



SERVICE/PARTS MANUAL

SERIES 400/800 ENCODING ALTIMETER (Types EA-401A and EA-801A)

NOTE

This manual contains recommended service information and illustrated parts list applicable to the Cessna 400/800 Series Encoding Altimeter (Types EA-401A and EA-801A). This information is supplemented and kept current by Service Letters and Service News Letters published by Cessna Aircraft Company. Recommended replacement parts for your 400/800 Series Encoding Altimeter are available from the Cessna Service Parts Center.

The information in this Service/Parts Manual does not profess to include all the details of design, production, or variations of equipment, or to cover all the possible contingencies which may arise during operation, installation, or maintenance. Should special problems arise or further information be desired, contact the Service Department of Cessna Aircraft Company.

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SECTION 1

GENERAL INFORMATION

1-1. SCOPE.

This manual contains general information, installation, operation, trouble shooting, maintenance, and parts information for the EA-401A Encoding Altimeter and difference data for the EA-801A Encoding Altimeter.

1-2. GENERAL.

The Encoding Altimeter (figure 1-1) is a panel mounted barometric altimeter with a built-in optical type altitude encoder. Altitude is indicated by dial and digital readouts.

The Encoding Altimeter provides aircraft altitude information to a pilot and to the aircraft transponder. Altitude pressure is sensed through an aneroid capsule and a patented displacement detector. Visual displays, dial pointer and digital drum counter are driven from a servo system. The servo system is indirectly driven from the aneroid capsule through photocell amplifier which detects pressure induced movement of the capsule. Altitude range is from -1000 to 35,000 feet.



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Figure 1-1. EA-401A Encoding Altimeter

Barometrically sensed altitude information is encoded, in digital form, by an optical encoder. These data, a ten bit word, are sent to the aircraft transponder for transmission to an ATCRBS (Air Traffic Control Radar Beacon System) ground beacon during Mode C (altitude) reporting to that facility. The encoding function produces a ten bit word in the ICAO (International Civil Aviation Organization) code corresponding to the altitude being sensed. The encoder, a solid state optical type, is directly connected to the Encoding Altimeter's servo gear train.

Altitude indications are displayed through a single dial pointer and a supplementary digital readout. The dial has ten major divisions of one hundred feet per major division. Major divisions are further subdivided into five equally spaced increments of twenty feet each. Every revolution of the dial pointer is equal to one thousand feet of altitude. The digital readout indicates in both thousands and in hundreds of feet. A striped warning flag appears during a "power off" condition to block the digital readout from view.

The BAROSET knob, a front panel control, compensates for ambient atmospheric pressure. Adjustable range is from 28.1 to 31 in. Hg (946 to 1049 millibars). A four digit display, at the bottom of the dial, indicates adjusted setting. Encoded altitude data are not affected by BAROSET adjustments since encoded altitude is always referenced to standard pressure of 29.92 in. Hg.

Electrical connections to the Encoding Altimeter are made through a single connector on the rear of the unit. A static pressure line, from the aircraft pilot system, is connected to the rear of the Encoding Altimeter. Through this connection, exterior atmospheric pressure only is applied to the aneroid diaphragm assembly.

1-3. REFERENCE DATA.

Specifications for the Encoding Altimeter are listed in table 1-1.

TABLE 1-1. ENCODING ALTIMETER SPECIFICATIONS

Parameter	Specifications and/or Range
Input Voltage	14 Vdc or 28 Vdc
Range (Display and Encoding)	−1000 feet to 35,000 feet (@ 29.92 in. Hg)
Barometric Scale Range	28.10 in. Hg to 31 in. Hg or 946 millibars to 1049 millibars
Lag	Instantaneous altitude tracking greater than 20,000 feet/minute
Encoded Output	Logic "0" Output: Open, typically +5V from transponder. Logic "1" Output: +0.7V, 0.2 ma maximum
Certification	TSO-C10b, TSO-C88 (MTG-IP)
Dimensions	3¼" X 3¼" X 8" long
Weight	2½ pounds

1-4. EQUIPMENT SUPPLIED.

The encoding Altimeter is supplied for either 14 Vdc or 28 Vdc operation and with a baroset readout either in inches of mercury (in. Hg.) or in millibars. Part numbers assigned to identify each of the instruments and their differences are listed in table 1-2. The Encoding Altimeter is available with either illuminated or non-illuminated front panels.

1-5. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

Electrical interconnections between Encoding Altimeter, ATCRBS Transponder, and aircraft power and ground

are terminated in 19-pin plug connector P1, ARC PN 42816-0000 (not supplied), which mates with receptacle J1 on the rear of the Encoding Altimeter.

The Encoding Altimeter must be connected to the aircraft static line. Connection is made at the rear of the Encoding Altimeter through a 1/8-27 NPT connector which is not supplied.

1-6. EQUIPMENT SIMILARITIES.

There are basic similarities between EA-401A and EA-801A Encoding Altimeter comprising installation, operation, and maintenance. For specific details, refer to the Difference Data material located within the 800 Series section of this manual.

TABLE 1-2. MODEL IDENTIFICATION CHART FOR ENCODING ALTIMETERS

Part No. 42540-			Primary Power Vdc	Baroset Readout
Unlit Panel		Lighted Panel		
2114	and	5114	14	in. Hg
3114	and	6114	14	in. Hg
4114	and	7114	14	in. Hg
2214	and	5214	14	Millibars
3214	and	6214	14	Millibars
4214	and	7214	14	Millibars
2128	and	5128	28	in. Hg
3128	and	6128	28	in. Hg
4128	and	7128	28	in. Hg
2228	and	5228	28	Millibars
3228	and	6228	28	Millibars
4228	and	7228	28	Millibars

SECTION 2

INSTALLATION

2-1. POWER REQUIREMENTS.

Primary power requirements are either 14 Vdc or 28 Vdc depending on model selected. Interconnection with aircraft primary power source is through the 5 Ampere circuit breaker at the 14 Vdc or 28 Vdc MAIN power bus.

2-2. INSPECTION AND ADJUSTMENT.

Inspect Encoding Altimeter for obvious physical damage. Checkout dial face, electrical and static line connectors (figures 2-1 and 5-4), and cover assembly. BAROSET knob should turn evenly without binding. As BAROSET knob is rotated, dial readout for barometric pressure should indicate change and altitude dial pointer should advance (CW or CCW) depending on direction of rotation of BAROSET knob.

2-3. PREINSTALLATION BENCH TEST.

Prior to installation, bench test the Encoding Altimeter using this procedure. (See figures 2-1 and 5-3.)

- Step 1. Interconnect test cable (figure 5-3) between Encoding Altimeter and power supply only. Leave power supply OFF.
- Step 2. Connect and adjust rated primary power, as required, using substep a or b.
 - a. For a 14 volt model, connect 14 Vdc from power source to connector pin J1-P. Adjust DC OUTPUT voltage to 13.75 ± 0.5 Vdc.
 - b. For a 28 volt model connect 28 Vdc from power source to connector pin J1-N. Adjust DC OUTPUT voltage to 27.5 ± 0.5 Vdc.
- Step 3. Apply power to the Encoding Altimeter from power source. Striped warning flag should disappear from view.
- Step 4. Obtain accurate local barometric pressure. Using BAROSET knob, adjust dial readout for local barometric pressure. Dial pointer and digital drum counter readout should indicate local altitude.

2-4. INSTALLATION REQUIREMENTS.

2-5. Mechanical Installation.

The Encoding Altimeter should be rear mounted on a vibration isolated aircraft instrument panel within convenient reach and view of a pilot. Mechanical installation details and specific dimensions are shown on figure 2-1. The following procedure outlines the basic mechanical installation.

- Step 1. Locate mounting position and scribe markings on instrument panel for cutout. Use dimensions given on figure 2-1.
- Step 2. Drill three 5/32-inch holes for mounting screws at positions indicated on figure 2-1.
- Step 3. Drill 1/4-inch (0.125 radius) hole, for shaped cutout, at lower left of panel cutout.
- Step 4. Cutout mounting hole (3.150 diameter) and finish rough edges.
- Step 5. Finish shaping cutout that was started in step 3.
- Step 6. Mount and secure Encoding Altimeter with 6-32 steel screws of a length that will not penetrate more than 3/8 of an inch nor less than 1/4 of an inch into the instrument mounting hole.

2-6. Electrical Interconnections.

Electrical interconnections between Encoding Altimeter and aircraft primary power, aircraft light dimmer circuit, and transponder are outlined in this procedure. Detailed point-to-point wiring and required wire gauges are indicated on figure 2-2.

- Step 1. Implement all electrical interconnections to the Encoding Altimeter through 19-pin plug connector P1, PN 42816-0000 (not supplied).
- Step 2. Interconnect aircraft ground wire between aircraft primary power supply and connector pin P1-M.
- Step 3. Connect rated primary power from Encoding Altimeter side of aircraft MAIN 5 Ampere circuit breaker to connector P1 per substep a or b as required.

- a. For a 14 volt model, connect 14 Vdc aircraft power to connector pin P1-P.
- b. For a 28 volt model, connect 28 Vdc aircraft power to connector pin P1-N.

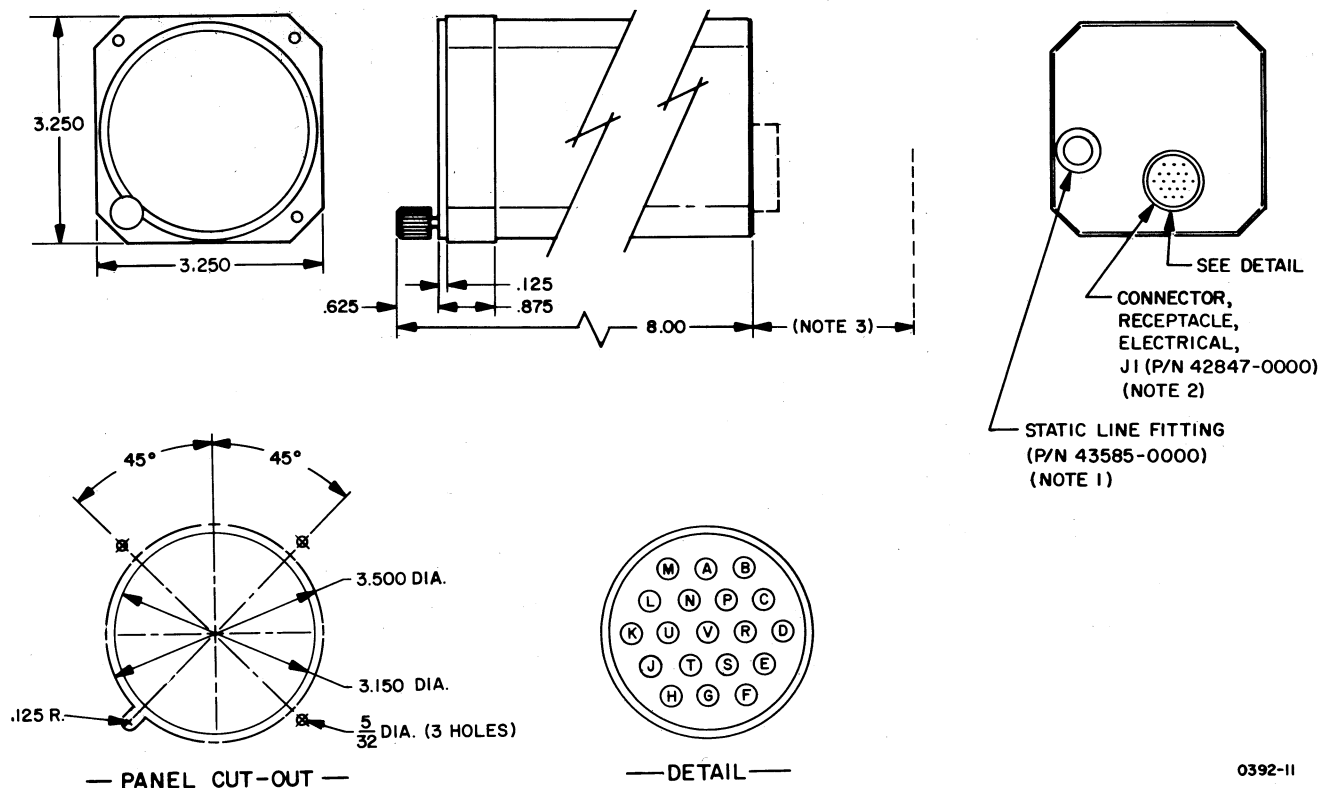
- Step 4. For lighted panel models only, interconnect aircraft light dimmer circuit with connector pin P1-V.
- Step 5. Interconnect designated pins of connector P1 with appropriate pins of aircraft transponder. Refer to applicable transponder manual for location of specific connections within that unit.

2-7. Static Line Connection.

CAUTION

Do not apply pressure to static connection port at rear of Encoding Altimeter. Application of pressure to this port will cause permanent damage to the aneroid diaphragm.

Connect aircraft static line to static connection port at rear of Encoding Altimeter. A 1/8-27 NPT connector is required, but not supplied, for this fitting. (See figures 2-1 and 5-4.)



Notes:

1. Static Line Fitting takes 1/8-27 NPT Connector PN 43585-0000 (not supplied).
2. Connector Receptacle J1 mates with Connector Plug P1, PN 42816-0000 (not supplied).
3. Allow 3 inches for plug removal.

Figure 2-1. Encoding Altimeter, Installation Diagram

Notes:

1. Connectors Data:
 - (a) J1: Connector Receptacle, Electrical, PN 42847-0000.
 - (b) P1: Connector Plug, PN 42816-0000 (not supplied).
2. For 28 volt model only: Connector pin P1-N is interconnected, as indicated, with 28 Vdc MAIN BUS. Connector pin P1-P is not connected.
3. For 14 volt model only: Connector pin P1-P is interconnected, as indicated, with 14 Vdc MAIN BUS. Connector pin P1-N is not connected.
4. Dial Illumination:
 - (a) For illuminated panel models only: Interconnect connector pin P1-V as indicated.
 - (b) For non-illuminated panel models only: Connector pin P1-V is not connected.
5. Interconnecting Wiring Information:
 - (a) All wires are stranded copper.
 - (b) All unmarked wires are No. 22 AWG with insulating jacket.
 - (c) All wires marked with asterisk (*) indicate No. 20 AWG.

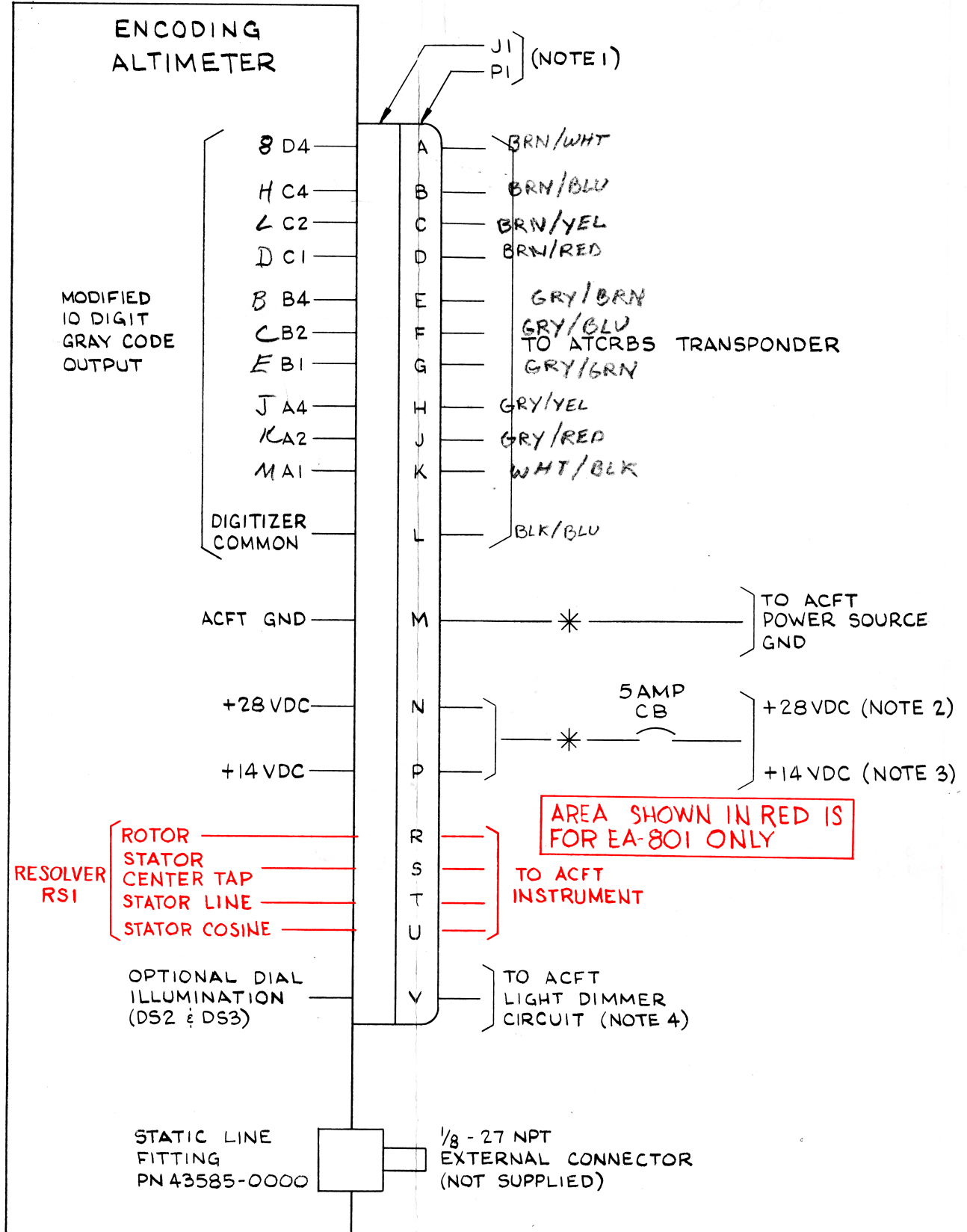
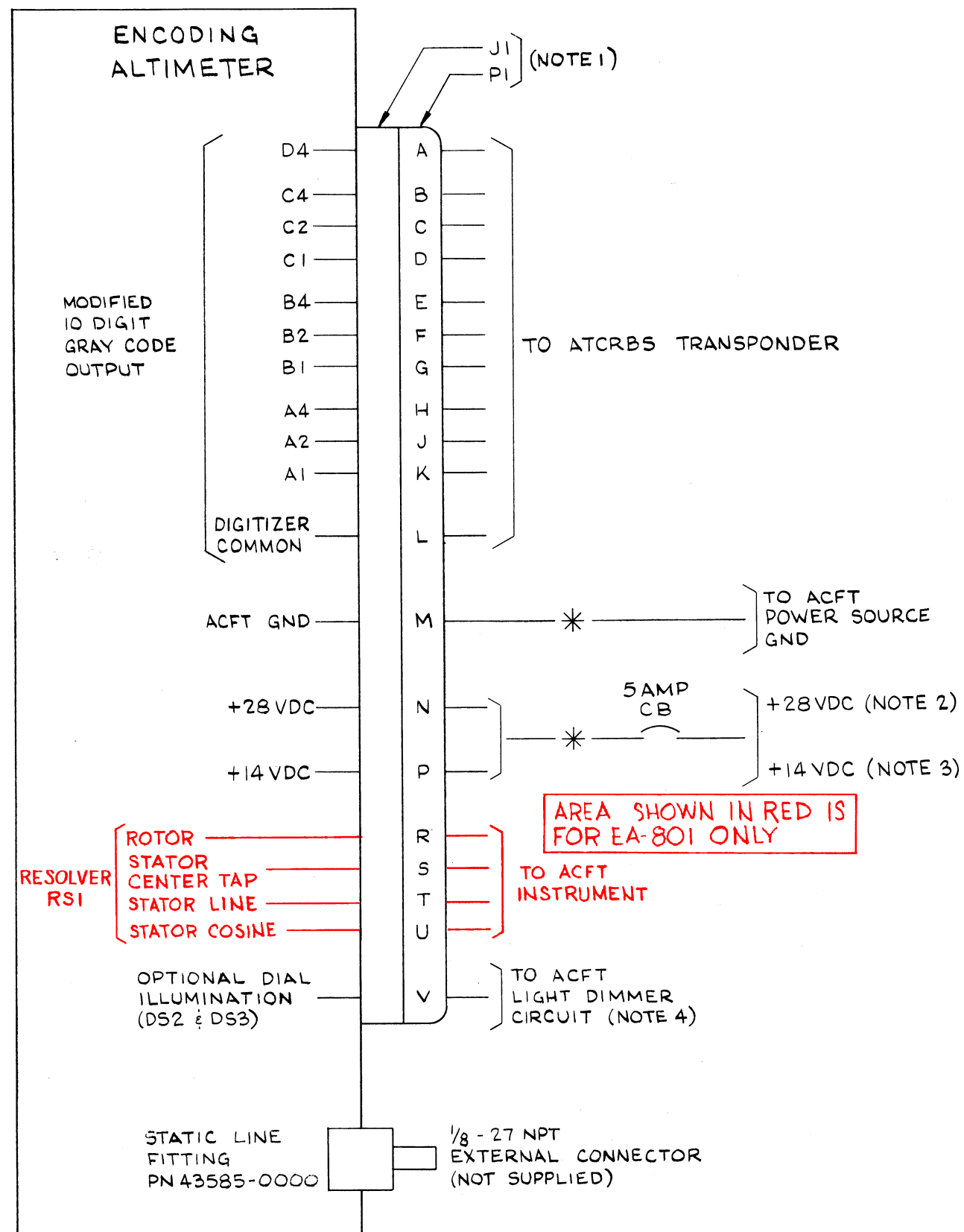


Figure 2-2. Encoding Altimeter, Interconnection Diagram



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Notes:

1. Connectors Data:

- (a) J1: Connector Receptacle, Electrical, PN 42847-0000.
- (b) P1: Connector Plug, PN 42816-0000 (not supplied).

2. For 28 volt model only: Connector pin P1-N is interconnected, as indicated, with 28 Vdc MAIN BUS. Connector pin P1-P is not connected.

3. For 14 volt model only: Connector pin P1-P is interconnected, as indicated, with 14 Vdc MAIN BUS. Connector pin P1-N is not connected.

4. Dial Illumination:

- (a) For illuminated panel models only: Interconnect connector pin P1-V as indicated.
- (b) For non-illuminated panel models only: Connector pin P1-V is not connected.

5. Interconnecting Wiring Information:

- (a) All wires are stranded copper.
- (b) All unmarked wires are No. 22 AWG with insulating jacket.
- (c) All wires marked with asterisk (*) indicate No. 20 AWG.

Figure 2-2. Encoding Altimeter, Interconnection Diagram

SECTION 3

OPERATION

3-1. FUNCTIONAL OPERATION.

The Encoding Altimeter provides the dual functions of visual altitude indications within an aircraft and encoding altitude data for further transmission to an ATCRBS ground beacon through an aircraft transponder.

3-2. Operating Limitations.

The Encoding Altimeter provides continuous altitude information, both visual and encoded data, over a range from -1000 to 35,000 feet. Below -1000 feet and above 35,000 feet, internal control circuits stop the Encoding Altimeter's servomotor preventing lower or higher altitude indications. When this occurs, altimeter power remains on and the striped warning flag does not show.

When the striped warning flag appears across the altitude digital drum counter, a primary power loss to the Encoding Altimeter is indicated. All Encoding Altimeter functions cease until power is restored. When visible, the striped warning flag indicates a power off condition but not necessarily a malfunction. When not visible, the striped

warning flag indicates that some power is applied to the unit. It does not indicate a trouble-free Encoding Altimeter.

