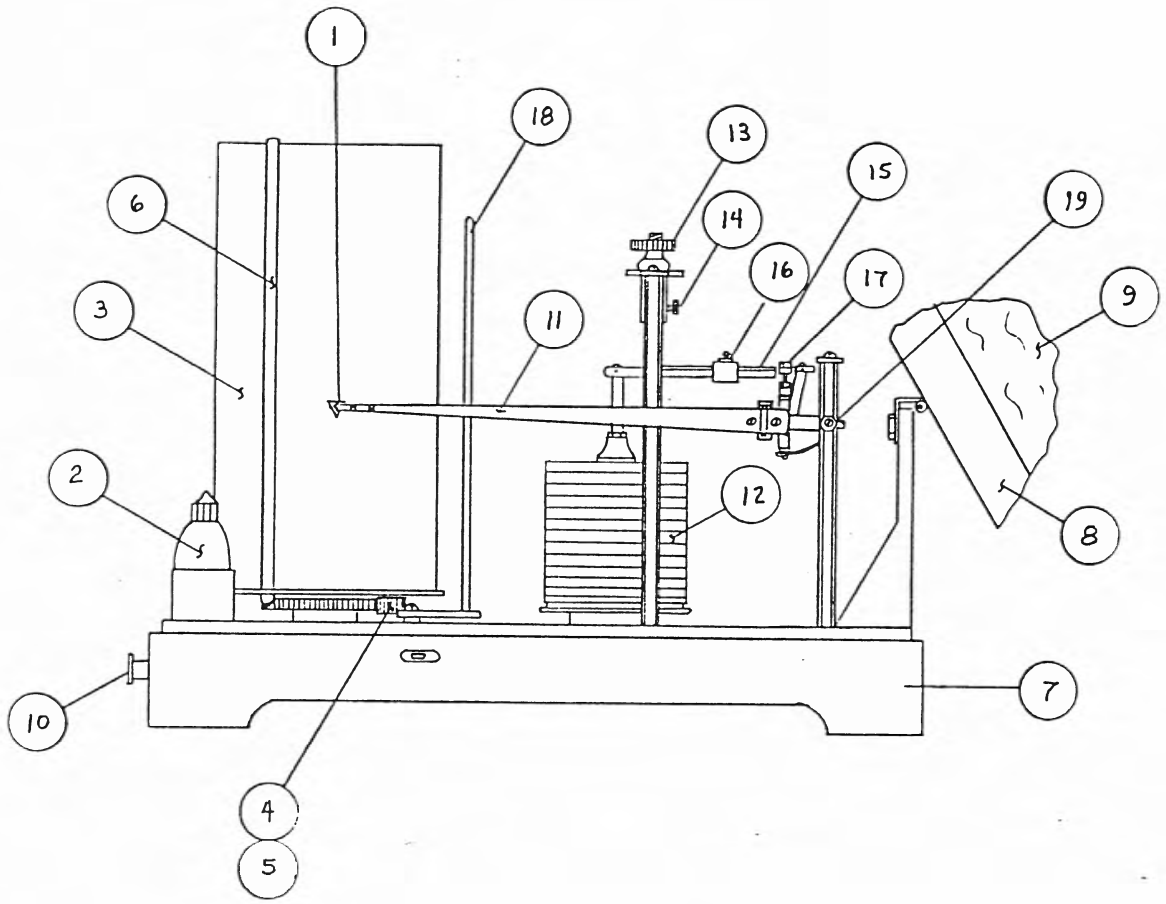
6.5 Ink that is exposed to air tends to absorb water and becomes diluted, especially in rainy or damp weather. When the trace on the chart becomes faint or otherwise unsatisfactory, remove the ink from the pen with blotting paper and refill with new ink. Keep the ink bottle tightly closed. Reservoir ink is not required and not furnished with instruments equipped with cartridge pen tips.

