



- 1 — D4
- 2 — A1
- 3 — A2
- 4 — A4
- 5 — B1
- 6 — SIGNAL COMMON
- 7 — OPEN
- 8 — +27.5VDC
- 9 — B2
- 10 — B4
- 11 — C1
- 12 — C4
- 13 — C2
- 14 — +13.75VDC
- 15 — GROUND

- A — +5.000±.001VDC
- B — OUTPUT
- C — GROUND

J1 J2

**WIRING DIAGRAM**

NOTE 1. DOTTED LINES REPRESENT CONFIGURATION FOR LIGHTED UNITS.  
 2. 'CALIBRATED TO 20,000 FEET' MARKING IN WHITE WILL BE ON THE 10,000-FT POINTER (BELOW 'ALT' MARKING) ON EACH 20,000 FT RANGE ALTIMETER.

|      |         |      |      |         |      |          |        |
|------|---------|------|------|---------|------|----------|--------|
| REV. | DATE    | CHK. | REV. | DATE    | CHK. | NAME     | DATE   |
| C    | 3/6/09  |      |      |         |      | PREP. BY |        |
| A    | 1/13/00 |      | B    | 7/10/03 |      | APPR. BY | 7/1/98 |
|      |         |      |      |         |      | CHECKER  |        |

|  |   |                                     |                   |
|--|---|-------------------------------------|-------------------|
| <b>UNITED INSTRUMENTS, INC.</b><br>3625 Comotara Avenue<br>Wichita, KS 67226 | <b>TITLE:</b><br>INDICATOR - ENCODING ALTIMETER | <b>SPEC. NO.:</b><br>UI5035P2B-P158 | <b>ISSUE</b><br>C |
|  |   | PAGE 1 OF 8 PAGES                   |                   |

UNITED INSTRUMENTS, INC.

| <u>PART NO.</u> | <u>CODE NO.</u> | <u>RANGE</u> | <u>BARO SCALE</u> |
|-----------------|-----------------|--------------|-------------------|
| 5035P2B-P158    | P.158           | 20,000 FT    | DUAL              |
| 5035PB-P159     | P.159           | 35,000 FT    | DUAL              |

NOTES: 1. EACH ALTIMETER BECOMES INTERNALLY LIGHTED WITH THE ADDITION OF THE FOLLOWING LIGHTING COMPONENTS:

|                          | <u>BEZEL ASSEMBLY</u> | <u>LIGHT TRAY ASS'Y</u> |
|--------------------------|-----------------------|-------------------------|
| PLASTIC WEDGE LIGHTING   | BA3-001-003           | BA5(or 14,or 28)-24-BW3 |
| HEA GLASS WEDGE LIGHTING | BA3-001-003G-901      | BA5(or14,or28)-24-BW3G  |

2. DELETED

3. INDIVIDUAL TEST DATA SHEET SHALL BE ATTACHED TO EACH ALTIMETER.

CUSTOMER  
ACCEPTANCE  
SPECIFICATION  
UNITED INSTRUMENTS, INC.

TITLE:  
  
INDICATOR --  
ENCODING ALTIMETER

SPEC. NO:  
  
UI5035P2B-P158

ISSUE  
  
C

1.0. GENERAL

- 1.1. PURPOSE: This specification defines standards of minimum performance and conditions under which these standards apply for the 5035PB series Altimeter – Encoder.
- 1.2. DESCRIPTION: The 5035PB series Altimeter – Encoder is for use on aircraft to indicate the height of the aircraft above a reference point, generally mean sea level, assuming standard conditions of temperature and pressure. The altimeter measures the existing barometric pressure. Since atmospheric pressure varies with altitude, this pressure is indicated on the dial in feet of altitude. The altimeter provides an electrical output proportional to the barometric setting, which is manually adjustable to barometric pressure.

The internal encoder provides altitude signals in accordance with ICAO altitudes code requirements. The code output is unaffected by the knob rotations associated with usual altimeter operation.