3-3. OPERATING CONTROLS AND INDICATORS.

Operating controls and indicators for the Encoding Altimeter are described in table 3-1.

Encoding Altimeter operation is limited to power ON/OFF and adjustment of BAROSET knob. A basic operating procedure follows. (See figure 3-1.)

- Step 1. To operate Encoding Altimeter, place the Aircraft Master Power Switch to ON. Striped warning flag should disappear from view.
- Step 2. Prior to take-off, adjust BAROSET knob for local barometric pressure. Adjusted setting appears in barometric pressure window at bottom of dial face. The Encoding Altimeter's dial pointer now indicates local altitude.
- Step 3. For lighted panels only, dial light intensity is controlled through adjustment of aircraft LIGHT DIMMER switch.



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Figure 3-1. Encoding Altimeter, Operating Controls and Indicators

TABLE 3-1. ENCODING ALTIMETER CONTROLS AND INDICATORS.

Control/Indicator	Function
Encoding Altimeter ON/OFF Switching	ON/OFF switch is the aircraft Master Power Switch which connects primary power (14 Vdc or 28 Vdc) to the Encoding Altimeter.
Warning Flag	Indicates a power OFF condition only.
BAROSET Knob	Allows setting of local barometric pressure. Adjustable range is from 28.1 to 30.99 in. Hg (946 to 1049 millibars). When adjusted, an altitude offset is applied to the dial pointer. Encoded altitude data is not affected since this data is always referenced to standard barometric pressure of 29.92 in. Hg (1013.2 millibars).
Barometric Pressure Window	Displays adjusted barometric pressure.
Altitude Dial Pointer One complete revolution Ten major divisions Five subdivisions	Indicates altitude. Is equal to 1000 feet of altitude Each division is 100 feet of altitude Each subdivision is 20 feet of altitude
Altitude Readout (Drum Counters)	Displays altitude in hundreds and thousands of feet. Registers 100 feet for every major subdivision traversed by dial pointer. Registers 1000 feet for each revolution of dial pointer.

SECTION 4

TROUBLE SHOOTING

4-1. SCOPE.

This section contains trouble shooting information and a block diagram analysis of the Encoding Altimeter.

4-2. TROUBLE SHOOTING.

If major trouble develops in the Encoding Altimeter, remove the assembly from the aircraft and do a complete set of performance tests (located in Section 5) on the unit. Test results will help to localize the subassembly in which a malfunction exists.

When suspected faulty unit has been located, trouble may be cleared by performing one of the alignment or calibration procedures located in Section 5. If the trouble cannot be cleared through any of the foregoing procedures, return the Encoding Altimeter or the known faulty subassembly to the manufacturer for repair.

Prior to removing the instrument from the aircraft, the following procedures should be performed as preliminary steps to further trouble shooting.

4-3. Local Altitude Check.

WARNING

When checking the Encoding Altimeter, an accurate barometer must be used as a reference. Setting the Encoding Altimeter against an incorrect reference may only confirm an existing error that will not be apparent. An unknown error could cause dangerous situations to develop during actual use of the Encoding Altimeter.

- Step 1. Using the BAROSET knob, set Encoding Altimeter's barometric readout to identical readout of an accurate barometer.
- Step 2. Indicated altitude on Encoding Altimeter should equal local altitude plus height of the aircraft. If indicated altitude is in error by more than ± 75 feet, do not use Encoding Altimeter for IFR flight.

4-4. Primary Power Check.

Verify normal application and value of primary power to Encoding Altimeter.

- Step 1. Be sure that aircraft master power switch is ON. Striped warning flag should disappear from view. If the flag remains in view, proceed to Step 2.
- Step 2. Check primary power applied to Encoding Altimeter using substeps a or b as required.
 - a. For a 14 volt model: 13.75 ± 0.5 Vdc.
 - b. For a 28 volt model: 27.5 ± 0.5 Vdc.
- Step 3. Check for presence of primary power at connector plug P1.
 - a. For a 14 volt model, check connector pin P1-P.
 - b. For a 28 volt model, check connector pin P1-N.
- Step 4. If striped warning flag remains in view, remove unit from aircraft and check primary power within Encoding Altimeter. Check power at warning flag solenoid L1. (See figure 6-1.)

4-5. Encoding Altimeter Checkout.

If the results of paragraphs 4-3 and/or 4-4 are negative, remove the unit from the aircraft and proceed to performance testing. Results of these tests should indicate the subassembly responsible for the trouble.

If trouble is an electronic component on any of the three printed wiring boards (A1, A2, or A3), replace the faulty component and retest the unit using performance test procedures. If the failure was on the A2 board in the Capsule and Servo subassembly, perform the temperature calibration procedure in addition to performance tests. The temperature calibration procedure is required to check validity of temperature compensation with a new component in the A2 board.

If mechanical trouble is suspected in the Capsule and Servo

subassembly, do not disassemble that unit. Return the subassembly to the manufacturer for repair.

4-6. FUNCTIONAL DESCRIPTION.

A functional description of the Encoding Altimeter is provided in the following paragraphs. This discussion is based on the Functional Block Diagram, figure 4-1.

4-7. Generation of Error Signal.

Aircraft altitude is sensed through the aneroid diaphragm assembly which expands or contracts in response to higher or lower altitude levels. A slotted vane, mounted on the diaphragm, is moved either up (diaphragm expansion) or down (diaphragm contraction). Light intensity from lamp DS1 is directed through the slot in the vane and brought to focus on dual photocell V1. Under static conditions, zero altitude change, light intensity from lamp DS1 is distributed equally over both elements of dual photocell V1. For the static condition then, there is zero error signal.

When a change of altitude occurs, diaphragm expansion or contraction drives the vane forward or backward between lamp DS1 and dual photocell V1. The resulting unbalanced light intensity on dual photocell V1 causes an output voltage, or error signal, to develop. After amplification in A1AR1A, the error signal appears at the inverting input of summing amplifier A1AR1B as the variable input. The amplified error signal will then appear as the driving voltage for servomotor B1 after further amplification in driver amplifiers A1AR2 and A1AR3. Direction of rotation of B1 depends on whether the greater amplitude voltage is from amplifier A1AR2 or A1AR3. The relative polarity of the originating error signal determines its magnitude at the output of either A1AR2 or A1AR3.

4-8. Error Signal Null.

A servoloop from servomotor B1 to diaphragm vane assembly tends to drive error signal voltage to a null or zero level. The servoloop includes servomotor B1, gear train assembly, coupling shafts, diaphragm vane assembly, and altitude compensator vane assembly. Whenever servomotor B1 is driven, coupling shafts engage the mounting shaft of the aneroid diaphragm assembly and raise or lower the entire unit. The vane, mounted on the assembly, will be driven toward a position so as to equalize light intensity, through the slotted vane, over dual photocell V1. When the condition of equal light intensity on V1 is obtained, the error signal is again equal to zero and servomotor B1 stops.

4-9. Altitude Compensation.

To account for non-linear elements, altitude compensation is required. A compensator vane, having the same operating motion as the vane attached to the aneroid capsule, is driven by a cam and lever arrangement from the servomotor. The altitude compensation cam (figure 5-1 and 5-6) functions to offset the light from lamp DS1 in a direction which will linearize altitude readout. The cam is adjustable and is calibrated to known altitude settings over the entire range of the instrument.

4-10. Tachometer-Generator G1.

During the terminal phase of a null seeking condition, error voltage is reduced in level and may cause overshoot with attendant hunting for the null position. This would be demonstrated by an oscillation in the instrument's dial pointer. To provide for smoother operation, another voltage takes control of servomotor B1 operation during the terminal phase of the null seeking condition. This terminal phase controlling voltage is derived from tachometer-generator G1. Tachometer-generator G1, driven from servomotor B1, provides a swamping voltage to override the error signal voltage. Since the tachometer is sensing the rate of change of rotation of B1, tachometer voltage can more accurately control the slew rate toward zero error position.

4-11. Temperature Compensation.

Thermistor bridge and amplifier A2U1 provide temperature compensation for any temperature induced error voltage. Thermistor A2RT1 changes resistance inversely as temperature changes. The resulting bridge circuit unbalance causes a change in output voltage across both inputs to bridge amplifier A2U1. Bridge amplifier A2U1 outputs a reference voltage that is temperature compensated to the non inverting input of summing amplifier A1AR1B.

Whenever temperature induced movement of aneroid diaphragm assembly is incurred, the resulting error voltage will be offset at the inverting input to summing amplifier A1AR1B by an equal and opposite temperature compensated voltage at the non inverting input to this same amplifier. The net result is to provide a zero output from the summing amplifier under any temperature induced circuit change.

4-12. Altitude Display.

Servomotor B1 drives a dial pointer through gear train and differential assemblies. A mechanical counter with digital readout is activated by the dial pointer to indicate altitude in hundreds and then thousands of feet.

4-13. BAROSET Adjustment.

The BAROSET adjustment, through differential gearing, allows limited adjustment of the dial pointer without any interaction with servomotor B1. This feature permits adjustment of the dial indicator to actual barometric pressure and local elevation. An additional linkage from the BAROSET knob connects to another mechanical counter which presents a digital display of barometric pressure in either inches of mercury or in millibars. This display is located at the bottom of the dial face.

The BAROSET adjustment does not interact with the encoding function. Encoded altitude data are not affected by the BAROSET adjustments since encoded altitude is always referenced to standard pressure of 29.92 inches of mercury (in. Hg).

4-14. Encoder Transducer MT1.

The encoder transducer interprets mechanically coded altitude data as electrical levels. These levels are coded, in suitable logic circuits, into a ten-digit modified Gray code. Coded data are sent out on ten separate lines to the aircraft transponder for transmission to an ATCRBS ground beacon. At the ground beacon, the data are decoded and interpreted as the aircraft's altitude. Altitude data are transmitted by request only and are not in continuous transmission. The transponder must be switched to MODE C (altitude reporting) before the encoder logic will output a ten-digit code to the transponder. When the transponder is in any other mode, the encoder logic, in the Encoding Altimeter is inhibited from outputting a code.

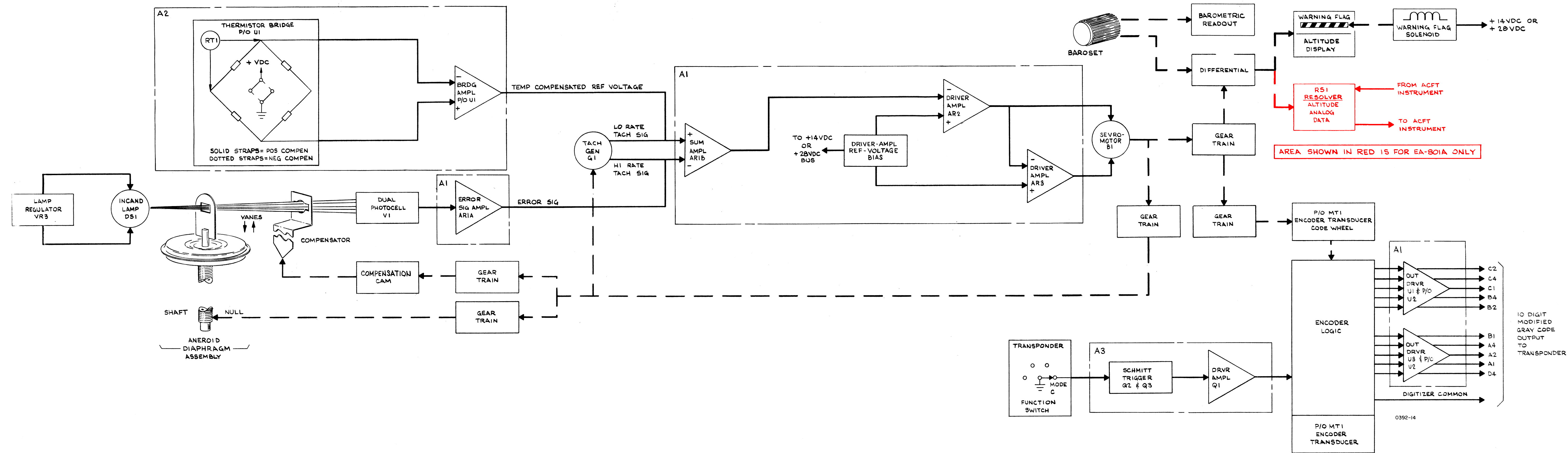


Figure 4-1. Encoding Altimeter, Functional Block Diagram

SECTION 5

MAINTENANCE

5-1. SCOPE.

This section contains calibration, tests, removal, and disassembly procedures for the Encoding Altimeter. The procedures are intended for field depot maintenance and provide adequate coverage for the extent of repair or testing at this level. Disassembly or repair of items not covered under these procedures should not be attempted in the field.

5-2. PREVENTIVE MAINTENANCE.

The Encoding Altimeter should be checked for normal operation using preliminary procedures given in Section 4 (primary power check and local altitude check). These procedures can be performed with the instrument mounted in the aircraft. The input voltage can be checked at the main power bus of the aircraft (see figure 2-2). Since preventive maintenance schedules are not necessary, the referenced procedures need only be applied as preliminary measures for a suspected malfunction.

5-3. Transponder.

If trouble develops with encoded altitude information, isolate the malfunction to the faulty unit — either Encoding Altimeter or the aircraft Transponder because these two units are interconnected and it is necessary to first determine where encoded altitude data are malfunctioning.

5-4. CORRECTIVE MAINTENANCE.

The Encoding Altimeter consists of three main subassemblies: Plate and Printed Wiring Board (figures 5-10 and 5-11); Capsule and Servo (figures 5-13 and 5-14); and Counter and Dial (figures 5-15 and 5-16). If minor adjustments or alignments to one of these items are indicated, corrective action may be undertaken to the extent prescribed by procedures given in this section. Certain minor mechanical and electrical repairs can be made to the Dial and Counter and Plate and Printed Wiring subassemblies without special test equipment and test fixtures.

CAUTION

Under no circumstances is further disassembly of the Capsule and Servo subassembly to be attempted at field depot level. If repair to this item is required, disassemble the Capsule and Servo subassembly from the top assembly and return it to the manufacturer for repair or replacement.

5-5. SPECIAL TEST EQUIPMENT.

5-6. Test Jog (Special Test Fixture).

For certain procedures, a Special Test Fixture (figure 5-1) is required. The Encoding Altimeter with its cover assembly removed can be inserted into this Special Test Fixture and operated under changing altitude conditions. A plastic window with a tool insert (Bristol splined wrench) provides access to the set screws of the altitude compensation cam (13, figure 5-7). Under various test altitudes and under normal operating conditions, adjustments can be made to the altitude compensation cam while the Encoding Altimeter is inside the Special Test Fixture.

The fabrication diagram (figure 5-1) provides instructions for fabricating a test fixture having three containers which would allow for simultaneous testing of three Encoding Altimeters.

5-7. Temperature Controller.

A Temperature Controller is required for temperature controlled testing. This device must have sealed access holes to accommodate test cables (electrical and air lines). The device must be able to sustain test temperatures over a three hour period (thermostatically controlled). Internal temperature variation between -30° to $+55^{\circ}\text{C}$ is a requirement.

5-8. TEST EQUIPMENT AND TOOLS.

Test equipments required are itemized in table 5-1. The special Test Fixture is required for altitude accuracy calibration. A Temperature Controller is required for temperature controlled testing. Required tools include assorted screwdrivers and Bristol (splined) wrenches with four and six splines for loosening and tightening setscrews. Additionally, a set of small box wrenches is required for removing threaded mounting rods.

5-9. CLEAN ROOM.

All maintenance procedures are to be performed within the confine of a clean room. This precaution also applies to dis-

assembly procedures when internal components are exposed.

CAUTION

The Encoding Altimeter must always be completely assembled when it is in any other environment.

5-10. ALIGNMENT, CALIBRATION, AND COMPENSATION.

The following procedures are to be performed whenever sub-assembly or major part replacements have been required.

TABLE 5-1. REQUIRED TEST EQUIPMENT

Item	Source/Model
Altimeter/VSI Test Set	Mensor Corp. Model 10620-001 0 to 32 in. Hg (Absolute)
Digitizer Test Set	Instrument Technology Corp. Model 90,000-115
Power Supply	Power Designs Inc. Model 6060A, 14 and 28 Vdc @ 1 Ampere capacity. Front panel meter monitors output voltage and current.
Pressure Source	10 PSI, dry, high purity nitrogen (N ₂) or filtered and dried compressed air.
Pump-Vacuum	Sargent-Welsch Co., Model 1405
Test Cable	Fabricate locally (Figure 5-2)
Test Jig (Special Test Fixtures)	Fabricate locally (Figure 5-1 and refer to paragraph 5-6).
Temperature Controlled Test Chamber	Requires access holes for test cable (electrical) and air line from Altimeter/VSI Test Set. Range of control is -30°C to +55°C.
Stopwatch	Required range of ONE minute
Digital Multimeter	Fluke Corp. Model 8000A

TABLE 5-2. PRECONDITIONS TO ALIGNMENT AND CALIBRATION PROCEDURES

Condition	Requirement
Position	Unless otherwise specified, the instrument shall be calibrated, aligned, or compensated while in its normal operating position.
Pressure-Ambient	29.92 in Hg
Primary Power 14 volt model: Voltage: Current: 28 volt model: Voltage: Current:	13.75 $\pm$ 0.5 Vdc 600 milliamperes dc (maximum) 27.50 $\pm$ 0.5 Vdc 350 milliamperes dc (maximum)
Temperature-Ambient	77° $\pm$ 10° F
Warmup	Prior to beginning any procedure, the instrument shall have had power applied for five minutes.
Clean Room	All of these procedures are to be performed within the confines of a clean room.

Preconditions applicable to all of the procedures are specified in table 5-2.

CAUTION

The procedures must be performed within the confines of a clean room.

5-11. Encoder Alignment.

This procedure is to be performed whenever repair or replacement of the Dial and Counter, Capsule and Servo sub-assemblies, or any function concerned with the encoding function has been repaired or aligned. After reassembling the Encoding Altimeter, perform this procedure prior to performing the altitude accuracy calibration procedure. This procedure is performed with the cover assembly removed.

NOTE

This procedure is performed with the cover assembly removed.

Step 1. Loosen locking screw (3, figure 5-12) for sector-

gear lever (6, figure 5-15). Slide sector-gear lever to side to disengage servomotor gears from Dial and Counter subassembly.

- Step 2. Turn altitude counter bevel-gear (10, figure 5-16) by hand until counter displays all zeros and dial pointer is at zero. The dial pointer and altitude drum counter should move freely with no evidence of binding or sticking.
- Step 3. Be sure that BAROSET knob moves freely and that BAROMETRIC display indicates pressure (in. Hg or millibars) throughout the range of 28.1 to 30.99 in. Hg (946 to 1049 millibars). Note that upper and lower baroset knob stops (8, figure 5-16) are set so that BAROMETRIC display indicates slightly above and below specified range.
- Step 4. Set BAROSET knob for an indication of 29.92 in. Hg (1013.2 millibars). Leave BAROSET display in this position throughout this procedure.
- Step 5. Loosen set screws on encoder disc drive gear (1, figure 5-9).
- Step 6. Connect test cable (figure 5-2) between Encoding Altimeter, power supply, and digitizer. Apply

primary power per table 5-2 and perform checks as follows:

- a. Check that current supplied agrees with specified current of table 5-2.
- b. Check warning flag operation as power is switched ON and OFF. There should be no binding or hang up of warning flag. As power is switched OFF there will be a slight delay as flag drops into view.

CAUTION

After power has been applied to the Encoding Altimeter, the servomotor should run and then stop at a null position. If servomotor does not stop, switch power OFF. If servomotor is allowed to run continuously without nulling out, severe or permanent damage to the Capsule and Servo sub-assembly will occur.

- Step 7. Switch primary power ON. Let servomotor seek a null position. Aneroid capsule (5, figure 5-9) should be in approximate mid-range position.
- Step 8. Manually, move altitude compensator vane (7, figure 5-7) toward rear of Encoding Altimeter and hold in this position. The servomotor should start and then stop.
- Step 9. Release altitude compensator vane. Servomotor should reverse direction and then stop.
- Step 10. Manually, turn encoder disk (2, figure 5-9) until readout on digital altitude decoder indicates all zeros. Continue turning encoder disk until readout indicates +100 feet.
- Step 11. Manually, rotate altitude counter bevel-gear (10, figure 5-16) until dial pointer indicates +50 feet.
- Step 12. Lightly, retighten encoder disk drive-gear set screws.
- Step 13. Turn altitude counter miter-gear until dial pointer indicates -50 feet. The readout on the altitude decoder (Digitizer) should indicate -100 feet. If this requirement is not met, repeat steps 10 through 13 and split error difference.

EXAMPLE: Dial pointer on plug side of 0 indicates +50 feet and on minus side of 0 the dial pointer indicates -30 feet. Total error is 80 feet ($+50/-30$). Divide total error (in this case 80 feet) by 2 and get 40 feet. Reset dial pointer to indicate +40 feet when digitizer

indicates +100 feet. Dial pointer on minus side of 0 should indicate -40 feet when digitizer indicates -100 feet. The error is now evenly divided.

- Step 14. Slide sector gear lever (6, figure 5-15) back into position to engage sector gear with servomotor drive train. Retighten sector gear lever locking screw (3, figure 5-12). Do not turn any gears at this point.
- Step 15. Tighten encoder disk drive gear set screws (1, figure 5-9). Be sure not to let encoder disk (2, figure 5-9) rotate independently while tightening set screws.
- Step 16. Insert Encoding Altimeter into Special Test Fixture and connect test equipment per figure 5-2.
- Step 17. Adjust Mensor for an atmospheric pressure of -1000 feet. Continue to change pressure below -1000 feet until Encoding Altimeter's dial pointer stops, indicating that servomotor lower altitude limit switch S1 (9, figure 5-7) has opened. This should occur at or below -1,100 feet. If this condition is not met, perform altitude accuracy calibration procedure and set the operating point at which lower altitude limit switch S1 functions.
- Step 18. Adjust Mensor for an atmospheric pressure of +35,000 feet. Continue to change pressure above +35,000 feet until Encoding Altimeter's dial pointer stops, indicating that servomotor upper altitude limit switch S2 (1, figure 5-7) has opened. This should occur above 35,250 feet. If this condition is not met, perform altitude accuracy calibration procedure and set the operating point at which upper altitude limit switch S2 functions.
- Step 19. Proceed with performance tests for the Encoding Altimeter to determine accuracy and validity of this procedure.