7.0 PARTS LIST

7.1 The following pages include assembly drawings and parts list for this instrument. Please note that the parts lists are arranged in assembly/subassembly form. Each subassembly is listed on a separate page. Subassemblies and parts are listed in the smallest economical size available from Qualimetrics.

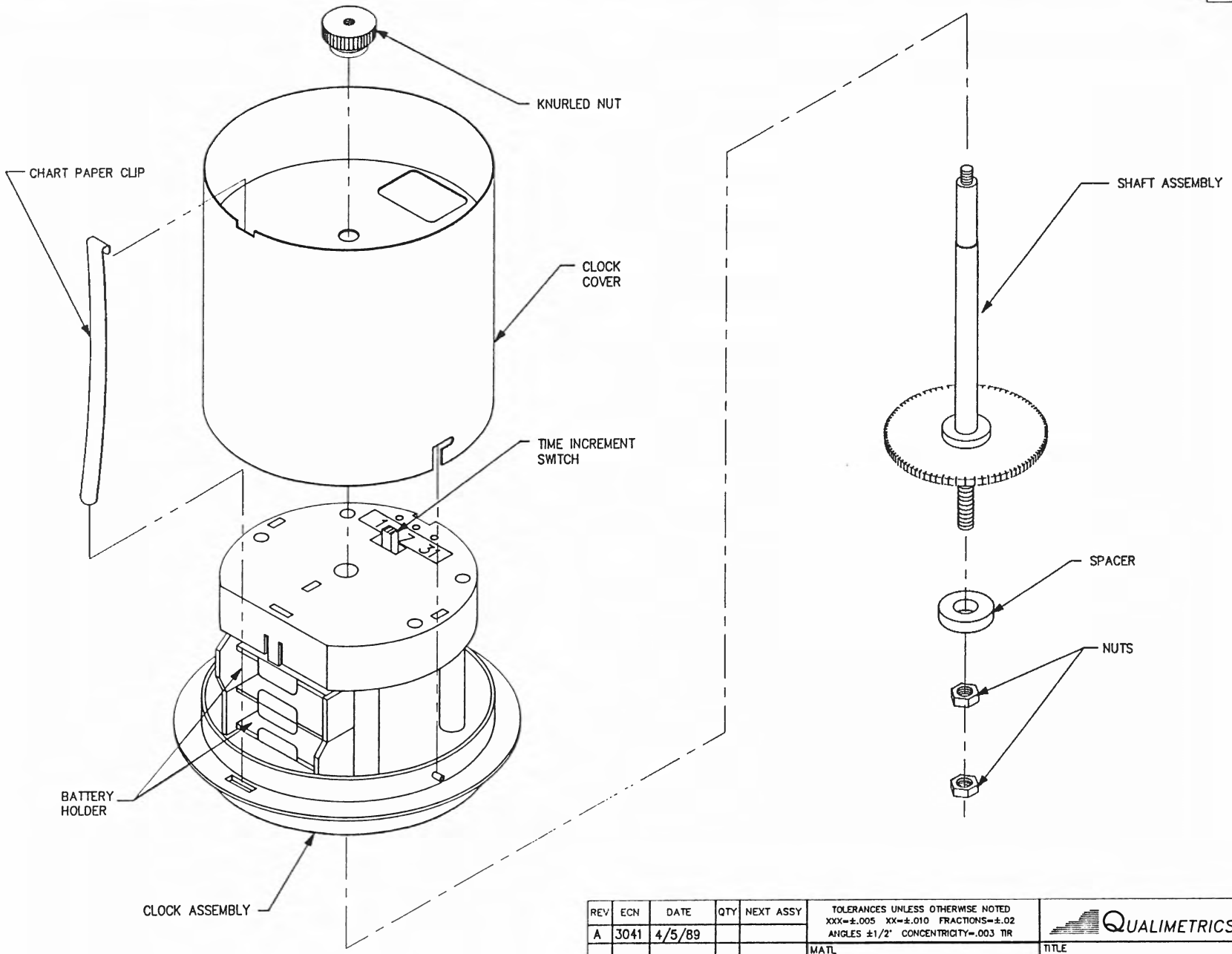
8.0 WARRANTY

8.1 All instruments are warranted for one year, unless otherwise specified, against defects in material or workmanship. Should any instrument prove to be defective within the warranty period, upon written notice and return of the instrument freight prepaid, Qualimetrics will, at its option, repair or replace the defective unit and return it freight collect. Instruments abused, improperly used or installed, and modified or altered by others, may cancel warranty.