The sensing element (diaphragm assembly) and gear train are encased in a die cast aluminum case. The altitude is indicated in a three pointer display. An increase in altitude results in a clockwise rotation of the pointers. The gear train driving the pointer also drives the encoder thus permitting accurate correlation. Electrical power failure or circuit component failure cannot impair the ability of the altimeter to function normally.

- 1.3. OPERATING LIMITS: The 5035PB series Altimeter operates through a maximum calibrated range of -1,000 to 35,000 feet. Encoder's input voltage variation should not exceed plus or minus 15 percent. Encoder output resolution is 100 feet. The signal output to common closed circuit voltage drop will not exceed 0.7 VDC at 0.005 AMP. Input voltage variation for barometric correction shall not exceed plus or minus 0.2 percent.
- 1.4. BAROMETRIC SCALE ADJUSTMENT: The barometric scale setting with its electrical output is adjustable by means of an adjustment knob located in the lower left hand corner of the altimeter. Due to the variances in the barometric pressure, it is necessary to set the barometric scale to the existing barometric pressure. The existing barometric pressure may be obtained from the weather station or control tower. Rotation of the knob for barometric scale adjustment results in rotation of the pointers on the altitude dial, and a consistent change in the electrical output. This relationship of pointers to barometric scale is based on standard conditions of pressure and temperature. Mechanical stops are provided to prevent incorrect readings of the pressure scale when the limits of the barometric scale are exceeded.

2.0. STANDARD TEST CONDITIONS

- 2.1. ATMOSPHERIC CONDITIONS: Unless otherwise specified, all tests required by this specification shall be conducted at an atmospheric pressure of approximately 29.92 inches of mercury and at the ambient temperature of approximately 25°C and at a relative humidity of not greater than 85 percent.
- 2.2. VIBRATION TO MINIMIZE FRICTION: Unless otherwise specified, all tests for performance may be conducted with the instrument subjected to a vibration of 0.002 to 0.005 inch double amplitude at a frequency of 1,500 to 2,000 cycles per minute.
- 2.3. POSITION: Unless otherwise specified, all tests shall be made with the altimeter mounted in its normal operating position.

CUSTOMER  
ACCEPTANCE  
SPECIFICATION  
UNITED INSTRUMENTS, INC.

TITLE:  
  
INDICATOR –  
ENCODING ALTIMETER

SPEC. NO:  
  
UI5035P2B-P158

ISSUE  
  
C

3.0. INDIVIDUAL PERFORMANCE REQUIREMENTS

3.1. SCALE ERROR: With the barometric pressure scale at 29.92 inches of mercury, the altimeter shall be subjected successively to pressure corresponding to the altitude specified in Table I up to the maximum calibrated range of the altimeter being tested. The reduction in pressure shall be made at a rate not in excess of 20,000 feet per minute to within approximately 2,000 feet of the test point. The test point shall be approached at a rate compatible with the test equipment. The altimeter shall be kept at the pressure corresponding to each test point for at least one minute, but not more than ten minutes, before the reading is taken. The error at all test points must not exceed the tolerances specified in Table I. Following a delay of four hours this test may be repeated and the altimeter shall meet tolerances as specified in Table I. B

3.2. HYSTERESIS: The hysteresis test shall begin not more than fifteen minutes after the altimeter's initial exposure to the pressure corresponding to the upper limit of the scale error test. While the altimeter is at this pressure, the hysteresis test shall commence. Pressure shall be increased at a rate simulating a descent in altitude at the rate of 5,000 to 20,000 feet per minute until within 3,000 feet of the first test point (50 percent of maximum altitude). The test point shall then be approached at a rate of approximately 3,000 feet per minute. Within 10 seconds after the pressure has been stabilized at the test point, the instrument indication shall be within 100 feet of the scale error reading obtained in Scale Error test. The altimeter shall be kept at this pressure for at least 5 minutes, but not more than 15 minutes before the reading is taken. After the reading has been taken, the pressure shall be increased further, in the same manner as before, until the pressure corresponding to the second test point (40 percent of maximum altitude) is reached. The altimeter shall be kept at this pressure for at least one minute, but not more than 10 minutes, before the test reading is taken. After the reading has been taken, the pressure shall be increased further in the same manner as before, until atmospheric pressure is reached. The reading of the altimeter at either of the two test points shall not differ by more than 75 feet from the reading of the altimeter for the corresponding altitude recorded during the scale error test prescribed in 3.1. B