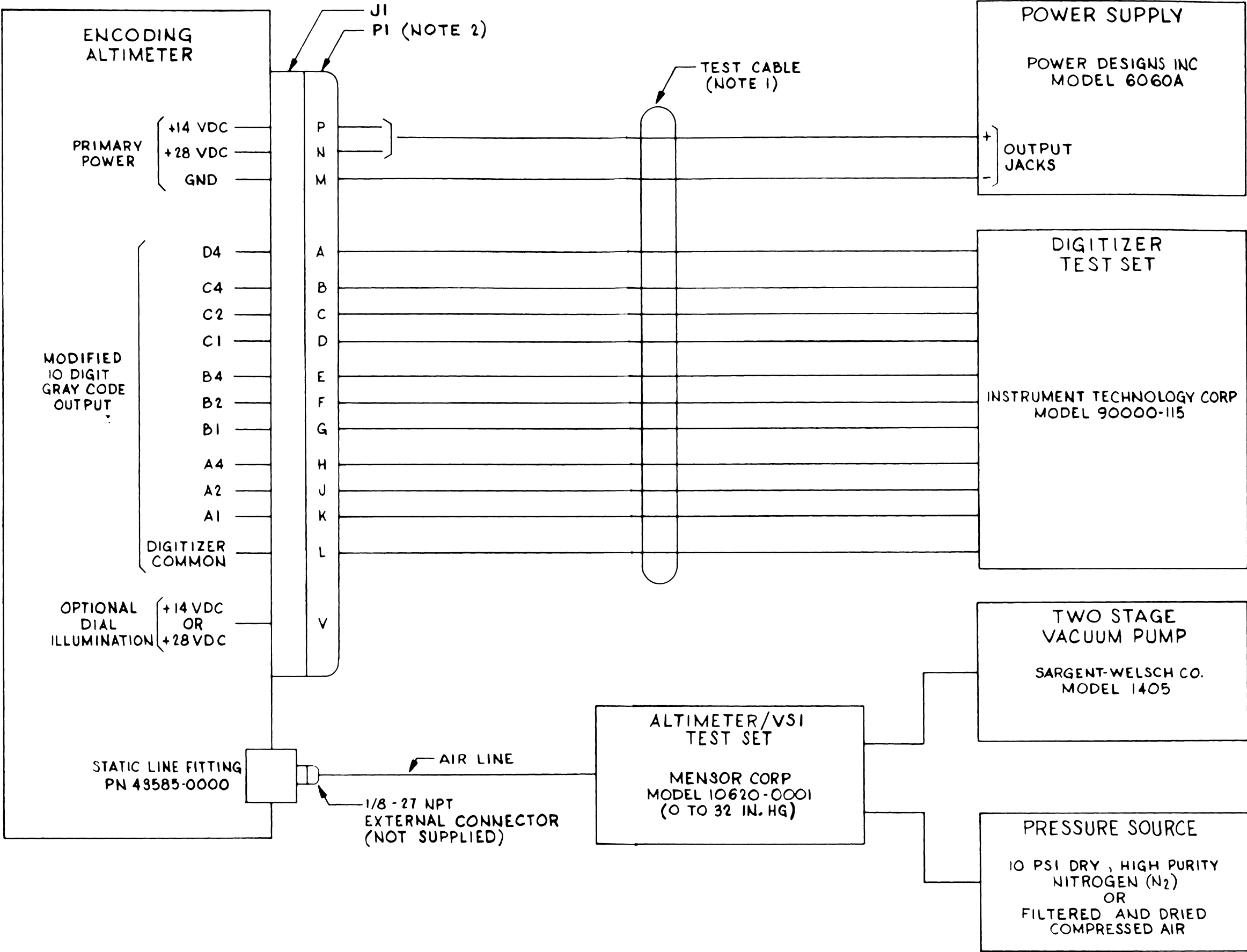
5-12. Altitude Accuracy Calibration.

This procedure is to be performed whenever repair or replacement of components or subassemblies, affecting altitude calibration, has been accomplished. This procedure is performed with cover assembly removed and requires the use of the Special Test Fixture, previously described in this section. (See figure 5-1.)

- Step 1. Adjust power supply OUTPUT DC voltage to the rated value for the Encoding Altimeter under test. Rated voltages are specified in table 5-2. Switch power supply OFF.

Notes:

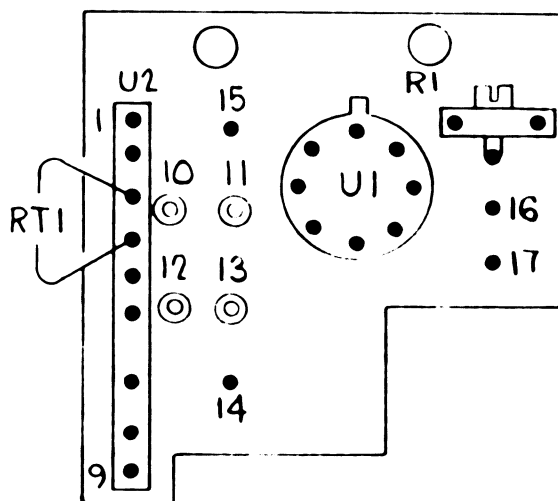
- 1. Fabricate Test Cable locally using Connector Plug P1 and stranded copper wire as follows:
 - (a) Use No. 20 AWG for connector pins P1-M (GND) and P1-P or P1-N whichever is used for Primary Power.
 - (b) Use No. 22 AWG for all other wires.
- 2. For Connector Plug P1 use straight connector plug PN 42816-0000 (not supplied).



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Figure 5-2. Performance Tests, Interconnection Diagram

- Step 2. Interconnect test cable (figure 5-2) between Encoding Altimeter and power supply.
- Step 3. On worm gear (4, figure 5-8), loosen two set-screws, disengage worm gear, and slide it out of the way toward the end of its shaft.
- Step 4. Switch power supply ON. Allow Encoding Altimeter to warm up for five minutes before continuing with this procedure.
- Step 5. Adjust BAROSET knob for an indication of 29.92 in. Hg (1013.2 millibars) on barometric readout. This setting will not be changed throughout this procedure.
- Step 6. On Encoding Altimeter's A2 Board (7, figure 5-8), connect voltmeter (+) lead to pin 10 (see figure 5-3 for pin location) and voltmeter (-) lead to GND.
- Step 7. Adjust potentiometer A1R6 REFERENCE VOLTAGE ($E/2$) ADJUSTMENT (4, figure 5-11) for required voltmeter indication as follows:
- For a 14 volt model: 6.75 Vdc
 - For a 28 volt model: 13.75 Vdc
- Step 8. Switch power supply OFF.
- Step 9. On altitude compensation cam (13, figure 5-7), adjust all seven cam set screws (14, figure 5-7) to their nominal position using a Bristol (splined) wrench. Manually rotate altitude compensation cam. Altitude compensator vane (7, figure 5-7) should remain nearly motionless as cam is rotated throughout its entire range. If altitude compensator vane moves at any point of cam rotation, readjust cam set screw so that interacting compensating pin (15, figure 5-7) does not touch contact lever (10, figure 5-7). When completed, the altitude compensator vane lever should remain parallel to the rear servo plate (5, figure 5-7) as the cam is rotated throughout its entire range.
- Step 10. Disconnect test cable from Encoding Altimeter. Insert Encoding Altimeter into Special Test Fixture and connect test equipment per figure 5-2. Turn ON all test equipment.
- Step 11. Adjust Mensor for sea level atmospheric pressure (29.92 in Hg) and wait until dial pointer stops (servo has nulled out).
- Step 12. Switch power supply OFF and remove Encoding Altimeter from Special Test Fixture.
- Step 13. Loosen sector gear lever locking screw (3, figure 5-12). Slide sector gear lever (6, figure 5-15) aside to disengage gear train.
- Step 14. Manually, rotate altitude counter bevel gear (10, figure 5-16) until a zero indication is obtained on altitude readout and dial pointer.



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Notes:

1. For POSITIVE compensation, strap pins 10 to 11 and strap pins 12 to 13.
2. For NEGATIVE compensation, strap pins 10 to 12 and strap pins 11 to 13.

Figure 5-3. A2 Printed Wiring Assembly, Location of Jumper Tie Points For Temperature Compensation

- Step 15. Reengage gear train by sliding sector gear lever back to its original position. Tighten sector gear lever locking screw (3, figure 5-12) after adjusting for slight backlash when gears have meshed.
- Step 16. Return Encoding Altimeter to Special Test Fixture and switch power supply ON.
- Step 17. Adjust Mensor for an atmospheric pressure of 18,000 feet. Let pressure stabilize and let dial pointer stop (indicating servo has nulled out). Check for excessive leaks from Special Test Fixture before proceeding.
- Step 18. Adjust Mensor for an atmospheric pressure of 35,500 feet. Let pressure stabilize and check altitude indication on Encoding Altimeter and digitizer.
- Step 19. Switch power supply OFF. Reduce pressure within Special Test Fixture to local altitude and remove Encoding Altimeter from Special Test Fixture.
- Step 20. Manually, rotate altitude compensation cam (13, figure 5-7) to its maximum CCW position. When fully rotated, a protruding lever, attached to the lower cam shaft, will engage the ON/OFF button of upper altitude limit switch S2 (1, figure 5-7). The ON/OFF button must be fully depressed and held in this position while performing the next

step. Check cam springs for proper alignment. (See figure 5-4.)

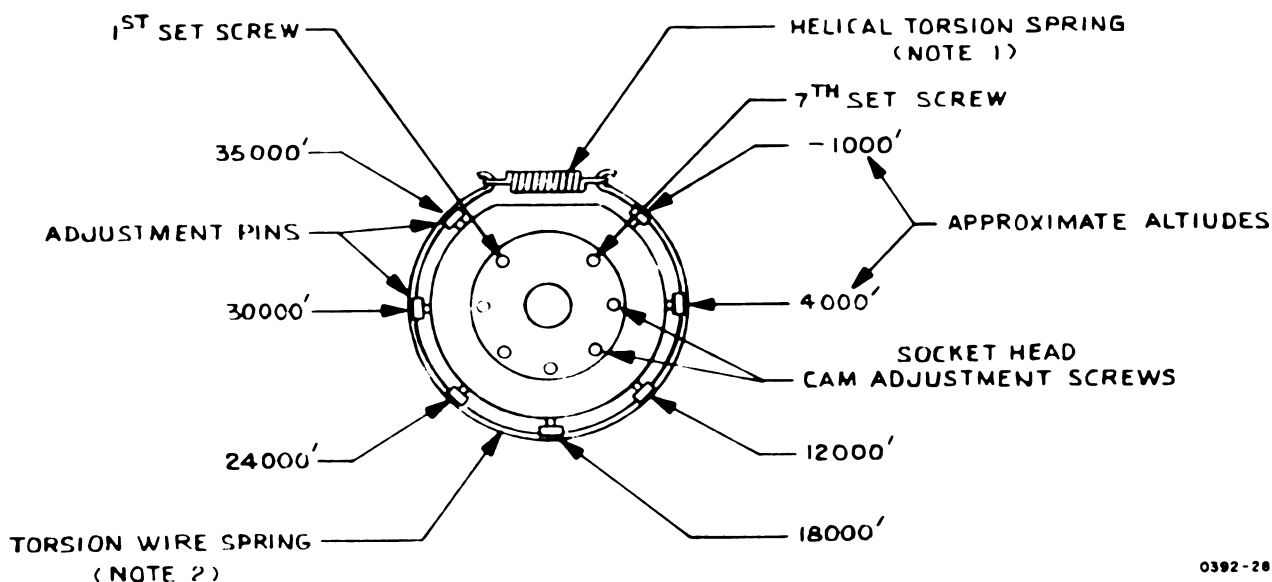
- Step 21. Return worm gear (4, figure 5-8) to its normal position (mated with the cam's shaft gear). When properly mated, tighten worm gear setscrews. Be sure that ON/OFF button on switch S2 has been fully depressed by cam lever throughout the performance of this step.

- Step 22. Return Encoding Altimeter to Special Test Fixture. Switch power supply ON.

NOTE

Throughout the following adjustments, adjust barometric pressure from Mensor so that each succeeding altitude compensation cam set screw (figure 5-4 and 14, figure 5-7) is aligned under the Bristol (splined) wrench in the plastic window in Special Test Fixture. Pressure and altitude standards from the Mensor will be used as reference.

- Step 23. Adjust Mensor for an atmospheric pressure of 35,000 feet. Continue to adjust Mensor until seventh set screw (figure 5-4) is under Bristol (splined) wrench in plastic window of Special Test Fixture.



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Notes:

1. Ensure that helical tension spring is centered between and does not touch - 1000 and 35,000 foot adjustment pins.
2. Ensure that torsion wire spring is centered in grooves of adjustment pins.

Figure 5-4. Altitude Compensation Cam

- Step 24. Adjust cam set screw with Bristol (splined) wrench until altitude indication on Encoding Altimeter is identical with altitude indication on Mensor or there is minimum difference between these two indication.
- Step 25. Adjust Mensor so that sixth cam set screw is aligned under Bristol (splined) wrench in plastic window of Special Test Fixture. Adjust cam set screw so that altitude indications are identical on Encoding Altimeter and Mensor or so that there is minimum difference between these two indications.
- Step 26. Repeat step 25 for remaining cam set screws until all have been adjusted.
- Step 27. Perform a dial pointer scale error test on the Encoding Altimeter. Use the procedure given in this section under performance tests. Use the data sheet associated with dial pointer scale error test (table 5-8). For each of the 20 test steps, enter the dial pointer altitude indication on the data sheet. Check all written data against the specified tolerances on data sheet (column 5, table 5-8). If the specified requirements are met, the Encoding Altimeter is properly calibrated. If these requirements are not met, continue with this procedure.
- Step 28. From dial pointer scale error test data, determine which test steps are out of tolerance. Re-adjust Mensor to test altitude (column 2, table 5-8) and reset corresponding altitude compensation cam set screw until dial pointer indicates an altitude that is within the tolerance specified (column 5, table 5-8). Repeat the procedure of this step for all out of tolerance test steps (column 1, table 5-8) until all data falls within the tolerances specified under column 5, table 5-8.
- Step 29. Adjust Mensor for local altitude and switch OFF power supply. Remove Encoding Altimeter from Special Test Fixture and replace cover assembly.
- Step 30. Proceed with performance tests for Encoding Altimeter to determine accuracy and validity of this procedure.

5-13. Temperature Compensation Procedure.

This procedure is to be performed whenever repair or replacement to Encoding Altimeter's A2 printed wiring board is accomplished. If Capsule and Servo subassembly have been replaced, and replacement unit has jumper wires (figure 5-3) for temperature compensation in place, assemble Encoding Altimeter and perform this test as a validation

checkout without making any adjustments to the Encoding Altimeter. If all tolerances are met, the unit is acceptable. If test requirements are not met, perform this procedure making adjustments as stipulated in procedure.

This test requires the use of the temperature controller. The Encoding Altimeter is completely assembled while undergoing temperature environmental testing.

- Step 1. On Encoding Altimeter's A2 printed wiring board (7, figure 5-8), do the following (cover assembly removed):
- Rotate potentiometer A2R1 (3, figure 5-9) to full CCW position.
 - Strap pins of A2 board for positive compensation. (See figure 5-3.)
- Step 2. With no load connected, adjust power supply OUTPUT DC voltage to rated voltage of Encoding Altimeter under test. Use specified voltages of substep a or b as required. Switch power supply OFF when voltage adjustment has been completed.
- For a 14 volt model: 13.75 ± 0.5 Vdc
 - For a 28 volt model: 27.5 ± 0.5 Vdc
- Step 3. Using test cable (figure 5-2), interconnect Encoding Altimeter with power supply as shown in figure 5-2.
- Step 4. Switch power supply ON, check applied DC voltage and reset if necessary. Allow a 15 minute warmup period before proceeding further into this procedure.
- Step 5. Remove test cable and reassemble Encoding Altimeter. Place Encoding Altimeter into temperature controller.
- Step 6. Interconnect Encoding Altimeter with test equipment as shown in figure 5-2 (the digitizer is not required).
- Step 7. With temperature controller at ambient temperature, do the following:
- Perform case leak test as described under performance tests in this section.
 - Verify that pressure leakage from Encoding Altimeter does not exceed the 100 feet per minute altitude loss as specified in leak test.
 - Verify that pressure leakage from air line between Mensor and Encoding Altimeter does not exceed the 100 feet per minute altitude loss. This may be done by observing Encoding Altimeter's dial pointer for loss of altitude.

- d. Verify that all requirements of this step are met before continuing this procedure.

Step 8. Adjust Mensor for an atmospheric pressure of +1000 feet. Let pressure stabilize within Encoding Altimeter.

Step 9. Verify Encoding Altimeter's dial pointer indicates exactly +1000 feet. If dial pointer does not so indicate, adjust BAROSET knob until dial pointer indicates +1000 feet. Record dial pointer indication at start of test step 1, column 4, table 5-3.

Step 10. Adjust temperature controller for an internal temperature of -30°C and log the local time that this is done. This test will continue over a five hour period and data must be recorded at discrete time intervals. Take note of these specific time intervals, as listed in column 3 on data sheet (table 5-3), and be available to record test data during these periods.

Step 11. After three hours, do the following:

- a. Record altitude indication of Encoding Altimeter in test step 2, column 4, table 5-3.
- b. Adjust temperature controller for an internal temperature of $+55^{\circ}\text{C}$ and log the local time.
- c. From data sheet, table 5-3, determine the algebraic difference between reference altitude (column 2) and indicated altitude recorded in substep a of this procedure (indicated altitude in column 4 - 1000 Feet). Record this difference in test step 2, column 10, table 5-3.
- d. Compare difference recorded in column 10 with specified tolerance of column 5 and determine whether data is in or out of tolerance and by what amount. Record this figure in test step 2, column 11 or 12, table 5-3.

Step 12. After three hours and fifteen minutes, repeat step 11 of this procedure for test step 3, table 5-3.

Step 13. After three hours and 30 minutes, repeat step 11 of this procedure for test step 4, table 5-3.

Step 14. After three hours and 45 minutes, repeat step 11 of this procedure for test step 5, table 5-3.

Step 15. After five hours, repeat step 11 of this procedure for test step 6, table 5-3.

Step 16. Shutdown heating applied to temperature con-

troller. Remove Encoding Altimeter from test chamber and let stabilize for two hours before compensating. After two hours, remove cover assembly and reconnect test cable (figure 5-2). Compensation will be performed under ambient temperature and pressure conditions.

NOTE

There are two categories of temperature error which permit compensation. Determine applicable category by comparing test results (columns 11 and 12, table 5-3) and information in steps 17 and 18 of this procedure. Compensate the Encoding Altimeter accordingly.

If however, an error is indicated in test steps 2 and 6, under column 12, table 5-3, and these errors are both in the same direction, the unit can not be compensated as is.

Step 17. Compare adjusted data for -30°C and 55°C as recorded in columns 11 and 12, table 5-3 and proceed as follows:

- a. Adjusted data will indicate that at one of these temperatures the direction is positive and at the other temperature the direction is negative.
- b. Of these data, one will be within tolerance (column 11, table 5-3) and the other will be out of tolerance (column 12, table 5-3).
- c. Temperature compensate Encoding Altimeter by adjusting potentiometer A2R1 (3, figure 5-9) until dial pointer is rotated by the same amount and direction as the error noted in column 12, table 5-3.

Step 18. Compare adjusted data for -30°C and $+55^{\circ}\text{C}$ as recorded in columns 11 and 12, table 5-3 and proceed as follows:

- a. Adjusted data will indicate that at both of these temperatures, the direction of error is the same.
- b. Of these data, one will be within tolerance (column 11, table 5-3) and the other will be out of tolerance (column 12, table 5-3).
- c. If error is at $+55^{\circ}\text{C}$ and is greater than +50 feet, decrease indicated altitude by the difference between the error and +50 feet. When decreasing altitude indication, the compensat-

TABLE 5-3. TEMPERATURE COMPENSATION PROCEDURE, DATA SHEET

Test Step	Temperature Compensation Test Data								Adjusted Data		
	Test Altitude (Feet)	Time Into Test	Temperature Test Run						Difference In Altitudes (Indicated–Test)	Compensation Data	
			–30°C (Cold Soak)		Transitional Period		+55°C (Hot Soak)			Within Tolerance (Feet)	Error (Feet)
			Indicated Altitude	Tolerance (Feet)	Indicated Altitude	Tolerance (Feet)	Indicated Altitude	Tolerance (Feet)			
1	2	3	4	5	6	7	8	9	10	11	12
1	1000	Start Test 0.0 Hours									
2	1000	3.0 Hours		±40					(Column 4-1000)		
3	1000	3 Hrs +15 Min				±70			(Column 6-1000)		
4	1000	3 Hrs +30 Min				±70			(Column 6-1000)		
5	1000	3 Hrs +45 Min				±70			(Column 6-1000)		
6	1000	5 Hrs End of Test						±50	(Column 8-1000)		

TABLE 5-3. TEMPERATURE COMPENSATION PROCEDURE, DATA SHEET

Test Step	Temperature Compensation Test Data								Adjusted Data		
	Test Altitude (Feet)	Time Into Test	Temperature Test Run						Difference In Altitudes (Indicated—Test)	Compensation Data	
			−30° C (Cold Soak)		Transitional Period		+55° C (Hot Soak)			Within Tolerance (Feet)	Error (Feet)
			Indicated Altitude	Tolerance (Feet)	Indicated Altitude	Tolerance (Feet)	Indicated Altitude	Tolerance (Feet)			
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
1	1000	Start Test 0.0 Hours									
2	1000	3.0 Hours		±40					(Column 4-1000)		
3	1000	3 Hrs +15 Min				±70			(Column 6-1000)		
4	1000	3 Hrs +30 Min				±70			(Column 6-1000)		
5	1000	3 Hrs +45 Min				±70			(Column 6-1000)		
6	1000	5 Hrs End of Test						±50	(Column 8-1000)		

TABLE 5-4. CONDITIONS FOR PERFORMANCE TEST PROCEDURES

Condition	Requirement
Position	Unless otherwise specified, the Encoding Altimeter shall be tested in its normal operating position.
Pressure, Ambient	Approximately 29.92 in. Hg (1013.2 millibars)
Rest Period	Prior to testing, the unit shall have been at required ambient pressure and ambient temperature for a minimum of 12 hours.
Temperature, Ambient	Approximately 77°F ±10°
Vibration (To Minimize Friction)	Performance testing is to be done with Encoding Altimeter subjected to vibration of 0.002 to 0.005 inch double amplitude at a frequency of 1500 to 2000 cycles per minute.
Tapping (As a Substitute for Vibration)	If vibration equipment is not available, vibration can be performed by lightly tapping the Encoding Altimeter at the edge of the bezel and the top of the cover assembly. A hard rubber screwdriver handle may be used for this operation.
Primary Power 14 volt model Voltage Current 28 volt model Voltage Current	13.75 ±0.5 Vdc 600 milliamperes DC (maximum) 27.50 ±0.5 Vdc 350 milliamperes DC (maximum)
Individual Requirement	The Encoding Altimeter under test shall be the model specified by the manufacturer.
Clean Room	These tests are to be performed within the confines of a clean room.

ing pins on the A2 board (see figure 5-3) must be strapped for NEGATIVE compensation. Potentiometer A2R1 is then adjusted for required dial pointer offset.

- d. If error is at $+55^{\circ}\text{C}$ and is greater than -50 feet, increase indicated altitude by the difference between the error and -50 feet. Increase dial pointer indication through adjustment of potentiometer A2R1.
- e. If error is at -30°C and is greater than $+40$ feet, increase indicated altitude by the difference between the error and $+40$ feet. Increase dial pointer indication through adjustment of potentiometer A2R1.
- f. If error is at -30°C and is greater than -40 feet, decrease indicated altitude by the difference between the error and -40 feet. When decreasing altitude indication, the compensating pins on the A2 board (figure 5-3) must be strapped for NEGATIVE compensation. Potentiometer A2R1 is then adjusted for required dial pointer offset.

Step 19. When Encoding Altimeter has been temperature compensated, repeat this procedure to ensure validity of results of this procedure.

Step 20. Proceed to performance tests and perform the complete set of tests.

5-14. PERFORMANCE TESTS.

The following procedures are to be performed after repair, replacement of a subassembly, and after alignment, calibration, or compensation procedures. Results of these tests will verify whether or not the Encoding Altimeter under test is accurately calibrated and up to performance standards. All of these tests are to be performed within the confines of a clean room.

Test equipment and tools required for performance tests will be found in the listing under table 5-1. Unless otherwise specified, the conditions listed in table 5-4 (page 5-14) apply to all performance tests.

5-15. Input DC Voltage Adjustment.