TITLE: MICROBAROGRAPH ASSEMBLY MODELS 7010, 7011, AND 7012 7013, AND 7014		
SCALE: NONE	ENGR. APPV.: RDH	RELEASE DATE: 6-10-1977
DRAWN BY: RDH	MFG. APPV.	DOCUMENT NO.: 7010-03 SIZE: C
	MGT. APPV	SHEET: 1 OF: 1

8828-A03



REV	ECN	DATE	QTY	NEXT ASSY
A	3041	4/5/89		

TOLERANCES UNLESS OTHERWISE NOTED
XXX=±.005 XX=±.010 FRACTIONS=±.02
ANGLES ±1/2° CONCENTRICITY=.003 TIR

MATL

FINISH

ENGR RJ DT 4/5/89

APPROVED MW DT 4/5/89

QUALIMETRICS, Inc.

C

TITLE
ASSEMBLY,
1, 7, OR 31 DAY CLOCK

MOD. USAGE

SHEET 1 OF 1

BY K. Weber

DATE 4-5-89

SCALE NONE

DWG. NO. 8828-A03

QUALIMETRICS, INC.
BILL OF MATERIALS REPORT

MASTER PART # 7010-7014
DESCRIPTION MICROBAROGRAPH

COMPONENT PART #	DESCRIPTION	QTY	REF NO.
ECN	ENGINEERING CHANGE NOTICE	0	2409
MAN	MANUAL	1	7010-001
8810	PEN, V POINT, CAPILLARY	REF	
8815	PEN, BUCKET, CAPILLARY	REF	
88101	PEN, CARTRIDGE, BLUE	1	1
88102	PEN, CARTRIDGE, RED	REF	
8820	INK, CAPILLARY, BLUE	REF	2
8827	CLOCK, SPRING, 1/7 DAY	1	3
8833	CLOCK, BATTERY, 1/7 DAY	REF	7011
8838	CLOCK, BATTERY, 31 DAY	REF	7012
M666067	CLOCK, SPRING, 1/7 DAY	REF	7013
M666068	CLOCK, BATTERY, 1/7 DAY	REF	7014
88262	GEAR, 26 HOUR, 22 TEETH	1	4
M666002	GEAR, 24 HOUR, 21 TEETH	REF	7013, 7014
88263	GEAR,176 HOUR, 18 TEETH	1	5
M666003	GEAR,168 HOUR, 17 TEETH	REF	7013, 7014
88271	CLIP, CHART DRUM	1	6

QUALIMETRICS, INC.
BILL OF MATERIALS REPORT

MASTER PART # 7010-7014
DESCRIPTION MICROBAROGRAPH

COMPONENT PART #	DESCRIPTION	QTY	REF NO.
T970000	INSTRUMENT BASE	1	7
T970001	INSTRUMENT COVER	1	8
T970002	GLASS WINDOW	1	9
T970003	DOOR LATCH	1	10
T970004	PEN ARM	1	11
T970005	ANEROID CELL	1	12
T970006	ALTITUDE ADJUSTMENT KNOB	1	13
T970007	KNURLED LOCK SCREW	1	14
T970008	BIMETAL STRIP	1	15
T970009	ADJUSTMENT SLIDE	1	16
T970010	FINE ADJUSTMENT SCREW	1	17
T970011	PEN LIFTER	1	18
T970012	PEN PIVOT SHAFT ASSEMBLY	1	19