3.3. AFTER EFFECT: Not more than five minutes after the completion of the hysteresis test, the reading of the altimeter (corrected for any change in atmospheric pressure) shall not differ from the original reading by more than 30 feet.

3.4. FRICTION: The altimeter shall be subjected to a steady rate of decrease of pressure of approximately 750 feet per minute. At each altitude listed in Table II, the altimeter reading shall be noted before and after vibration. The difference shall not exceed the tolerance shown. B

3.5. CASE LEAK: The leakage of the altimeter case, when the pressure within it corresponds to an altitude of 18,000 feet, shall not change the altimeter reading by more than 100 feet per minute.

3.6. POSITION ERROR: With atmospheric pressure applied to the instrument, the difference between pointer indication when the instrument is in normal operating position and when it is in any other position shall not exceed 20 feet.

3.7. BAROMETRIC SCALE

3.7.1. BAROMETRIC SCALE ERROR: At constant atmospheric pressure, the barometric pressure scale shall be set at each pressure (falling within its range of adjustment) listed in Table III and shall cause the pointer to indicate the equivalent altitude difference shown in Table III with a tolerance of 25 feet.

CUSTOMER  
ACCEPTANCE  
SPECIFICATION  
UNITED INSTRUMENTS, INC.

TITLE:  
  
INDICATOR -  
ENCODING ALTIMETER

SPEC. NO:  
  
UI5035P2B-P158

ISSUE  
  
C

- 3.7.2. BAROMETRIC CORRECTION OUTPUT: With application of specified power input, the output readings obtained at corresponding barometric settings in Table IV in the order listed, shall not exceed the tolerances specified. The test shall be repeated at each test point marked with an asterisk, in the reverse order.
- 3.8. POINTER OSCILLATION: There shall be no more than 20 feet of pointer oscillation when the instrument is subjected to vibration when mounted in normal operating position at frequencies to be varied uniformly from 5 to 50 cycles per second at a maximum double amplitude of .020 inches and a maximum acceleration of 1.5 g's; and 50 to 500 cycles per second at a maximum acceleration of 0.5 g's.
- 3.9. ENCODER SIGNAL ERROR TEST:
- 3.9.1. With the barometric scale set exactly on 29.92 inches of mercury (1013.25 millibars) and vibration applied to remove friction (paragraph 2.2.), connect the Altimeter Encoder to a suitable encoder-transponder tester. Connect the static pressure port to a controlled pressure source.
- 3.9.2. The altitude code error is determined by noting the altitude indication of the Altimeter Encoder pointers at the instant of the code transition to the next consecutive altitude code. To obtain accurate reading of the pointers at the instant of transition, the rate of change of the pointers when approaching the transition point must not exceed 1,000 feet per minute and not less than 500 feet per minute.
- 3.9.3. Apply pressure to successively test the altitude code transition at the points shown in Table V.

CAUTION

The barometric scale must be set exactly on 29.92 inches of mercury (1013.25 mb) to synchronize the pointers with the altitude code output.