Step 1. Disconnect any external load from power supply OUTPUT jacks. Adjust unloaded power supply OUTPUT for rated voltage of Encoding Altimeter under test. Use substep a or b as required.

- a. For a 14 volt model, adjust power supply OUTPUT for 13.75 ± 0.5 Vdc. Record actual voltage in test step 1, column 2, table 5-5.

- b. For a 28 volt model, adjust power supply OUTPUT for 27.5 ± 0.5 Vdc. Record actual voltage in test step 1, column 3, table 5-5.

CAUTION

Before interconnecting test cable, adjust power supply for rated voltage of Encoding Altimeter under test. Failure to preset power supply may result in the application of an excessively high voltage to Encoding Altimeter circuits. If this error is made, permanent damage to electronic circuits will occur.

- Step 2. With power supply switch OFF, interconnect test cable only between test equipment and Encoding Altimeter as shown in figure 5-2. Leave static connection port on Encoding Altimeter disconnected.
- Step 3. Switch power supply ON and let equipment stabilize for five minutes. As power supply is switch ON, striped warning flag on Encoding Altimeter should disappear from view. Check FLAG indication in test step 2, column 5 or 6, table 5-5.
- Step 4. When equipment has stabilized, recheck rated DC voltage applied to Encoding Altimeter. If applied DC voltage is not as required, then readjust interconnected power supply per specifications given in step 1, substep a or b of this procedure.

5-16. Voltage Variation ($\pm 15\%$) Test.

Step 1. With Encoding Altimeter connected as shown in figure 5-2, adjust Mensor to supply sea level atmospheric pressure (29.92 in. Hg or 1013.2 millibars).

Step 2. Check power supply for nominal output voltage per substep a or b.

- a. For a 14 volt model: $+13.75$ Vdc
- b. For a 28 volt model: $+27.75$ Vdc

Step 3. Vary power supply output voltage $\pm 15\%$ from nominal value as indicated in substep a or b. In every case, dial pointer indications shall not vary by more than ± 10 feet.

- a. For a 14 volt model: 11.7 to 15.8 Vdc. Record dial pointer indication for each voltage in test step 3, column 8, table 5-5.

- b. For a 28 volt model: 23.3 to 31.7 Vdc. Record dial pointer indication for each voltage in test step 4, column 8, table 5-5.

Step 4. Reset power supply output voltage to the value specified in step 2.

5-17. Reference Voltage ($E_{1/2}$) Adjustment.

- Step 1. Set Mensor Ps switch at SHUTOFF. Adjust Mensor to supply local atmospheric pressure.
- Step 2. On Encoding Altimeter, adjust BAROSET knob for an indication of 29.92 in. Hg (1013.2 millibars) in barometric pressure window.

CAUTION

Avoid sudden application of high pressure differences between Encoding Altimeter and Mensor. Since Encoding Altimeter is at local pressure, be sure to adjust Mensor to local pressure prior to connecting or disconnecting static line on Encoding Altimeter. Capsule or other component damage may result from sudden application or rapid evacuation of pressure from Encoding Altimeter.

- Step 3. Interconnect air line between Mensor OUTPUT and static line fitting on Encoding Altimeter. (See figure 5-2.)
- Step 4. On Mensor, set Ps switch to OUTPUT and adjust unit to supply seal level atmospheric pressure (29.92 in. Hg or 1013.2 millibars). Let pressure stabilize.

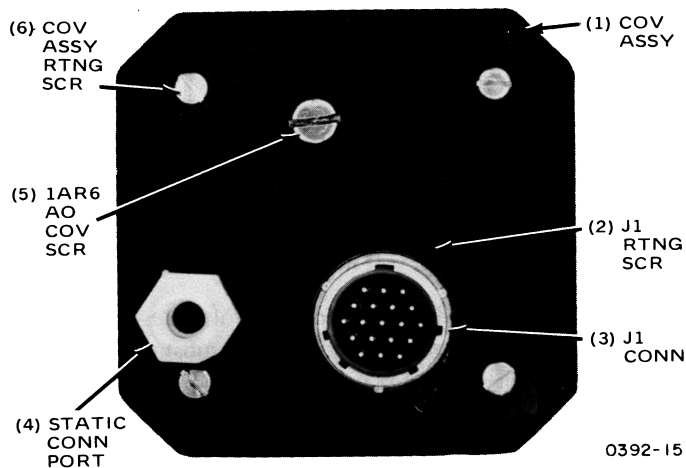


Figure 5-5. Encoding Altimeter Cover Assembly, Rear View

Step 5. Observe Encoding Altimeter dial pointer and proceed as follows:

- a. If indicated altitude is 0.0 feet, adjustment is not required and this procedure is terminated.
- b. Note offset of dial pointer from 0.0 feet and continue with this procedure. Record altitude offset and direction in test step 1, column 3, table 5-6.

CAUTION

If local altitude is well above sea level, removal of A1R6 cover screw (2, figure 5-5) will cause sudden evacuation of pressure within Encoding Altimeter. Avoid this condition by adjusting Mensor to supply local atmospheric pressure before removing A1R6 cover screw.

- Step 6. If local altitude is at or near sea level, remove A1R6 cover screw. (5, figure 5-5). If local altitude is well above sea level, adjust Mensor to supply local atmospheric pressure before removing A1R6 cover screw. Let Encoding Altimeter dial pointer stabilize after A1R6 cover screw has been removed.
- Step 7. Adjust potentiometer A1R6 so that dial pointer is offset by the same amount and in the opposite direction as was noted in step 5b.
- Step 8. Replace A1R6 cover screw and readjust Mensor to supply sea level atmospheric pressure (29.92 in. Hg). Encoding Altimeter's dial pointer should indicate an altitude of 0.0 feet with barometric pressure display of 29.92 in. Hg (1013.2 millibars). If this requirement is not met, repeat steps 4 through 8 of this procedure until the requirement is met.

5-18. Case Leak Test.

- Step 1. At rear of Encoding Altimeter's cover, check all screws (eleven) and static connection port fitting for tightness.
- Step 2. Adjust Mensor to supply atmospheric pressure of 20,000 feet. Let pressure stabilize. Encoding Altimeter should indicate 20,000 feet $\pm$ 130 feet. Record altitude in test step 2, column 4, table 5-6.
- Step 3. On Mensor, place Ps switch at SHUTOFF.
- Step 4. On Encoding Altimeter, observe dial pointer.

Indication should not decrease by more than 100 feet over an elapsed time of one minute from pressure shutoff. Record dial pointer indication in test step 2, column 5, table 5-6.

5-19. Slew Speed and Static and Slew Currents Measurements Tests.

- Step 1. Adjust Mensor to supply atmospheric pressure of 20,000 feet. Let pressure stabilize. Encoding Altimeter's altitude indication should be 20,000 feet $\pm$ 130 feet. Digitizer readout should also indicate 20,000 feet. Record this data in test step 1, columns 3 and 4, table 5-7.
- Step 2. With Encoding Altimeter in quiescent state (dial pointer at rest), measure static current. Record measured current in test step 1, column 6, table 5-7.
- Step 3. Remove power to Encoding Altimeter by switching power supply OFF.
- Step 4. Adjust Mensor to sea level atmospheric pressure (29.92 in. Hg or 1013.2 millibars). Let pressure stabilize.

NOTE

Read steps 5 and 6 before performing step 5. The current measurement of step 6 can be performed only during the slewing operation indicated in step 5.

- Step 5. Using stopwatch, note time required for Encoding Altimeter's dial pointer to return to an indication of zero feet after power supply has been switched ON. A maximum of one minute is the specified time limit for this slew speed. Record elapsed time in test step 2, column 5, table 5-7. Record final altitude and digitizer indications in test step 2, columns 3 and 4, table 5-7.
- Step 6. As dial pointer slews toward an indication of zero feet, measure input (slew) current to Encoding Altimeter. Record measured slew current in test step 2, column 7, table 5-7.

5-20. Dial Pointer Scale Error Test.

- Step 1. With Encoding Altimeter connected as shown in figure 5-2, adjust BAROSET knob for an indication of 29.92 in. Hg (1013.2 millibars).
- Step 2. On Mensor, set FUNCTION switch to MEASURE and Ps VENT/NORMAL switch to VENT.
- Step 3. The Encoding Altimeter is now subjected to ambient pressure and should indicate local altitude.

Record altitude from dial pointer in test step 1, column 3, table 5-9 (Hysteresis and After Effect Test, Data Sheet). Also record value of atmospheric pressure indicated on Mensor in test step 1, column 3, table 5-9.

- Step 4. On Mensor, set FUNCTION switch to CONTROL and Ps VENT/NORMAL switch to NORMAL.
- Step 5. Sequentially perform test steps 1 through 20 of table 5-8. Observe the following for each test step.
 - a. Using Mensor, approach each altitude at 8000 feet/minute until within approximately 500 feet of test altitude. Then, maintain an approach speed so that no overshoot of test step altitude occurs.
 - b. Progress sequentially without regression. If a test step is omitted, repeat test from the beginning.
 - c. When test step altitude is reached, let pressure stabilize before taking a reading. Record Encoding Altimeter altitude indication in appropriate test step, column 3, table 5-8.
 - d. Note altitude indication on Digitizer. Indicated altitude should agree with altitude indicated on Encoding Altimeter's dial pointer. Enter a "D" next to test point in table 5-8 only if these two altitudes agree within tolerance specified in column 5. Note any discrepancy in this same column and on back of table 5-8.
 - e. Observe dial pointer for irregular motion, jumps, and evidence of backlash as pressure is uniformly changed. Note any irregularity on back of table 5-8.
 - f. For certain test points, and after taking the scale error reading, a vibration reading is required. The Encoding Altimeter is either vibrated or tapped according to specifications of table 5-4. Record readings taken after vibration in selected test steps, column 4, table 5-8. These test steps are: 4, 6, 7, 8, 11, 13, 16, 18, 19, and 20.
- Step 6. At conclusion of scale error test, let atmospheric pressure to Encoding Altimeter remain at 35,000 feet. The starting point for the following test (hysteresis), is from the upper scale limit.

5-21. Friction Error Computations.

- Step 1. From table 5-8, scale error test data, determine the algebraic difference between data in columns 3 (before vibration) and 4 (after vibration).
- Step 2. Record these differences in column 6, table 5-7.
- Step 3. Observe that recorded differences in column 6,

fall within specified tolerances in column 7, table 5-8.

5-22. Hysteresis and After Effect Test.

- Step 1. Operate Mensor so that Encoding Altimeter's dial pointer decreases toward 25,000 feet. Approach at 8000 feet/minute until within approximately 500 feet of test altitude. Then, maintain an approach speed so that no overshoot of test step altitude occurs. Let pressure stabilize, Record Encoding Altimeter's altitude indication in test step 1, column 4, table 5-9.
- Step 2. Repeat the operation of step 1 for an altitude of 20,000 feet. Record the indicated altitude in test step 2, column 4, table 5-9.
- Step 3. Repeat the operation of step 1 for an altitude of zero feet. Record the results in test step 3, column 4, table 5-9.
- Step 4. On Mensor, set FUNCTION switch to MEASURE and Ps VENT/NORMAL switch to VENT. The Encoding Altimeter is now subjected to ambient pressure and should indicate local altitude. Record altitude from dial pointer in test step 4, column 4, table 5-9.
- Step 5. From table 5-8, transcribe column 3 (BV) data for 0, 20,000, and 25,000 feet to the corresponding position under column 3, table 5-9.
- Step 6. In table 5-9, determine algebraic difference between data of columns 3 (Up) and 4 (Down) and record in column 5. These differences should not exceed the values specified in column 6.

5-23. Digitizer Transition Test.

- Step 1. Connect equipment as shown in figure 5-2.
- Step 2. Adjust Mensor until digitizer altitude readout indicates -900 feet (test step 1, column 2, table 5-10). Encoding Altimeter's dial pointer should indicate within the specified range (test step 1, column 3, table 5-10). Record Encoding Altimeter's actual altitude indication in test step 1, column 4, table 5-10.
- Step 3. Verify status of lamps for digitizer code against code word bits listed on data sheet (test step 1, columns 5 through 14, table 5-10).
- Step 4. Repeat steps 2 and 3 of this procedure for test steps 2 through 11, table 5-10. Record data and check code word bits in corresponding columns of table 5-10.
- Step 5. Verify that all recorded data falls within specified tolerances listed in column 3, table 5-10.

5-24. Barometric Scale Error Test.

- Step 1. Connect Encoding Altimeter as shown in figure 5-2.
- Step 2. Adjust BAROSET knob for a barometric pressure indication of 28.50 in. Hg.
- Step 3. Adjust atmospheric pressure from Mensor until Encoding Altimeter indicates an altitude of 1340 feet. Do not change Mensor for the remainder of this test. Record indicated altitude in test step 1, column 5, table 5-11.
- Step 4. Adjust BAROSET knob for a barometric pressure indication of 28.10 in. Hg. Record indicated altitude of Encoding Altimeter in test step 2, column 5, table 5-11.
- Step 5. Repeat step 4 of this procedure for test steps 3 through 8, table 5-11. Record indicated altitude for each test step in column 5, table 5-11.
- Step 6. Determine algebraic difference between corresponding altitudes in column 4 and indicated altitudes in column 5, table 5-11 for all test steps.
- Step 7. Determine that each calculated difference in column 6 is within specified tolerance listed in column 7, table 5-11.

5-25. Position Error Test.

- Step 1. Connect Encoding Altimeter as shown in figure 5-2 but do not connect Mensor. Encoding Altimeter will remain at ambient atmospheric pressure during this test.
- Step 2. With Encoding Altimeter in normal position, record its indicated altitude in test step 1, column 3, table 5-12.
- Step 3. Rotate Encoding Altimeter to remaining three sides (90°, 180°, and 270°) and record indicated altitude for each position in test steps 2 through 4, column 3, table 5-12.
- Step 4. Hold Encoding Altimeter vertically (dial uppermost) and record altitude indication in test step 5, column 3, table 5-12.
- Step 5. Determine that indicated altitude, for each position tested, does not exceed specified tolerances listed in column 4, table 5-12.

5-26. DISASSEMBLY PROCEDURES.

The following procedures permit disassembly of the three main subassemblies of the Encoding Altimeter: Plate and Printed Wiring Assembly (figures 5-10 and 5-11); Capsule and Servo Assembly (figures 5-13 and 5-14); Counter and

Dial Assembly (figures 5-15 and 5-16). To reassemble the Encoding Altimeter, follow these procedures in reverse order. These procedures must be performed within the confines of a clean room.

5-27. Electronic Components.

Electronic components may be located from schematic diagram (figure 6-1), photographs in this section, and from the illustrated parts list (figures 7-1, 7-2, 7-3, and 7-4). Replacement of components or of a complete printed wiring assembly can be performed at the field level. Once replaced, however, a complete set of performance tests is required to check Encoding Altimeter accuracy. Special mention, concerning the A2 printed wiring board, is required here. If a component or the complete A2 board is replaced, the temperature compensation procedure must be performed to verify accuracy of that function. The performance tests must then be performed.

5-28. Mechanical Components.

Removal of gears requires special attention to the number of shims used to align the gear or gears. If a gear is removed, be sure to check the number of shims as disassembly proceeds. In the Counter and Dial Assembly, replacement of mechanical or electrical components can best be performed using the illustrated parts list (figure 7-3).

The Capsule and Servo Assembly requires an accuracy in assembly which can be performed only at the manufacturer. Do not further disassemble the Capsule and Servo Assembly beyond the level described in this procedure. If the unit cannot be made to perform to required standards as outlined in performance testing, return the unit to the manufacturer for repair.

5-29. Cover Assembly, Removal Of.

- Step 1. Remove six retaining screws (2, figure 5-5) for connector receptacle J1.
- Step 2. Remove one screw (5, figure 5-5) from access slot for potentiometer A1R6.
- Step 3. Remove four cover assembly retaining screws (6, figure 5-5).

CAUTION

Exercise care when removing or replacing cover over main assembly of Encoding Altimeter. When replacing cover, hold protruding wires and connectors away from cover to prevent damage to these items.

- Step 4. Remove cover by sliding it towards rear of Encoding Altimeter main assembly.
- Step 5. When replacing cover, position O-ring seal (14, figure 5-6) on top of outside perimeter of bezel (2, figure 5-6). Carefully slide cover forward until it just engages bezel rear flange (15, figure 5-6). Hold cover in this position and then slide O-ring seal into groove between bezel and edge of cover. Slide cover forward to terminal position and partially engage one cover assembly retaining screw to retain cover. Be sure that O-ring seal is completely seated before cover is secured.

5-30. Plate and Printed Wiring Assembly, Removal From Top Assembly.

For some maintenance applications, it may not be necessary to cut cable lacing ties or to completely remove Plate and Printed Wiring Assembly from Encoding Altimeter. If this be the intent, terminate this procedure with step 2. Printed wiring assembly A1, will then be accessible to effect minor repair. At this stage of disassembly, the plate may be separated from the printed wiring assembly by performing Plate and Printed Wiring Assembly disassembly procedure.

- Step 1. Disconnect connectors J3, J4, and P5 (8, 5, and 9, figure 5-6).
- Step 2. Remove four retaining screws (1, figure 5-11) from rear plate.

NOTE

Observe and note location of all cable lacing ties to be removed in step 3. Replace all cable lacing ties, that were removed during disassembly, with new lacing cord when re-assembling unit.

- Step 3. Slowly, withdraw Plate and Printed Wiring Assembly to a point where interconnecting wiring is visible. Cut only cable lacing ties necessary to free connectors J3, J4, and P5 (8, 5, and 9, figure 5-6).
- Step 4. Remove Plate and Printed Wiring Assembly from Encoding Altimeter.

5-31. Plate and Printed Wiring Assembly, Disassembly Of Unit.

- Step 1. Lightly, squeeze front and rear of assembly together and completely loosen four retaining screws (1, figure 5-10) on printed wiring assembly.

bly A1. Maintain pressure to prevent four sleeve spacers (3, figure 5-8) from falling out.

- Step 2. Separate plate from printed wiring assembly. Set aside fastening hardware (4 screws, 4 lock-washers, and 4 sleeve spacers).
- Step 3. Remove braided wire heat sink (6, figure 5-6) from its receptacle and set it aside while working with printed wiring board. Be sure to replace this item when reassembling unit.

5-32. Capsule and Servo Assembly, Removal Of.

The Capsule and Servo Assembly is not to be further disassembled other than described in this procedure. Disassembly beyond separation of this unit from the top assembly of the Encoding Altimeter cannot be performed without special tools, gauges, and test equipment. If a defective subassembly is apparent, from results of alignment, calibrating temperature compensation, or performance tests, return the Capsule and Servo Assembly to the manufacturer for repair.

- Step 1. Remove Plate and Printed Wiring Assembly (refer to procedure).

- Step 2. Disconnect connector plug P2 (3, figure 5-7).
- Step 3. Remove four threaded rods (6, figure 5-8) using a box wrench.
- Step 4. Partially loosen sector gear lever locking screw (3, figure 5-12). Slide sector gear lever to side to disengage servomotor gear train from Counter and Dial Assembly.
- Step 5. Slide Capsule and Servo Assembly straight out and away from Dial and Counter Assembly. At This point, the Encoding Altimeter has been disassembled into its three main subassemblies.

NOTE

When reassembling Capsule and Servo Assembly with Counter and Dial Assembly, be sure that mating pins (1, figure 5-14 and 4, figure 5-15) are aligned with their receptor holes. Be certain that these mating pins are fully seated when retightening mounting hardware.

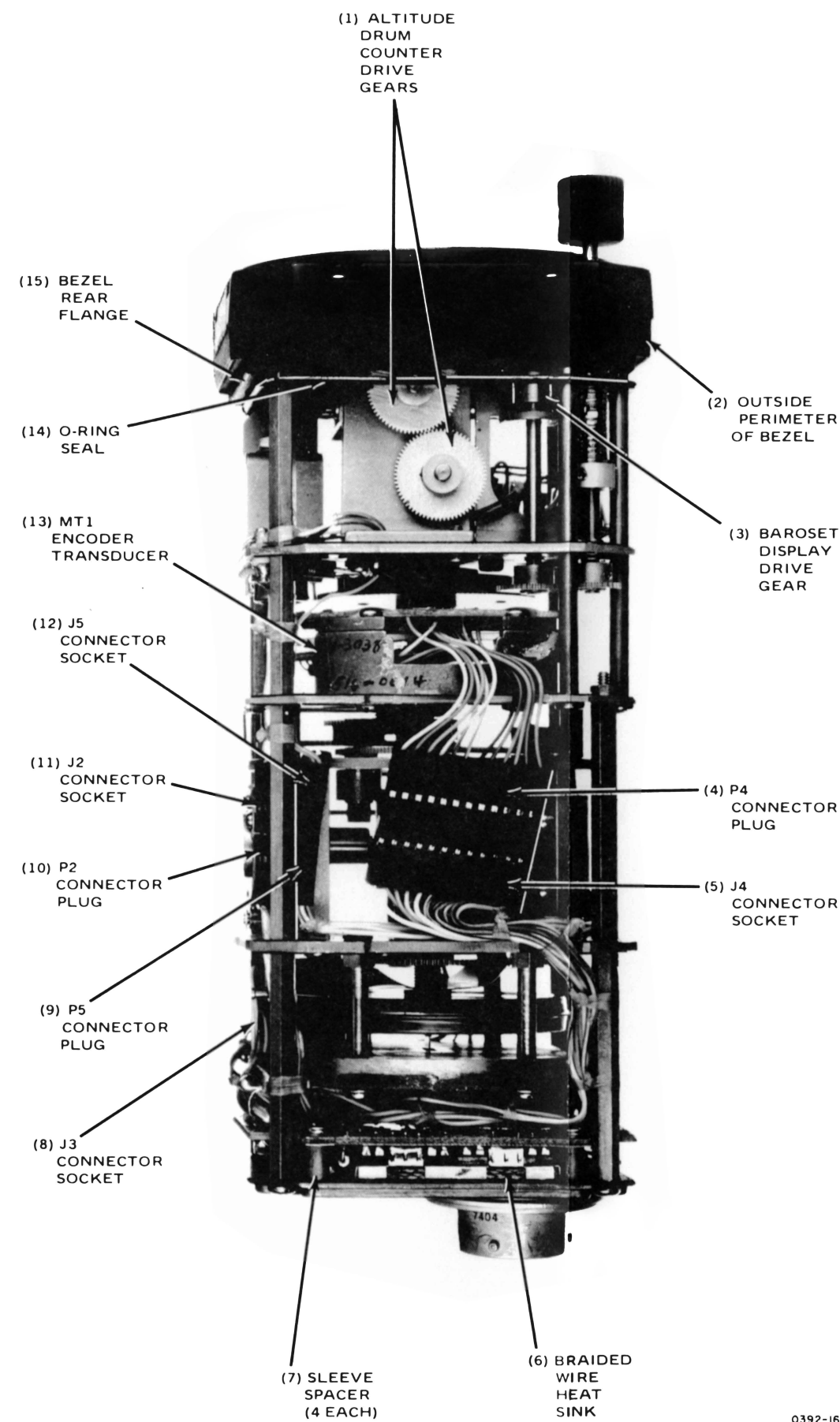


Figure 5-6. Encoding Altimeter, Left-Side View

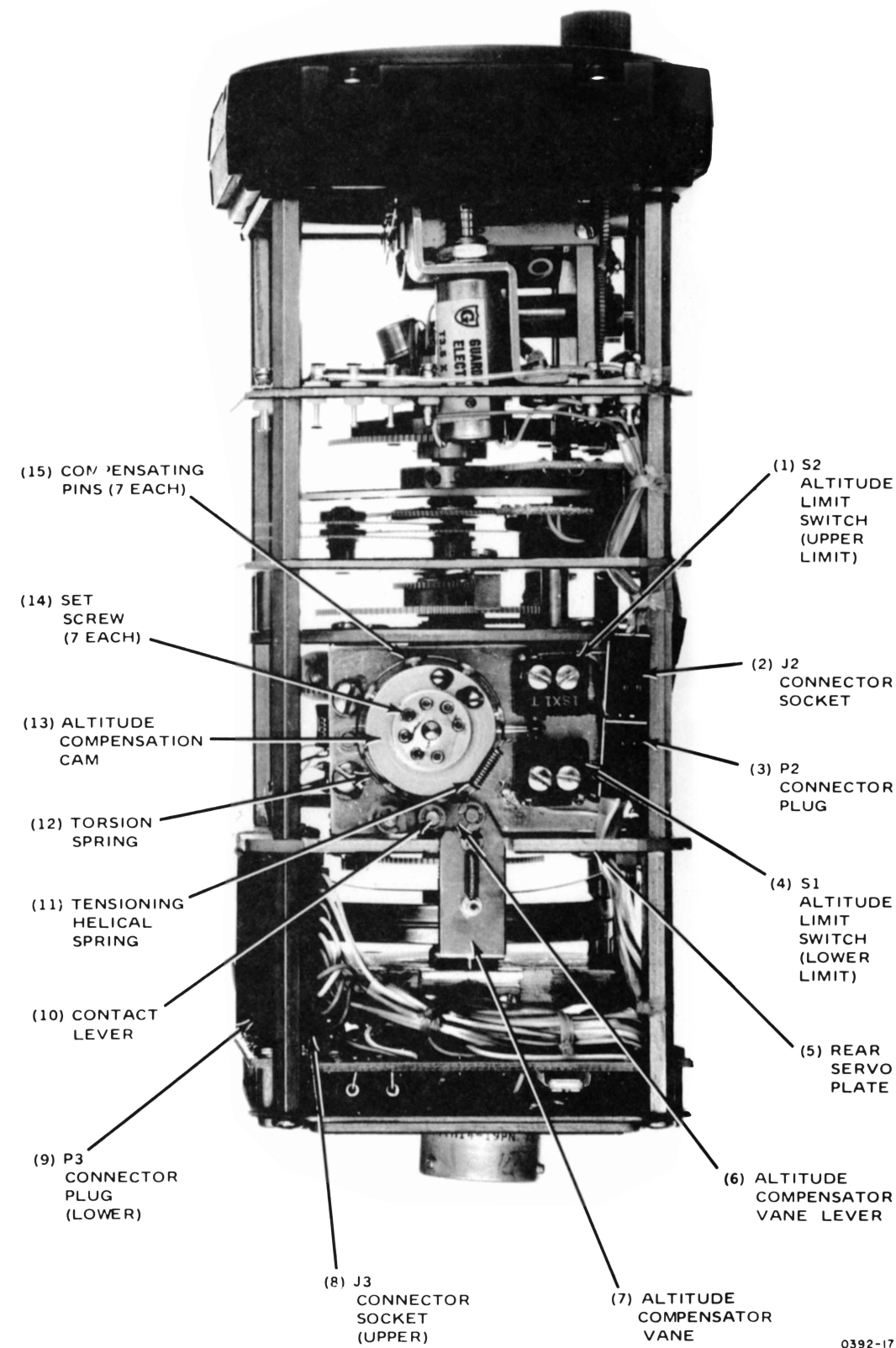


Figure 5-7. Encoding Altimeter, Top View

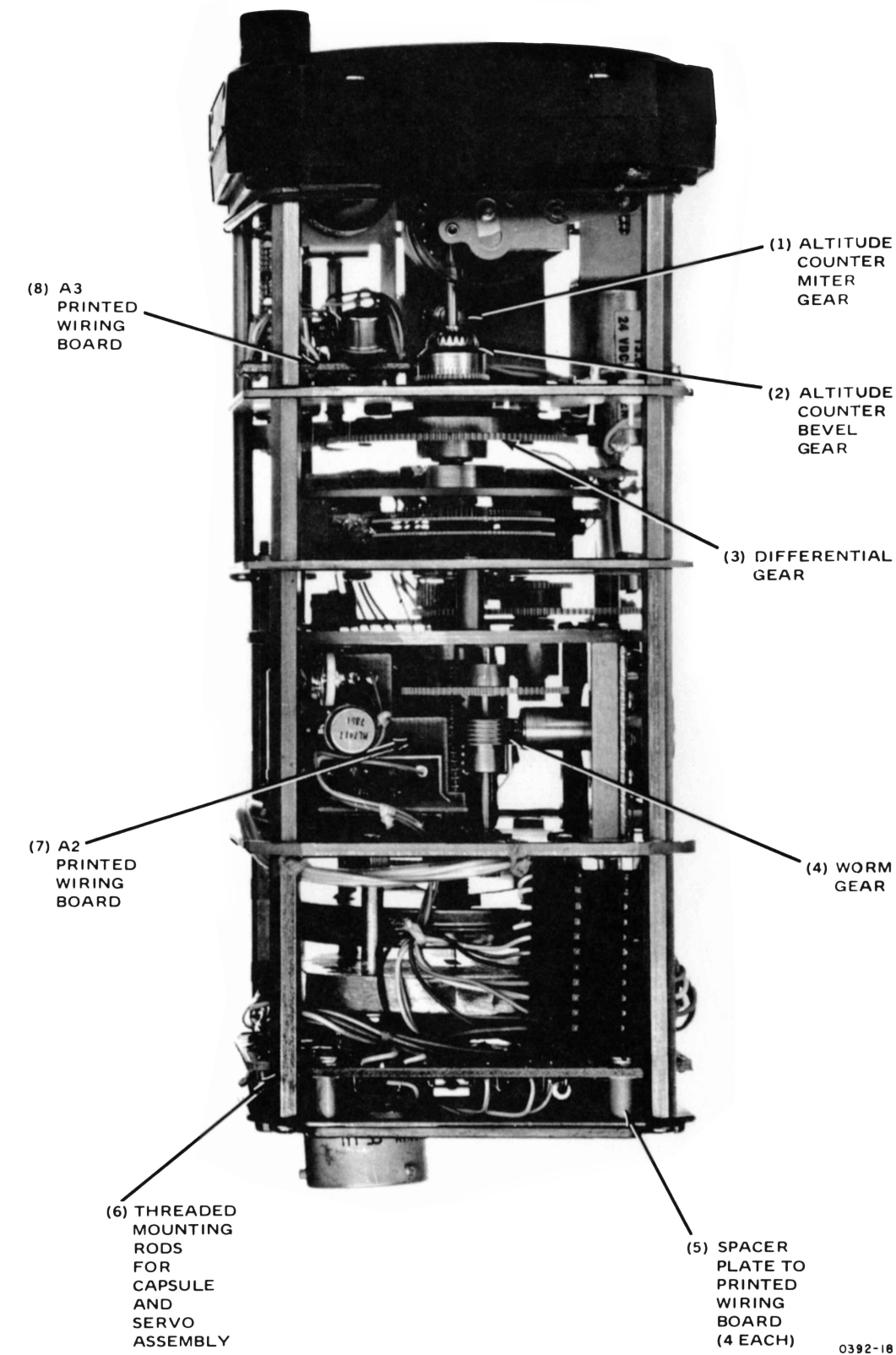


Figure 5-8. Encoding Altimeter, Right-Side View

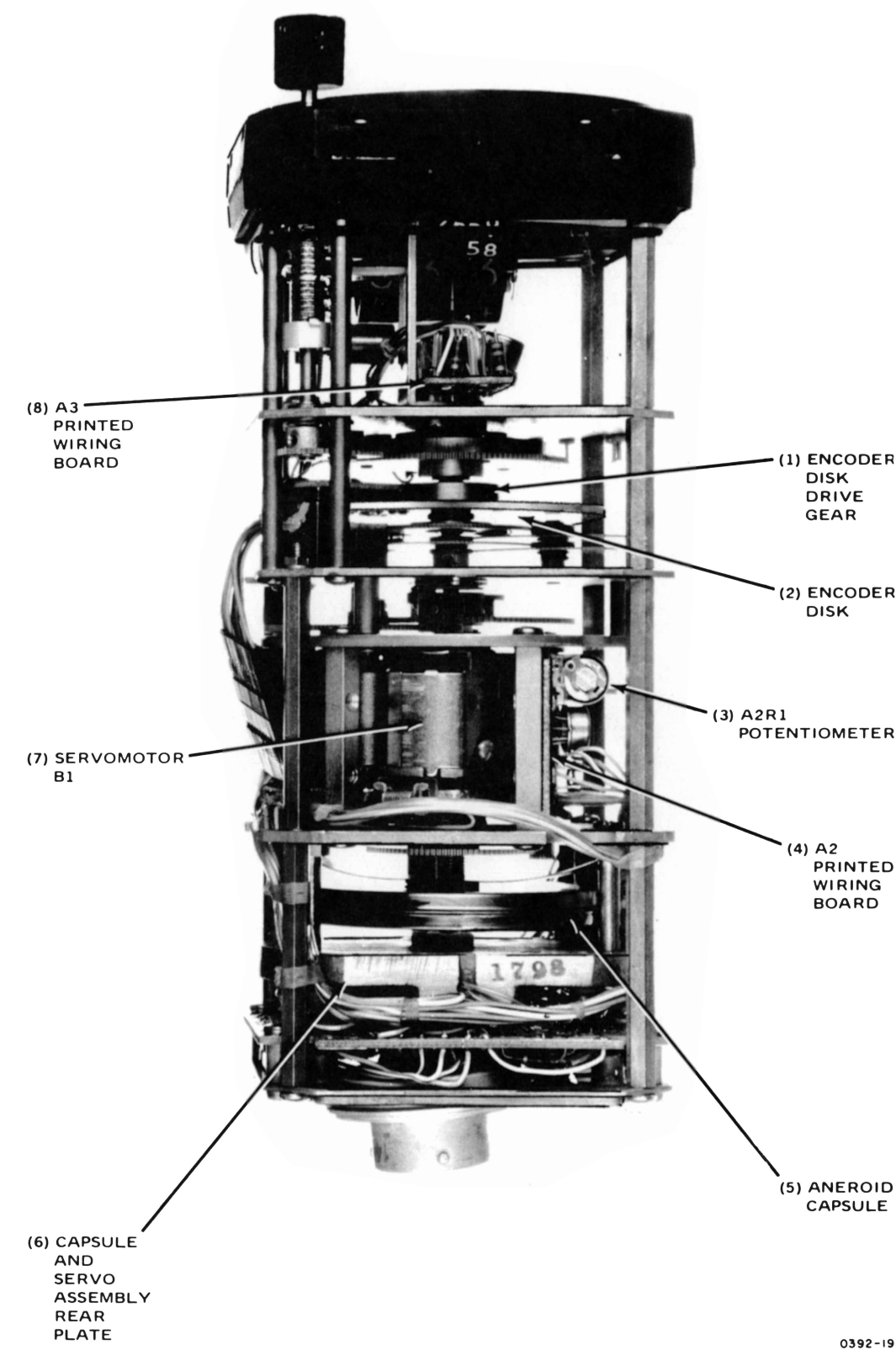


Figure 5-9. Encoding Altimeter, Bottom View

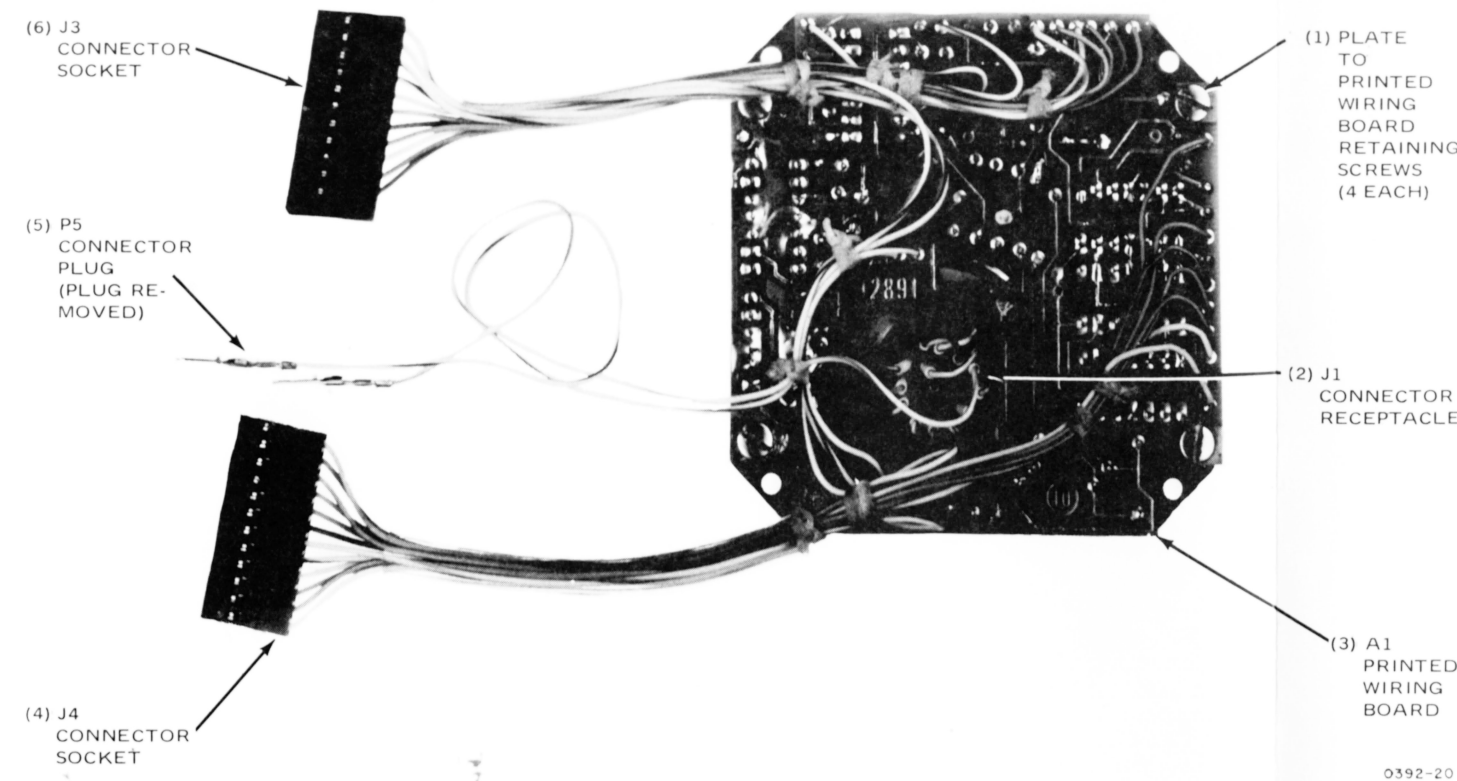


Figure 5-10. Plate and Printed Wiring Assembly, Front View of A1 Board



Figure 5-12. Encoding Altimeter, Top-Front View

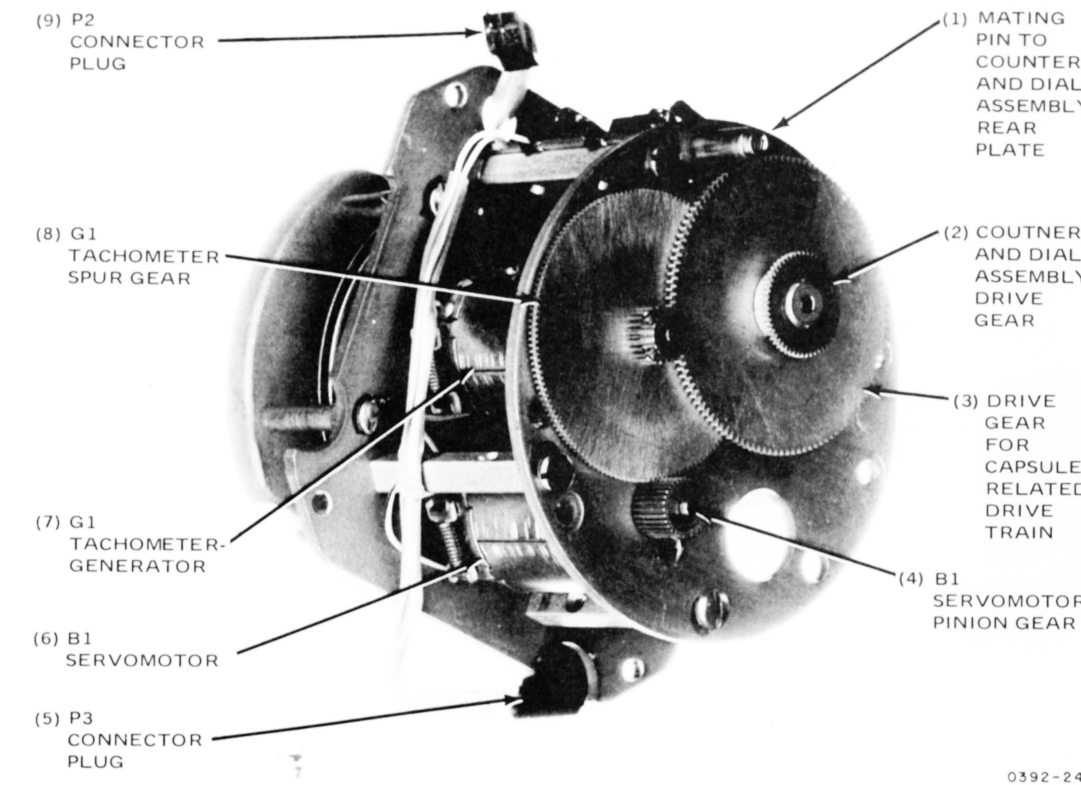


Figure 5-14. Capsule and Servo Assembly, Front-Oblique View

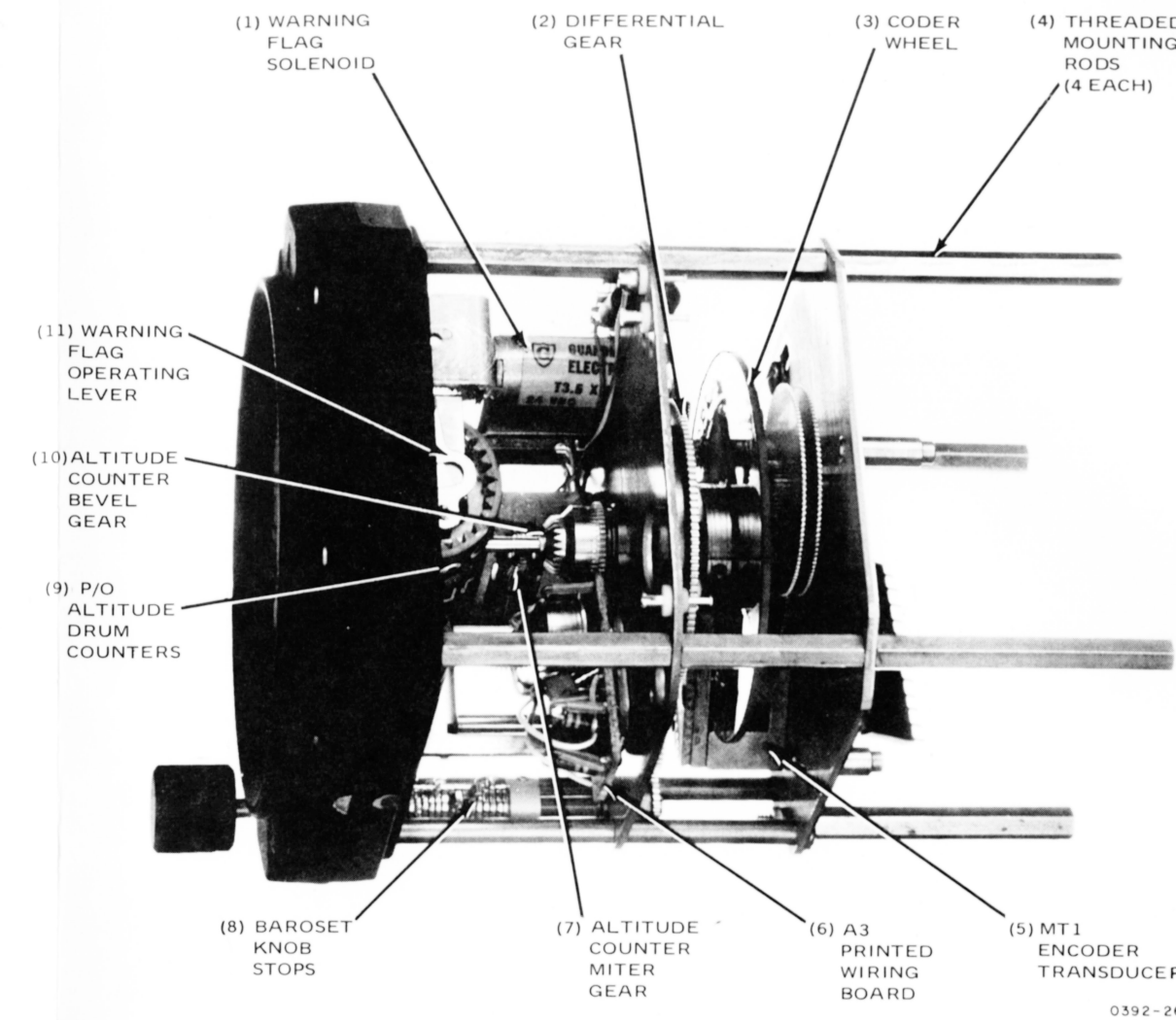


Figure 5-16. Counter and Dial Assembly, Side-Oblique View

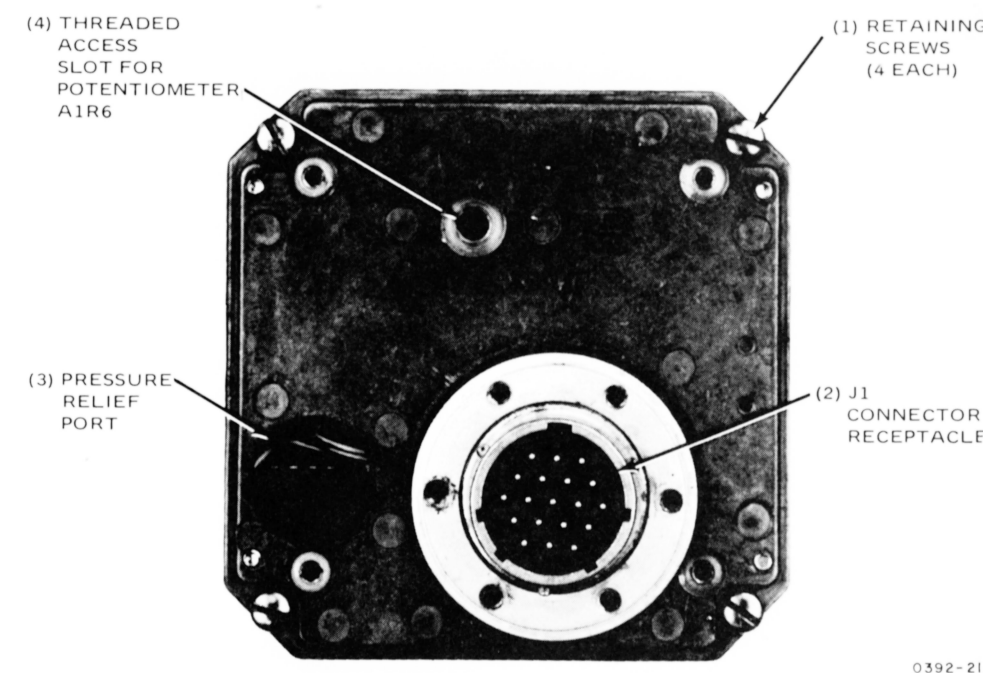


Figure 5-11. Plate and Printed Wiring Assembly, Rear View

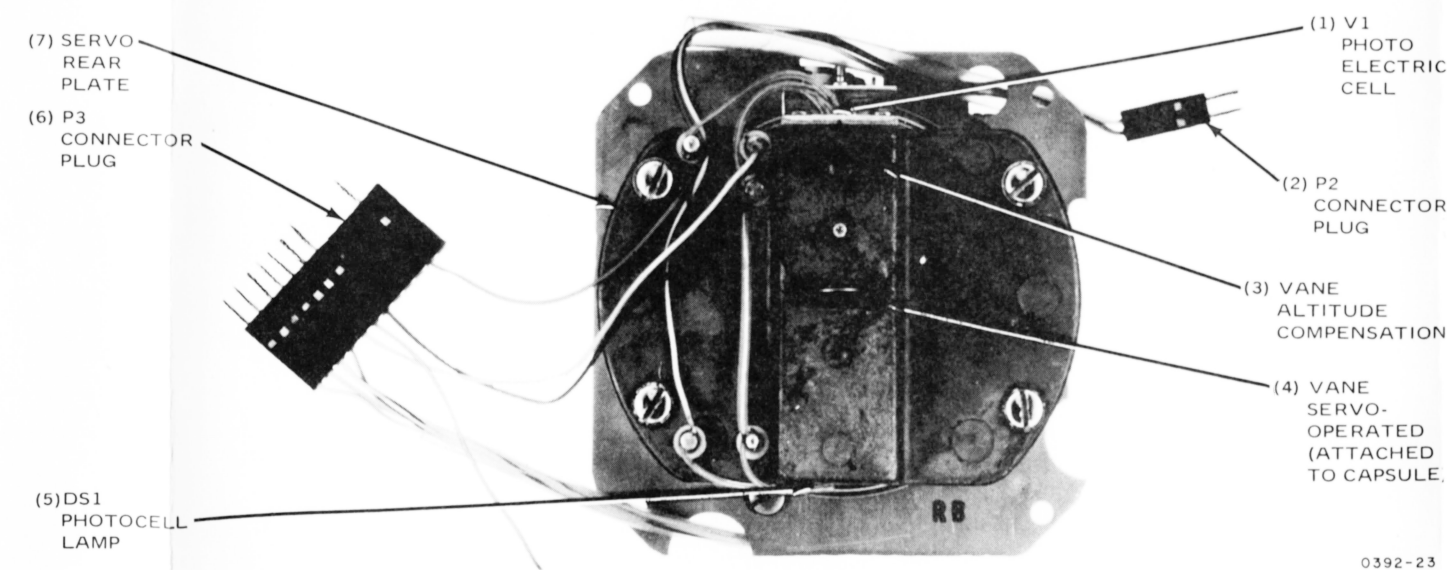


Figure 5-13. Capsule and Servo Assembly, Rear View

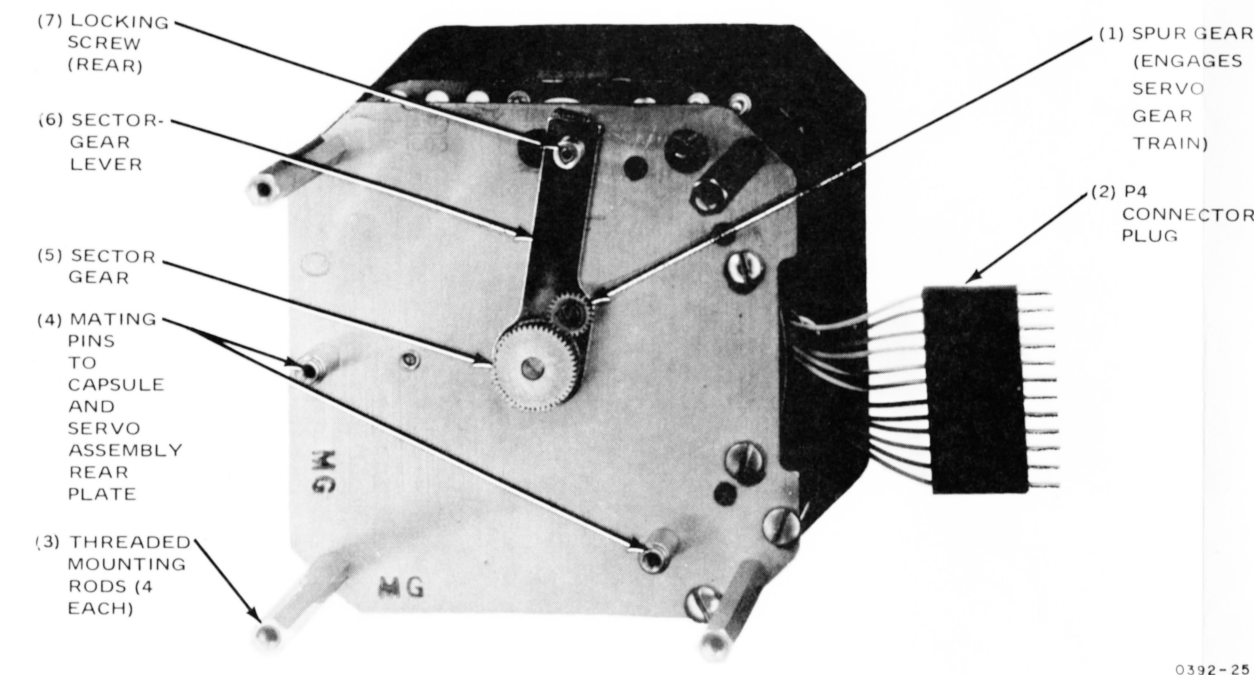


Figure 5-15. Counter and Dial Assembly, Rear View

TABLE 5-5. INPUT VOLTAGE ADJUSTMENT, WARNING FLAG, AND VOLTAGE VARIATION TESTS, DATA SHEET

Test Step	Input Voltage Adjustment Test			Warning Flag		±15% Voltage Variation Test				
	14 Volt Model	28 Volt Model	Tolerance	Check Flag Position With Power ON		Test Altitude	Indicated Altitude	Tolerance (± Feet)	Set 14 Volt Model To:	Set 28 Volt Model To:
1	2	3	4	5	6	7	8	9	10	11
1	13.75 Vdc	27.5 Vdc	±0.5 Vdc							
2				NOT in View (Normal)	In View (Failure)					
3						0.0 Feet		10	11.7 Vdc	23.3 Vdc
4						0.0 Feet		10	15.8 Vdc	31.7 Vdc

TABLE 5-6. REFERENCE VOLTAGE (E/2) ADJUSTMENT AND CASE LEAK TEST, DATA SHEET

Test Step	Reference Voltage (E/2) Adjustment, Test Data		Case Leak Test Data			
	Test Altitude	Dial Offset: Note Altitude And Direction	Test Altitude	Note Change of Test Altitude (Pressure OFF)	Tolerances	
					Loss of Altitude	Elapsed Time From Pressure Shutoff
1	2	3	4	5	6	7
1	0.0 Feet	Direction { CW CCW No. Feet:				
2					100 Feet Maximum	One Minute Maximum

7. SLEW SPEED AND STATIC AND SLEW CURRENTS MEASUREMENTS TESTS, DATA SHEET

	Static And Slew Speed Currents Tests Data					
Tolerance	Static Current Measured At 20,000 Feet	Measure Slew Current As Altimeter Slews From 20,000 To 0.0 Feet	Tolerances			
Elapsed Time For Dial Pointer To Return To 0.0 Feet			Static Current		Slew Current	
			14 Volt Model	28 Volt Model	14 Volt Model	28 Volt Model
5	6	7	8	9	10	11
			600 mA Maximum	400 mA Maximum		
ONE Minute Maximum					600 mA Maximum	400 mA Maximum

TABLE 5-9. HYSTERESIS AND AFTER EFFECT TEST, DATA SHEET

Test Step	Test Altitude	Hysteresis and After Effect Test Data			
		Indicated Altitude		Difference (Col 3-Col 4)	Tolerance (± Feet)
		Up	Down		
1	2	3	4	5	6
1	25,000				75
2	20,000				75
3	0.0				30
4	Ambient (Local)				

TABLE 5-8. DIAL POINTER SCALE ERROR TEST AND FRICTION ERROR, DATA SHEET

Test Step	Test Altitude	Scale Error Test Data			Friction Error	
		Before Vibration	After Vibration	Tolerance (± Feet)	Difference (Col 3-Col 4)	Tolerance (± Feet)
1	2	3	4	5	6	7
1	-1000			20		
2	0			20		
3	500			20		
4	1000			20		70
5	1500			25		
6	2000			30		70
7	3000			30		70
8	4000			35		70
9	6000			40		
10	8000			60		
11	10000			80		80
12	12000			90		
13	14000			100		90
14	16000			110		
15	18000			120		
16	20000			130		100
17	22000			140		
18	25000			155		120
19	30000			180		140
20	35000			205		160

TABLE 5-7. SLEW SPEED AND STATIC AND SLEW CURRENTS MEASUREMENTS TESTS, DATA SHEET

Test Step	Slew Speed Test Data				Static And Slew Speed Currents Tests Data			
	Indicated Altitude			Tolerance	Static Current Measured At 20,000 Feet	Measure Slew Current As Altimeter SLEWS From 20,000 To 0.0 Feet	Tolerance	
	Test Altitude	Dial Pointer	Digitizer Readout	Elapsed Time For Dial Pointer To Return To 0.0 Feet			Static Current	
							14 Volt Model	28 Volt Model
1	2	3	4	5	6	7	8	9
1	20,000 ±130 Feet						600 mA Maximum	400 mA Maximum
2	SLEWS To 0.0 Feet			ONE Minute Maximum				

TABLE 5-9. HYSTERESIS AND AFTER EFFECT TEST, DATA SHEET

Test Step	Test Altitude	Hysteresis and After Effect Test Data			
		Indicated Altitude		Difference (Col 3-Col 4)	Tolerance (± Feet)
		Up	Down		
1	2	3	4	5	6
1	25,000				75
2	20,000				75
3	0.0				30
4	Ambient (Local)				

TABLE 5-11. BAROMETRIC SCALE ERROR TEST, DATA SHEET

Bits Status At Digitizer Transition (Digitizer Code)								
Lamp ON			0 = Lamp OFF					
		B1	B2	B4		C1	C2	C4
		9	10	11		12	13	14
		0	0	0		0	1	0
		0	1	1		0	1	0
		1	1	0		0	1	0
		1	0	1		0	1	0
		1	1	1		0	1	0
		0	0	0		0	1	0
		1	0	1		0	1	0
		0	0	0		0	1	0
		1	1	1		0	1	0
		1	1	0		0	1	0
		0	0	1		0	1	0
		1	0	0		0	1	0

Test Step	BAROSET Knob Setting			Barometric Scale Error Test Data		
	In. Hg	Millibars	Corresponding Altitude	Indicated Altitude	Difference (Col 4-Col 5)	Tolerance (± Feet)
1	2	3	4	5	6	7
1	28.50	965	1340			25
2	28.10	951	1727			25
3	29.00	982	863			25
4	29.50	999	392			25
5	29.92	1013	0			25
6	30.50	1033	531			25
7	30.90	1046	893			25
8	30.99	1049	974			25

TABLE 5-12. POSITION ERROR TEST, DATA SHEET

Test Step	Position Error Data		
	Test Position	Indicated Altitude	Tolerance (± Feet)
1	2	3	4
1	0°		20
2	90°		20
3	180°		20
4	270°		20
5	Vertical		20