- 4.0. ENVIRONMENTAL CONDITIONS:  
When installed in accordance with United Instruments, Inc. instructions the Altimeter Encoder will function in the following environmental ranges:
- 4.1. TEMPERATURE: -30°C to 50°C
- 4.2. ALTITUDE: -1,000 to 35,000 feet
- 4.3. HUMIDITY: 0% to 95% at 32°C
- 4.4. VIBRATION:
- |  | <u>Frequency</u> | <u>Max. Double Ampl.</u> | <u>Max. Accel.</u> |
|--|------------------|--------------------------|--------------------|
|  | 5 to 50 Hz       | .020 inch                | 1.5 g's            |
|  | 50 to 500 Hz     | ----                     | 0.5 g's            |
- 5.0. INSTALLATION INSTRUCTIONS:  
The aircraft static system must meet the requirements of FAR Part 43 App. E. The altimeter connection to the static system must include a flexible hose or tubing to provide vibration isolation.
- 5.1. FITTING: The threads of the 1/8-27ANPT fitting to be inserted should be coated to prevent seizing or leaking.
- 5.2. ELECTRICAL CONNECTOR:
- 5.2.1. ENCODER: Cannon DA-15S or equivalent, to mate with Cannon DAH-15P-201.
- 5.2.2. BAROMETRIC SIGNAL: Cannon KPT06B8-3S, or equivalent, to mate with Detronics DT1H-8-3P.
- 5.2.3. WIRING: Connector wiring shall be as shown on page 1 of this specification.

CUSTOMER  
ACCEPTANCE  
SPECIFICATION  
UNITED INSTRUMENTS, INC.

TITLE:  
  
INDICATOR –  
ENCODING ALTIMETER

SPEC. NO:  
  
UI5035P2B-P158

ISSUE  
  
C

PAGE 5 OF 8 PAGES

TABLE I  
SCALE ERROR

| ALTITUDE<br>(FT) | EQUIVALENT PRESSURE<br>(IN.Hg) | TOLERANCE<br>(± FT) |
|------------------|--------------------------------|---------------------|
| -1,000           | 31.018                         | 20                  |
| 0                | 29.921                         | 20                  |
| 500              | 29.385                         | 20                  |
| 1,000            | 28.856                         | 20                  |
| 1,500            | 28.335                         | 25                  |
| 2,000            | 27.821                         | 30                  |
| 3,000            | 26.817                         | 30                  |
| 4,000            | 25.842                         | 35                  |
| 6,000            | 23.978                         | 40                  |
| 8,000            | 22.225                         | 60                  |
| 10,000           | 20.577                         | 80                  |
| 12,000           | 19.029                         | 90                  |
| 14,000           | 17.577                         | 100                 |
| 16,000           | 16.216                         | 110                 |
| 18,000           | 14.942                         | 120                 |
| *20,000          | 13.750                         | 130                 |
| 22,000           | 12.636                         | 140                 |
| 25,000           | 11.104                         | 155                 |
| 30,000           | 8.885                          | 180                 |
| 35,000           | 7.041                          | 205                 |

NOTE: An asterisk represents the last test point for 20,000 ft range altimeter.

**CUSTOMER  
ACCEPTANCE  
SPECIFICATION  
UNITED INSTRUMENTS, INC.**

**TITLE:**  
  
INDICATOR –  
ENCODING ALTIMETER

**SPEC. NO:**  
  
UI5035P2B-P158

**ISSUE**  
  
C

**PAGE 6 OF 8 PAGES**

TABLE II

FRICTION

| <u>ALTITUDE<br/>(FT)</u> | <u>TOLERANCE<br/>(± FT)</u> |
|--------------------------|-----------------------------|
| 1,000                    | 70                          |
| 2,000                    | 70                          |
| 3,000                    | 70                          |
| 5,000                    | 70                          |
| 10,000                   | 80                          |
| 15,000                   | 90                          |
| *20,000                  | 100                         |
| 25,000                   | 120                         |
| 30,000                   | 140                         |
| 35,000                   | 160                         |

NOTE: An asterisk represents the last test point for 20,000 ft range altimeter.