TABLE 5-10. DIGITIZER TRANSITION TEST, DATA SHEET

Test Step	Adjust Test Altitude For Ascending Digitizer Readout	—Tolerance— Encoding Altimeter’s Range of Indication At Digitizer’s Transition (Low) (High)	Indicated Altitude of Encoding Altimeter	Word Bits Status At Digitizer Transition (Digitizer Code)												
				1 = Lamp ON						0 = Lamp OFF						
				D4		A1	A2	A4		B1	B2	B4		C1	C2	C4
1	2	3	4	5		6	7	8		9	10	11		12	13	14
1	-900	-1025 To -875		0		0	0	0		0	0	0		0	1	0
2	0.0	-125 To +25		0		0	0	0		0	1	1		0	1	0
3	1000	+875 To 1025		0		0	0	0		1	1	0		0	1	0
4	2000	1875 To 2025		0		0	0	0		1	0	1		0	1	0
5	4000	3875 To 4025		0		0	0	1		1	1	1		0	1	0
6	7000	6875 To 7025		0		0	1	1		0	0	0		0	1	0
7	10,000	9875 To 10,025		0		0	1	1		1	0	1		0	1	0
8	15,000	14,875 To 15,025		0		1	1	0		0	0	0		0	1	0
9	20,000	19,875 To 20,025		0		1	1	1		1	1	1		0	1	0
10	25,000	24,875 To 25,025		0		1	0	1		1	1	0		0	1	0
11	30,000	29,875 To 30,025		0		1	0	0		0	0	1		0	1	0
12	35,000	34,875 To 35,025		1		1	0	1		1	0	0		0	1	0

SECTION 6

DIAGRAMS

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PARTS LOCATION/CHANGE INDEX											
DESIG	LOC	CHG KEY	DESIG	LOC	CHG KEY	DESIG	LOC	CHG KEY	DESIG	LOC	CHG KEY
AR1	A1		R14	25R		R28	7M		MT1	56C	
AR2	21G		R18	31K			CHASSIS		P2	11G	
AR3	25G		R19	31R					P3	16D	
CR1	28H		R20	23B		B1	42K		P4	37G	
C1	28N		U1	68C		CR2	42G		P5	61C	
C2	22B		U2	72J		CR3	40G			6U	
C3	29D		U3	68M		C6	9E			92B	
C4	29K					DS1	12F			92G	
C5	31H		A2			DS2	90C			32D	
C6	31P		RT1	9R		DS3	90H			8J	
C7	33L		R1	13S			90D			8H	
C8	25C		U1	14S		G1	90J			41H	
C9	22C		U2	12P		J1	14E			40H	
R1	20C						3A			9K	
R2	23F		A3				82C			10F	
R3	23D		Q1	7L			94B			14F	
R4	25D		Q2	3P			94G				
R5	22K		Q3	5N		J2	11G				
R6	23T		R21	3K		J3	17D				
R9	27G		R22	4K			38G				
R10	29F		R23	3L		J4	61C				
R11	29L		R24	4N		J5	6U				
R12	27N		R25	4R		L1	91B				
R13	25N		R27	6M			91G				
							92P				
							90N				

CHG KEY: A=ADDED
C=CHANGE
D=DELETED

L=LOCATION CHANGE
V=VOLTAGE/WAVEFORM
W=WIRE CHANGE

EA-801A ONLY

Notes:

- Reference designations are abbreviated. For complete identification, prefix reference designation with assembly designation; for example, A1AR1, A2R1.
- For wiring diagram, see Figure 6-2.
- Capacitor values are in microfarads (μ F) unless otherwise indicated.
- Resistor values are in ohms unless otherwise indicated.
- Some terminal and connector designations are marked on assemblies; others are assigned for reference only.
- All points designated (NOTE 6) are interconnected with PROTECTED bus.
- All points designated (NOTE 7) are interconnected with DECOUPLED bus.
- For 14 volt models, connect wires marked ***.
- For 28 volt models connect wires marked XXX.
- Jumper straps for thermistor bridge:
 - For POSITIVE compensation, strap pins 10 to 11 and 12 to 13.
- For NEGATIVE compensation, strap pins 10 to 12 and 11 to 13.
- Resistor R15 used on 28 volt models only, jumper wire (24 AWG) used on 14 volt models.
- For LIGHTED panel models only. See DETAIL A.
- Servomotor Limit Switches:
 - S1 is lower altitude limit switch.
 - S2 is upper altitude limit switch.

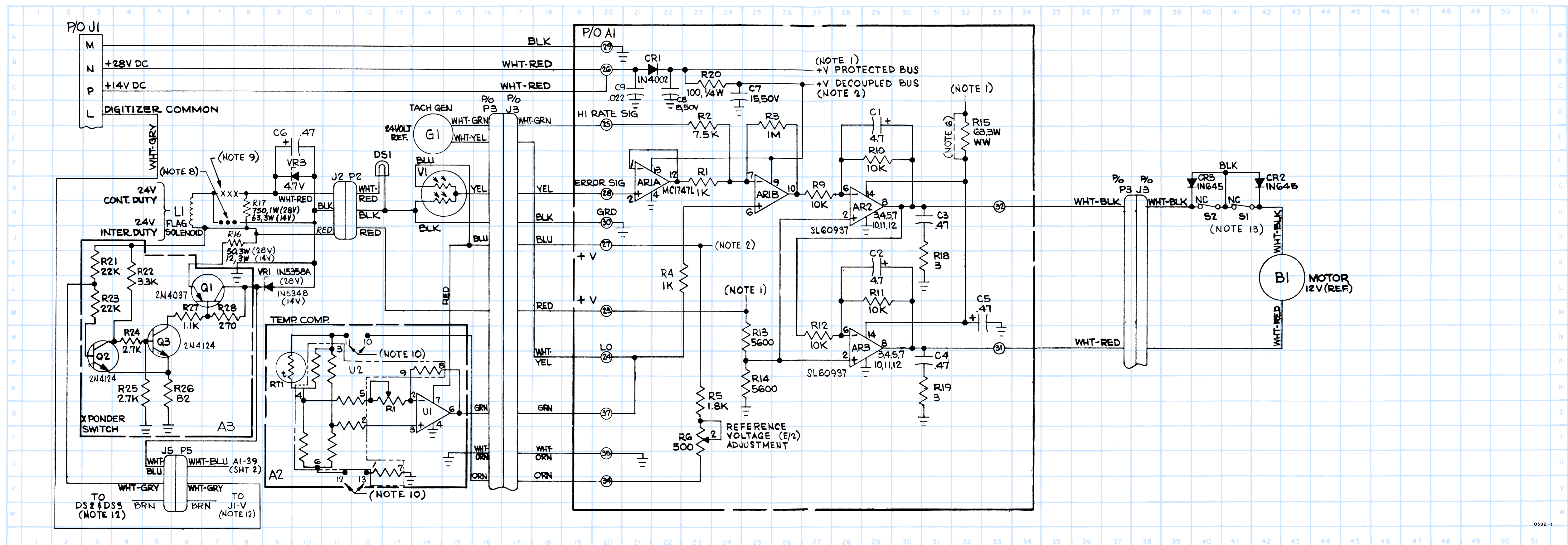
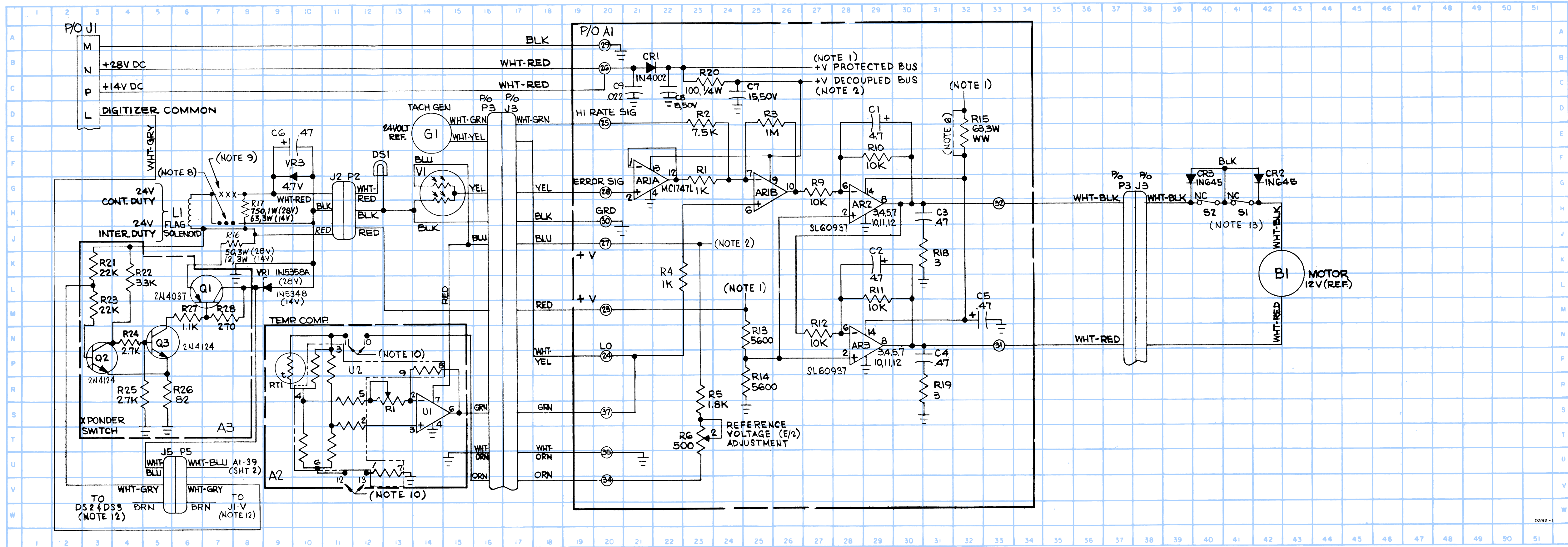


Figure 6-1. Encoding Altimeter,
Schematic Diagram (Sheet 1 of 2)



PARTS LOCATION/CHANGE INDEX											
DESIG	LOC	CHG KEY	DESIG	LOC	CHG KEY	DESIG	LOC	CHG KEY	DESIG	LOC	CHG KEY
AR1	A1		R14	25R		R28	7M		MT1	56C	
AR2	21G		R18	31K			CHASSIS		P2	11G	
AR3	25G		R19	31R					P3	16D	
CR1	28H		U1	68C		B1	42K		P4	61C	
C1	22B		U2	72J		CR2	42G		P5	6U	
C2	29D		U3	68M		CR3	40G			92B	
C3	31H					DS1	12F			92G	
C4	31P		RT1	9R		DS2	90C		R15	32D	
C5	33L		R1	13S		DS3	90D		R16	8J	
C7	25C		U1	14S			90J		S1	41H	
C8	22C		U2	12P		G1	14E		S2	40H	
C9	20C					J1	3A		VR1	9K	
R1	23F		A3				82C		VR3	10F	
R2	23D		Q1	7L			94B		V1	14F	
R3	25D		Q2	3P		J2	11G			95P	
R4	22K		Q3	5N		J3	17D			93P	
R5	23R		R21	3K		J4	38G			92P	
R6	23T		R22	4K		J5	61C			90N	
R9	27G		R23	3L			6U				
R10	29F		R24	4N			91B				
R11	29L		R25	4R			91G				
R12	27N		R26	6R			6H				
R13	25N		R27	6M		L1					

CHG KEY: A=ADDED
C=CHANGE
D=DELETED

L=LOCATION CHANGE
V=VOLTAGE/WAVEFORM
W=WIRE CHANGE

- Notes:
- Reference designations are abbreviated. For complete identification, prefix reference designation with assembly designation; for example, A1AR1, A2R1.
 - For wiring diagram, see Figure 6-2.
 - Capacitor values are in microfarads (μ F) unless otherwise indicated.
 - Resistor values are in ohms unless otherwise indicated.
 - Some terminal and connector designations are marked on assemblies; others are assigned for reference only.
 - All points designated (NOTE 6) are interconnected with PROTECTED bus.
 - All points designated (NOTE 7) are interconnected with DECOUPLED bus.
 - For 14 volt models, connect wires marked ●●●.
 - For 28 volt models connect wires marked XXX.
 - Jumper straps for thermistor bridge:
 - For POSITIVE compensation, strap pins 10 to 11 and 12 to 13.
 - Resistor R15 used on 28 volt models only, jumper wire (24 AWG) used on 14 volt models.
 - For LIGHTED panel models only. See DETAIL A.
 - Servomotor Limit Switches:
 - S1 is lower altitude limit switch.
 - S2 is upper altitude limit switch.

Figure 6-1. Encoding Altimeter, Schematic Diagram (Sheet 1 of 2)

PARTS LOCATION/CHANGE INDEX											
DESIG	LOC	CHG KEY	DESIG	LOC	CHG KEY	DESIG	LOC	CHG KEY	DESIG	LOC	CHG KEY
AR1	A1		R14	25R		R28	7M		MT1	56C	
	21G		R18	31K			CHASSIS		P2	11G	
AR2	25G		R19	31R					P3	16D	
AR3	28H		R20	42K		B1	42K			37G	
CR1	28N		U1	68C		CR2	42G		P4	61C	
C2	22B		U2	72J		CR3	40G		P5	6U	
C1	29D		U3	68M		C6	9E			92B	
C2	29K					DS1	12F			92G	
C3	31H					DS2	90C		R15	32D	
C4	31P		RT1	9R					R16	8J	
C5	33L		R1	13S		DS3	90D		R17	41H	
C7	25C		U1	14S					S1	40H	
C8	22C		U2	12P		G1	14E		S2	9K	
C9	20C					J1	82C		VR1	10F	
R1	23F						94B		VR3	14F	
R2	23D		Q1	7L			94G		V1		
R3	25D		Q2	3P			11G				
R4	22K		Q3	5N		J2	17D				
R5	23R		R21	3K		J3	38G				
R6	23T		R22	4K		J4	61C				
R9	27G		R23	3L		J5	6U				
R10	29F		R24	4N			91B				
R11	29L		R25	4R		L1	91G				
R12	27N		R26	6R			6H				
R13	25N		R27	6M							

CHG KEY: A=ADDED L-LOCATION CHANGE
C=CHANGE V=VOLTAGE/WAVEFORM
D=DELETED W=WIRE CHANGE

Notes:

- Reference designations are abbreviated. For complete identification, prefix reference designation with assembly designation; for example, A1AR1, A2R1.
- For wiring diagram, see Figure 6-2.
- Capacitor values are in microfarads (μ F) unless otherwise indicated.
- Resistor values are in ohms unless otherwise indicated.
- Some terminal and connector designations are marked on assemblies; others are assigned for reference only.
- All points designated (NOTE 6) are interconnected with PROTECTED bus.
- All points designated (NOTE 7) are interconnected with DECOUPLED bus.
- For 14 volt models, connect wires marked ●●●.
- For 28 volt models connect wires marked XXX.
- Jumper straps for thermistor bridge:
 - For POSITIVE compensation, strap pins 10 to 11 and 12 to 13.
 - For NEGATIVE compensation, strap pins 10 to 12 and 11 to 13.
- Resistor R15 used on 28 volt models only, jumper wire (24 AWG) used on 14 volt models.
- For LIGHTED panel models only. See DETAIL A.
- Servomotor Limit Switches:
 - S1 is lower altitude limit switch.
 - S2 is upper altitude limit switch.

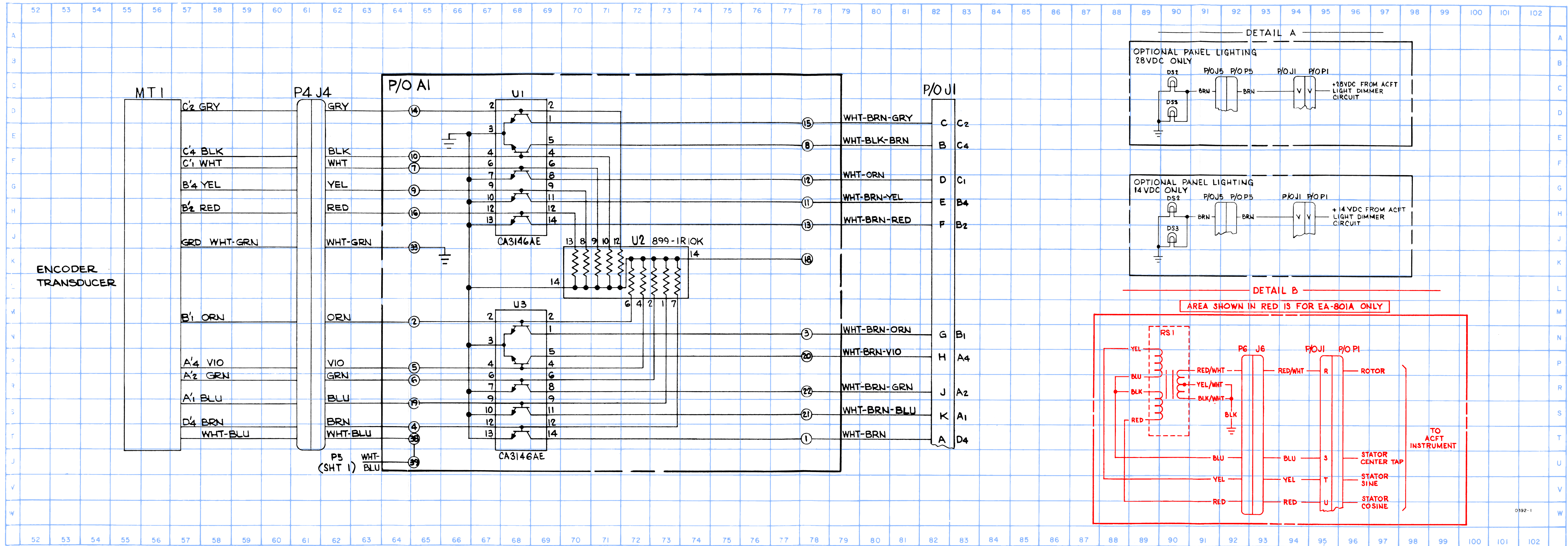


Figure 6-1. Encoding Altimeter, Schematic Diagram (Sheet 2 of 2)

- Notes:
1. For 14 volt models connect wires marked ●●●; for 28 volt models connect wires marked XXX.
 2. Resistor R15 used on 28 volt models only, jumper wire (24 AWG) used on 14 volt models.
 3. For LIGHTED panel models only.
 4. For schematic diagram see Figure 6-1.
 5. All wires are No. 24 AWG, silver-coated stranded copper, Teflon insulated.

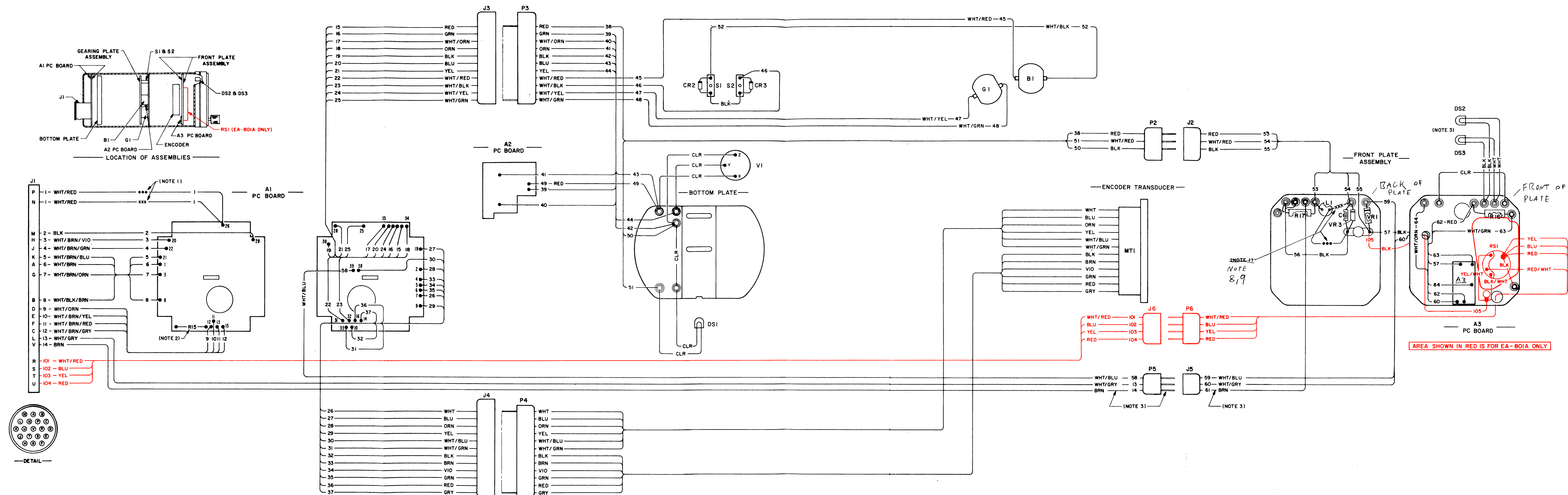


Figure 6-2. Encoding Altimeter,
Wiring Diagram

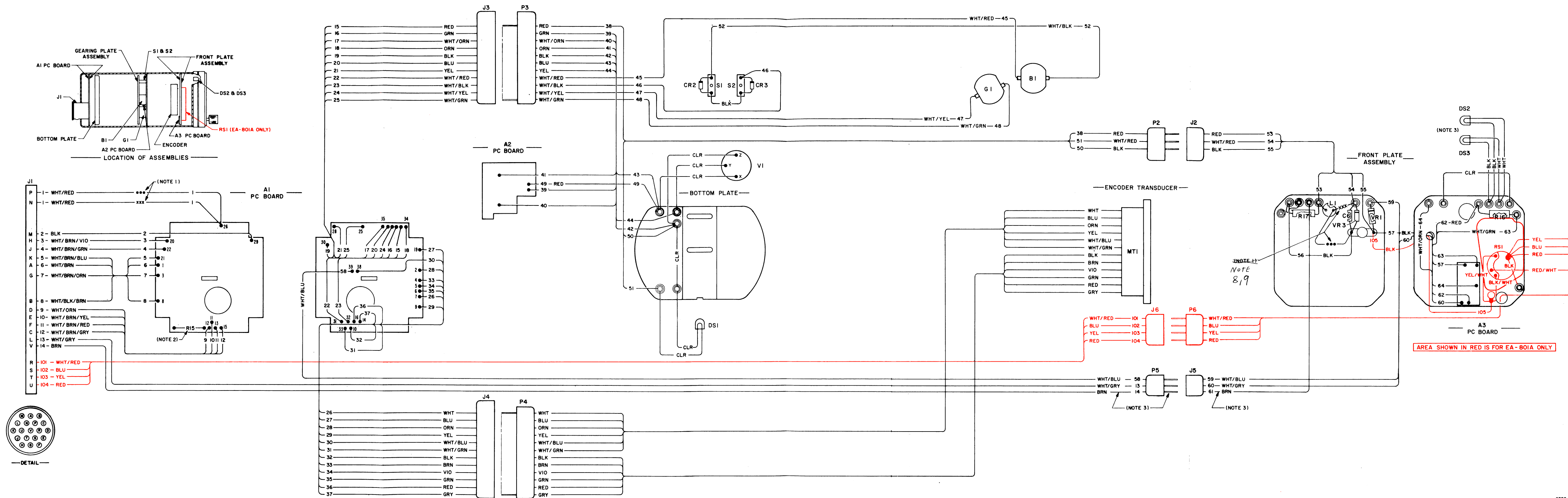


Figure 6-2. Encoding Altimeter, Wiring Diagram

PARTS LOCATION/CHANGE INDEX

DESIG	LOC	CHG KEY	DESIG	LOC	CHG KEY	DESIG	LOC	CHG KEY	DESIG	LOC	CHG KEY
AR1	11E		R9	13D							
AR2	14J		R10	13H							
AR3	14N		R11	12J							
CR1	7J		R12	13L							
C1	14F		R13	6T							
C2	11G		R14	6S							
C3	10J		R18	8H							
C4	10H		R19	7J							
C5	6S		R20	7E							
C7	6E		U1	4P							
C8	5E		U2	4L							
C9	5G		U3	4J							
R1	10E										
R2	9E		R15	6U							
R3	9H										
R4	9D										
R5	8D										
R6	8G										

A=ADDED
C=CHANGE
D=DELETED

L-LOCATION CHANGE
V-VOLTAGE/WAVEFORM
W=WIRE CHANGE

- Notes:
- Reference designations are abbreviated. For complete identification, prefix part designation with assembly designation, for example, A1AR1.
 - For schematic diagram, see Figure 6-1.
 - For wiring diagram, see Figure 6-2.
 - Printed wiring on topside of board (as viewed) shown as shaded area.
 - Printed wiring on underside of board (as viewed) shown in red.
 - Resistor R15 used on 28 volt models only, jumper wire (24 AWG) used on 14 volt models.

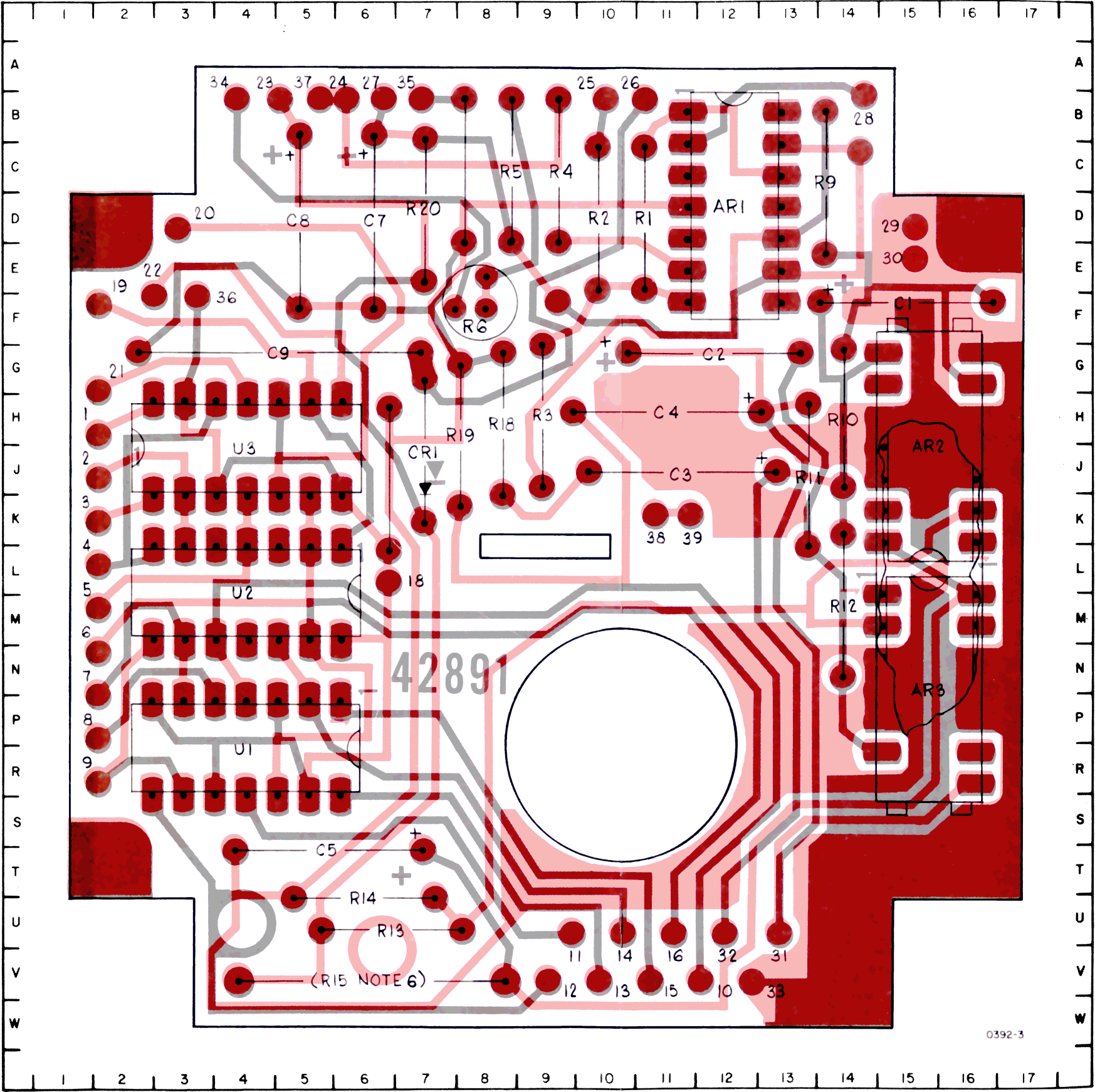
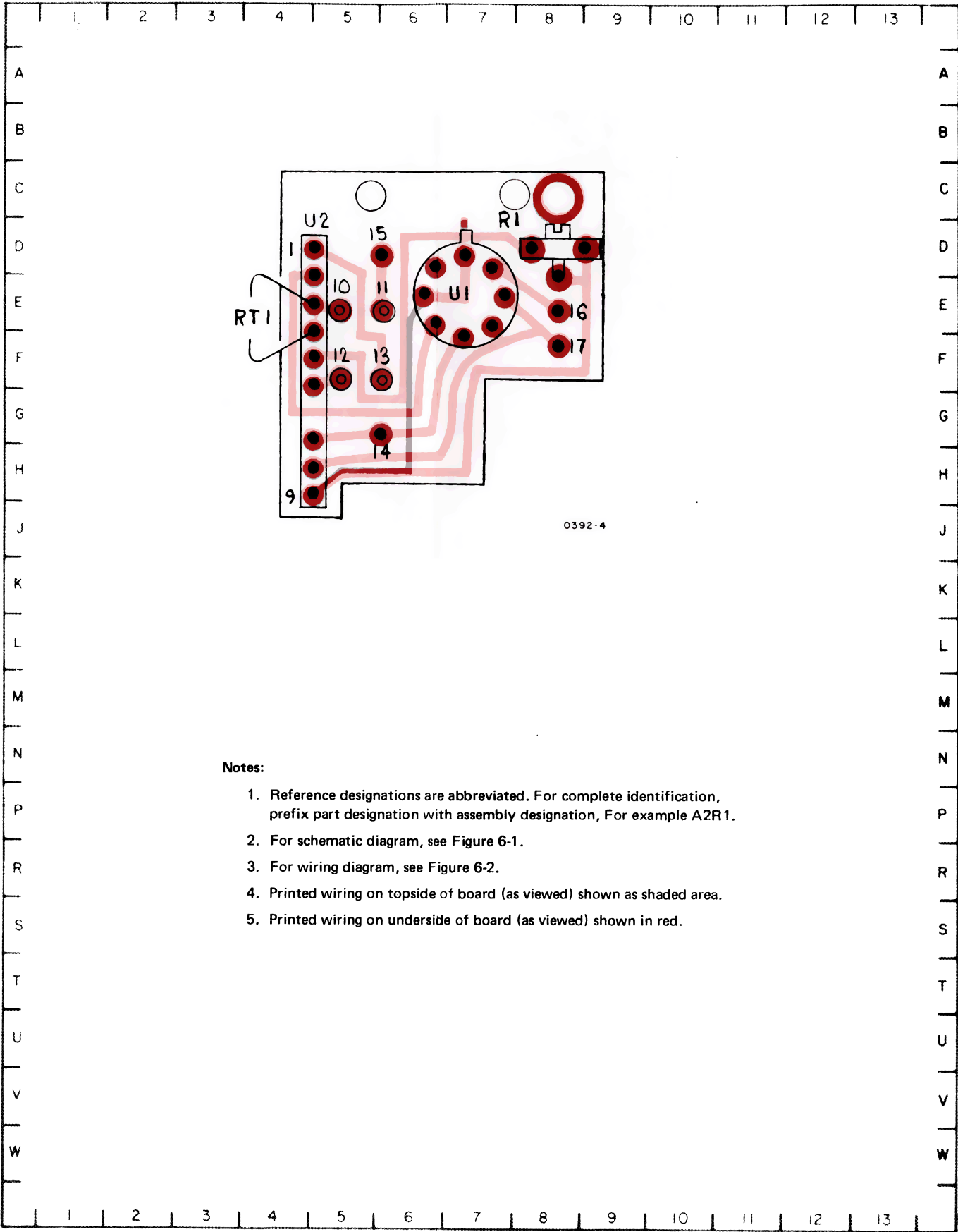


Figure 6-3. A1, Printed Wiring Assembly, Wiring Diagram



- Notes:
1. Reference designations are abbreviated. For complete identification, prefix part designation with assembly designation, For example A2R1.
 2. For schematic diagram, see Figure 6-1.
 3. For wiring diagram, see Figure 6-2.
 4. Printed wiring on topside of board (as viewed) shown as shaded area.
 5. Printed wiring on underside of board (as viewed) shown in red.

Figure 6-4. A2, Printed Wiring Assembly, Wiring Diagram

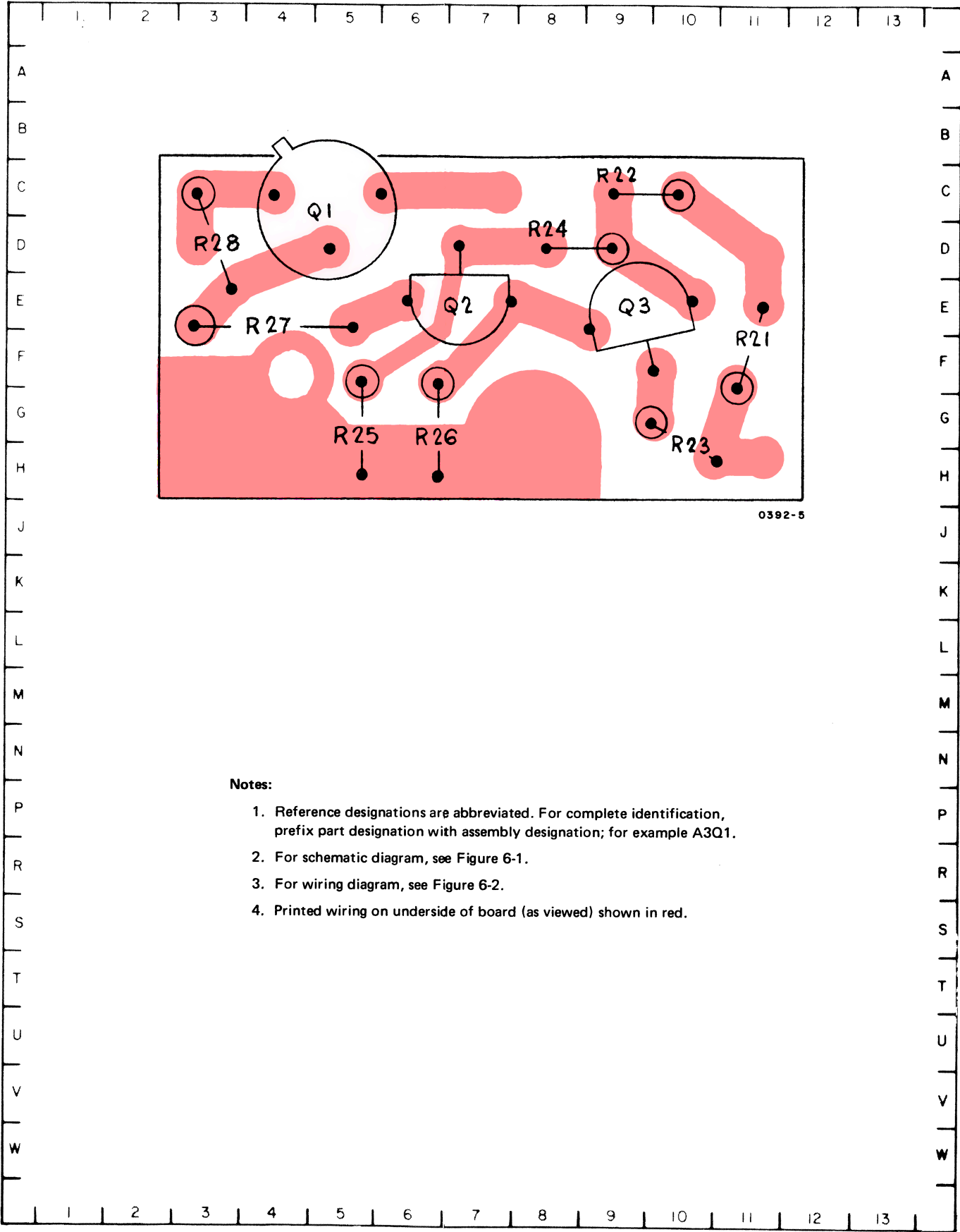


Figure 6-5. A3, Printed Wiring Assembly, Wiring Diagram

SECTION 7

ILLUSTRATED PARTS LIST

7-1. INTRODUCTION.