TABLE III

PRESSURE - ALTITUDE DIFFERENCE

| <u>PRESSURE<br/>(IN.Hg)</u> | <u>ALTITUDE<br/>DIFFERENCE<br/>(FT)</u> | <u>PRESSURE<br/>(MB)</u> | <u>ALTITUDE<br/>DIFFERENCE<br/>(FT)</u> |
|-----------------------------|---|--------------------------|---|
| 28.10                       | - 1,727                                 | 950                      | - 1,766                                 |
| 28.50                       | - 1,340                                 | 965                      | - 1,337                                 |
| 29.00                       | - 863                                   | 980                      | - 913                                   |
| 29.50                       | - 392                                   | 995                      | - 495                                   |
| 29.92                       | 0                                       | 1013                     | 0                                       |
| 30.50                       | + 531                                   | 1030                     | + 461                                   |
| 30.90                       | + 893                                   | 1045                     | + 863                                   |
| 30.99                       | + 974                                   | 1050                     | + 996                                   |

NOTE: When the barometric pressure is set at 29.92 IN.Hg, the reading in the millibar window shall be 1013.25 ±0.20 millibar, as viewed approximately 12 inches away from the dial.

CUSTOMER  
ACCEPTANCE  
SPECIFICATION  
UNITED INSTRUMENTS, INC.

TITLE:  
INDICATOR -  
ENCODING ALTIMETER

SPEC. NO:  
UI5035P2B-P158

ISSUE

C

PAGE 7 OF 8 PAGES

TABLE IV

BAROMETRIC CORRECTION OUTPUT

| <u>PRESSURE</u><br><u>(In.Hg)</u> | <u>OUTPUT</u><br><u>(VDC)</u> | <u>TOLERANCE</u><br><u>(±VDC)</u> |
|-----------------------------------|-------------------------------|-----------------------------------|
| 28.10                             | 0.484                         | 0.020                             |
| 28.50                             | 1.029                         | 0.020                             |
| *29.00                            | 1.701                         | 0.020                             |
| 29.50                             | 2.364                         | 0.020                             |
| *29.92                            | 2.916                         | 0.020                             |
| 30.06                             | 3.098                         | 0.020                             |
| *30.50                            | 3.664                         | 0.020                             |
| 30.90                             | 4.174                         | 0.020                             |
| 30.99                             | 4.288                         | 0.020                             |

TABLE V

ALTITUDE CODE OUTPUT ERROR

| <u>ALTITUDE</u><br><u>CODE</u><br><u>OUTPUT</u><br><u>(FT)</u> | <u>POINTER INDICATION</u>                           |      |   |      |
|--|---|------|---|------|
|  | <u>INCREASING</u><br><u>ALTITUDE</u><br><u>(FT)</u> |      | <u>DECREASING</u><br><u>ALTITUDE</u><br><u>(FT)</u> |      |
| 0  | -50   | ± 50 | 50  | ± 50 |
| 1,000  | 950   | ± 50 | 1,050   | ± 50 |
| 2,000  | 1,950   | ± 50 | 2,050   | ± 50 |
| 3,000  | 2,950   | ± 50 | 3,050   | ± 50 |
| 4,000  | 3,950   | ± 50 | 4,050   | ± 50 |
| 6,000  | 5,950   | ± 50 | 6,050   | ± 50 |
| 8,000  | 7,950   | ± 50 | 8,050   | ± 50 |
| 10,000   | 9,950   | ± 50 | 10,050  | ± 50 |
| 16,000   | 15,950  | ± 50 | 16,050  | ± 50 |
| 20,000   | 19,950  | ± 50 | 20,050  | ± 50 |
| 25,000   | 24,950  | ± 50 | 25,050  | ± 50 |
| 30,000   | 29,950  | ± 50 | 30,050  | ± 50 |
| 35,000   | 34,950  | ± 50 | 35,050  | ± 50 |

CUSTOMER  
ACCEPTANCE  
SPECIFICATION  
UNITED INSTRUMENTS, INC.

TITLE:  
  
INDICATOR -  
ENCODING ALTIMETER

SPEC. NO:  
UI5035P2B-P158

PAGE 8 OF 8

ISSUE  
C  
PAGES