The illustrated Parts List tabulates, illustrates and describes assemblies, subassemblies, and detailed parts for the EA-401A Encoding Altimeter.

7-2. GENERAL.

The Illustrated Parts List consists of a breakdown of the complete unit into subassemblies and detailed parts. Each assembly is listed in its order of disassembly and is followed by its component parts properly indented below it to show their relationship to the assembly. The attaching parts are listed immediately following the assembly or parts they attach. Items which are made from raw stock such as cut lengths of wire are not included in the Illustrated Parts List.

7-3. FIGURE AND INDEX NUMBER COLUMN.

In this column, the digits preceding the second dash refer to the figure on which a part or assembly is illustrated. The digits following the second dash are the index number of the parts and assemblies.

7-4. PART NUMBER COLUMN.

This column lists the ARC part number. The part number consists of a "basic" number and a "dash" number. The latter indicating variations in the basic number.

7-5. DESCRIPTIVE COLUMN.

This column lists each assembly its attaching parts and components of the assembly properly indented to show their relationship to the assembly. The symbol - - - * - - - is used to denote the end of attaching parts and the continuation of the listing. The indentation of attaching parts is the same as for the parts they attach.

7-6. UNITS PER ASSEMBLY COLUMN.

This column lists the quantities of assemblies or parts required in the immediately preceding assembly of which the given part or assembly is a component. The quantities specified, therefore are not necessarily the total used per equipment. Nonprocurable parts or assemblies are indicated by the abbreviation "NP", the letters "AR" denote that the selection of a part or parts should be made "as required". "REF" refers to an assembly which is shown completely assembled on a preceding illustration and is now exploded on the illustration on which it is referenced. In this case the description has a notation which refers to the illustration on which the assembly is shown completely assembled and indexed.

7-7. USABLE ON CODE COLUMN.

Part variations within the groups of equipment are indicated by a letter symbol in this column. In cases where the usable on code column has been left blank, part listed apply to all equipment covered by this Illustrated Parts List.

Figure & Index No.	Part Number	Description 1 2 3 4 5 6	Units per Assy	Usable on Code
7-1-	42540-2114	ENCODING ALTIMETER, Type EA-401A	1	A
	42540-2214	ENCODING ALTIMETER, Type EA-401A	1	B
	42540-3114	ENCODING ALTIMETER, Type EA-401A	1	C
	42540-3214	ENCODING ALTIMETER, Type EA-401A	1	D
	42540-4114	ENCODING ALTIMETER, Type EA-401A	1	E
	42540-4214	ENCODING ALTIMETER, Type EA-401A	1	F
	42540-2128	ENCODING ALTIMETER, Type EA-401A	1	G
	42540-2228	ENCODING ALTIMETER, Type EA-401A	1	H
	42540-3128	ENCODING ALTIMETER, Type EA-401A	1	J
	42540-3228	ENCODING ALTIMETER, Type EA-401A	1	K
	42540-4128	ENCODING ALTIMETER, Type EA-401A	1	L
	42540-4228	ENCODING ALTIMETER, Type EA-401A	1	M
	42540-5114	ENCODING ALTIMETER, Type EA-401A	1	N
	42540-5214	ENCODING ALTIMETER, Type EA-401A	1	P
	42540-6114	ENCODING ALTIMETER, Type EA-401A	1	Q
	42540-6214	ENCODING ALTIMETER, Type EA-401A	1	R
	42540-7114	ENCODING ALTIMETER, Type EA-401A	1	S
	42540-7214	ENCODING ALTIMETER, Type EA-401A	1	T
	42540-5128	ENCODING ALTIMETER, Type EA-401A	1	U
	42540-5228	ENCODING ALTIMETER, Type EA-401A	1	V
	42540-6128	ENCODING ALTIMETER, Type EA-401A	1	W
	42540-6228	ENCODING ALTIMETER, Type EA-401A	1	X
	42540-7128	ENCODING ALTIMETER, Type EA-401A	1	Y
	42540-7228	ENCODING ALTIMETER, Type EA-401A	1	Z
-1	42926-0001	. CAP, Dust (For shipping only)	1	
-2	42926-0002	. CAP, Dust (For shipping only)	1	
-3	42542-2114	. NAMEPLATE	1	A
	42542-2214	. NAMEPLATE	1	B
	42542-3114	. NAMEPLATE	1	C
	42542-3214	. NAMEPLATE	1	D
	42542-4114	. NAMEPLATE	1	E
	42542-4214	. NAMEPLATE	1	F
	42542-2128	. NAMEPLATE	1	G
	42542-2228	. NAMEPLATE	1	H
	42542-3128	. NAMEPLATE	1	J
	42542-3228	. NAMEPLATE	1	K
	42542-4128	. NAMEPLATE	1	L
	42542-4228	. NAMEPLATE	1	M
	42542-5114	. NAMEPLATE	1	N
	42542-5214	. NAMEPLATE	1	P
	42542-6114	. NAMEPLATE	1	Q
	42542-6214	. NAMEPLATE	1	R
	42542-7114	. NAMEPLATE	1	S
	42542-7214	. NAMEPLATE	1	T
	42542-5128	. NAMEPLATE	1	U
	42542-5228	. NAMEPLATE	1	V
	42542-6128	. NAMEPLATE	1	W
	42542-6228	. NAMEPLATE	1	X
	42542-7128	. NAMEPLATE	1	Y
	42542-7228	. NAMEPLATE	1	Z
-4	44363-0001	. PLATE, Modification	1	
-5	45470-0000	. PLATE, Information	1	
-6	33259-0016	. SCREW, Self-sealing, sltd hd,	1	
-7	43584-0000	. COVER (ATTACHING PARTS)	1	
-8	33259-4916	. SCREW, Self-sealing sltd hd	4	
-9	8078-0016	. SCREW, Flh, brs oxd, 4-40 by 1/4 in lg - - - * - - -	6	
-10	31213-0006	. SEAL, O-ring	4	
-11	31213-0009	. SEAL, O-ring	1	

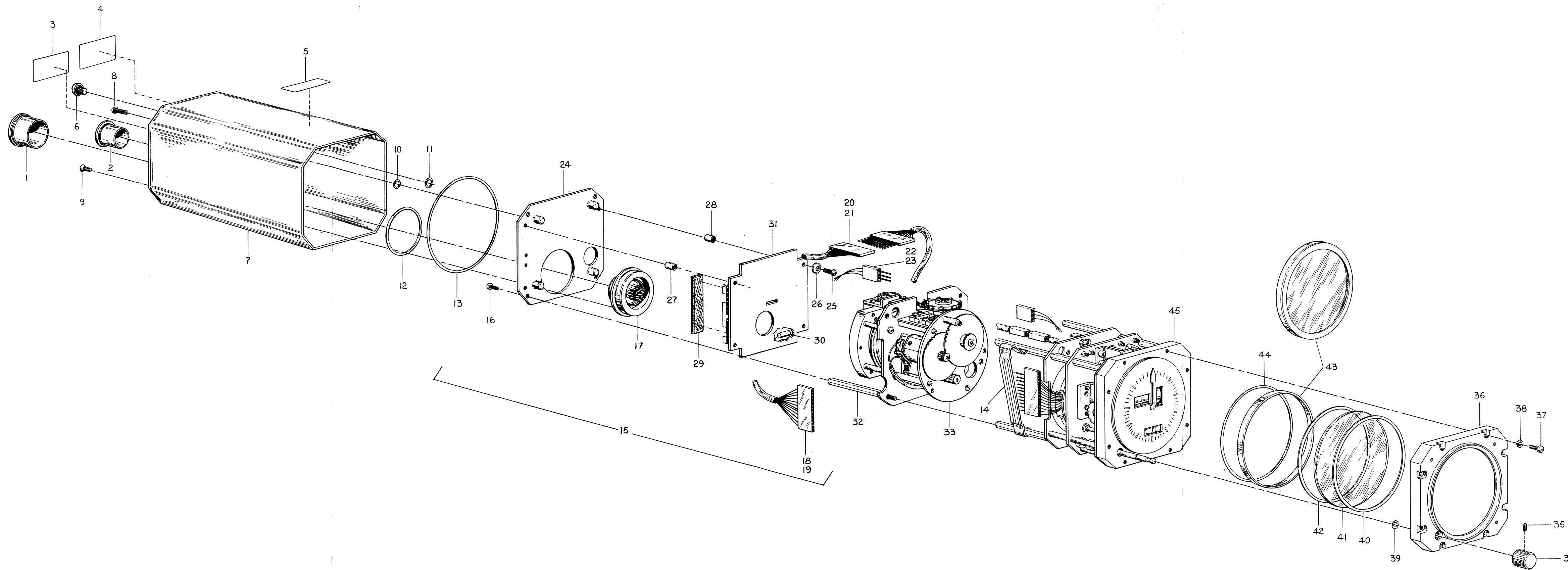


Figure 7-1. Encoding Altimeter,
Exploded View

0392-6

Figure & Index No.	Part Number	Description 1 2 3 4 5 6	Qty per Assy	Usable on Code
7-1-12	31213-0028	. SEAL, O-ring	1	
-13	31213-0041	. SEAL, O-ring	1	
-14	45239-0000	. STRAP	1	
-15	42848-0014	. PLATE AND PRINTED WIRING ASSEMBLY	1	A, B, C, D, E, F
	42848-0028	. PLATE AND PRINTED WIRING ASSEMBLY	1	G, H, J, K, L, M,
	42848-1014	. PLATE AND PRINTED WIRING ASSEMBLY	1	N, P, Q, R, S, T,
	42848,1028	. PLATE AND PRINTED WIRING ASSEMBLY	1	U, V, W, X, Y, Z
		(ATTACHING PARTS)		
-16	35595-4016	. SCREW, Bdgh, sst, 4-40 by 1/4 in lg.	4	
		- - - * - - -		
-17	42847-0000	. . CONNECTOR, Rept, elec (J1)	1	
-18	42442-2565	. . PIN, Female	12	
-19	42442-5013	. . CONNECTOR, Elec (J4)	1	
-20	42442-2565	. . PIN, Female	12	
-21	42442-5012	. . CONNECTOR, Elec (J3)	1	
-22	42442-3092	. . PIN, Male	2	A thru M
	42442-3092	. . PIN, Male	3	N thru Z
-23	42442-5003	. . CONNECTOR, Elec (P5)	1	
-24	42343-0000	. . PLATE, Rear	1	
		(ATTACHING PARTS)		
-25	104-0028	. . SCREW, Bdgh, brs np, 4-40 by 7/16 in lg.	4	
-26	14680-0000	. . WASHER, Spr tnsn, cop np, No. 4	4	
		- - - * - - -		
-27	39398-0012	. . SPACER, Sleeve	1	
-28	39398-0009	. . SPACER, Sleeve	3	
-29	28672-0016	. . WIRE, Braided	AR	
-30	209-0630	. . RESISTOR, Fxd, ww, 63 ohms $\pm 5\%$, 3 W (R15)	1	G, H, J, K, L, M, U, V, W
	34887-0009	. . JUMPER, Wire, 24 AWG	AR	X, Y, Z A, B, C, D, E, F, N, P, Q, R, S, T
-31	42892-0000	. . PRINTED WIRING ASSEMBLY, A1 (See Fig 7-4 for details)	1	
-32	41775-0004	. POST, Threaded, hex	4	
-33	42782-0014	. CAPSULE AND SERVO ASSEMBLY (See Fig 7-2 for details)	1	A, B, C, D, E, F, N, P, Q, R, S, T
	42782-0028	. CAPSULE AND SERVO ASSEMBLY (See Fig 7-2 for details)	1	G, H, J, K, L, M, U, V, W, X, Y, Z
-34	41764-0048	. KNOB	1	A, B, G, H, N, P, U, V
	41764-0032	. KNOB	1	C, D, E, F, J, K, L, M, Q, R, S, T, W, X, Y, Z
		(ATTACHING PARTS)		
-35	324-4012	. SETSCREW, Socket hd, stl, 4-40 by 3/16 in lg	2	
		- - - * - - -		

Figure & Index No.	Part Number	Description	Qty per Assy	Usable on Code
		1 2 3 4 5 6		
7-1-36	42288-0000	. BEZEL, Front (ATTACHING PARTS)	1	
-37	174-0028	. SCREW, Filh, brs, blk oxd, 4-40 by 7/16 in lg	8	
-38	22341-0000	. WASHER, Lock, split, sst, No. 4 - - - * - - -	8	
-39	31213-0006	. SEAL, O-ring	1	
-40	31213-0040	. SEAL, O-ring	1	
-41	26050-0000	. WINDOW	1	
-42	31213-0040	. SEAL, O-ring	1	A thru M
-43	42077-0001	. SPACER	1	A thru M
	44648-0000	. WEDGE AND MASK ASSEMBLY	1	N thru Z
-44	31213-0041	. SEAL, O-ring	1	
-45	42845-2114	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	A
	42845-2214	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	B
	42845-3114	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	C
	42845-3214	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	D
	42845-4114	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	E
	42845-4214	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	F
	42845-2128	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	G
	42845-2228	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	H
	42845-3128	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	J
	42845-3228	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	K
	42845-4128	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	L
	42845-4228	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	M
	42845-5114	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	N
	42845-5214	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	P
	42845-6114	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	Q
	42845-6214	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	R
	42845-7114	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	S
	42845-7214	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	T
	42845-5128	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	U
	42845-5228	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	V
	42845-6128	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	W
	42845-6228	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	X
	42845-7128	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	Y
	42845-7228	. COUNTER AND DIAL ASSEMBLY (See Fig 7-3 for details)	1	Z

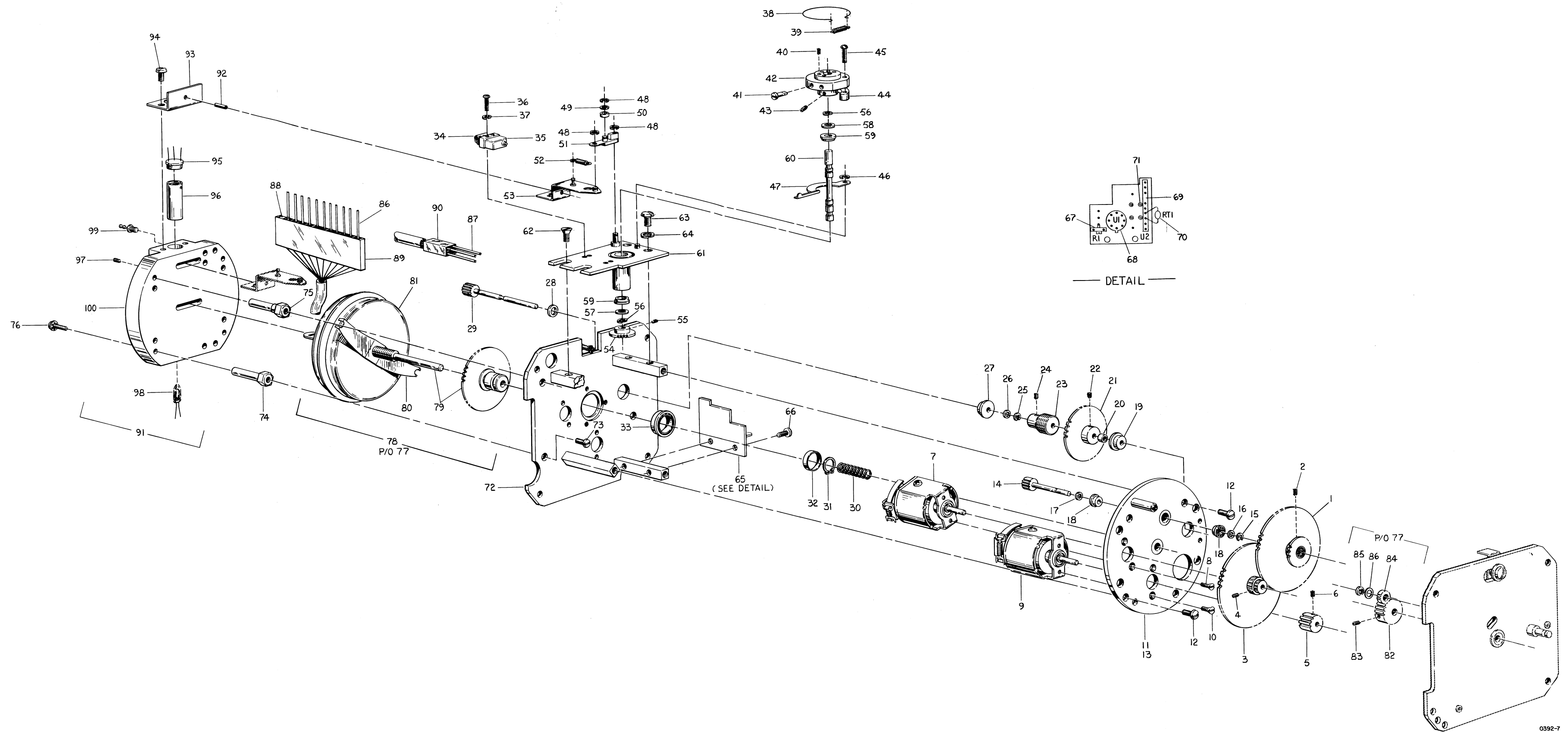


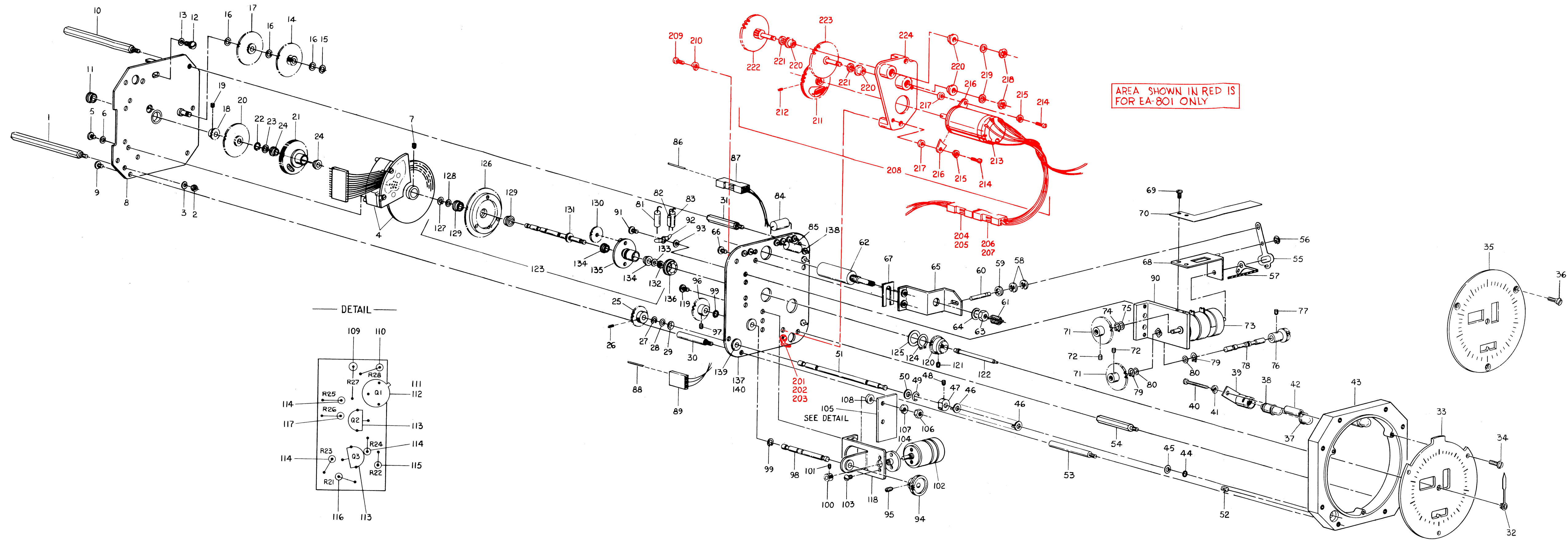
Figure 7-2. Capsule and Servo Assembly, Exploded View

Figure & Index No.	Part Number	Description						Qty per Assy	Usable on Code
		1	2	3	4	5	6		
7-2	42782-0014	CAPSULE AND SERVO ASSEMBLY (See Fig 7-1 -33 for NHA)						REF	A, B, C, D, E, F, N, P, Q, R, S, T G, H, J, K, L, M, U, V, W, X, Y, Z
	42782-0028	CAPSULE AND SERVO ASSEMBLY (See Fig 7-1 -33 for NHA)						REF	
-1	42785-0000	. GEAR ASSEMBLY (ATTACHING PARTS)						1	
-2	302-0008	. SETSCREW, Sch, stl, 2-56 by 1/8 in lg - - - * - - -						2	
-3	38558-0000	. GEAR ASSEMBLY (ATTACHING PARTS)						1	
-4	301-0008	. SETSCREW, Sch, stl, 1-74 by 1/8 in lg - - - * - - -						2	
-5	38345-0000	. PINION (ATTACHING PARTS)						1	
-6	301-0008	. SETSCREW, Sch, stl, 1-74 by 1/8 in lg - - - * - - -						2	
-7	38338-0024	. MOTOR, DC, 24 V (G1) (ATTACHING PARTS)						1	
-8	612-0012	. SCREW, Flh, sst, 2-64 by 3/16 in lg - - - * - - -						2	
-9	38338-0006	. MOTOR, DC, 6 V (B1)						1	A, B, C, D, E, F, N, P, Q, R, S, T G, H, J, K, L, M, U, V, W, X, Y, Z
	38338-0012	. MOTOR, DC, 12 V (B1)							
		(ATTACHING PARTS)							
-10	612-0012	. SCREW, Flh, sst, 2-64 by 3/16 in lg - - - * - - -						2	
-11	43854-0000	. PLATE ASSEMBLY, Gearing (PARTIAL BREAKDOWN FOLLOWS)						2	
-12	35595-4016	. . SCREW, Bdgh, sst, 4-40 by 1/4 in lg						4	
-13	No Number	. PLATE, Top						NP	
-14	42806-0000	. PINION (ATTACHING PARTS)						1	
-15	30323-0009	. RING, Retaining						1	
-16	43449-0000	. SHIM, Sst, 0.094 I.D. by 0.156 OD by 0.003 in thk						AR	
-17	43449-0000	. SHIM, Sst, 0.094 I.D. by 0.156 OD by 0.003 in thk						1	
-18	42811-0000	. BEARING, Ball, flanged						2	
-19	33138-0045	. BEARING, Flanged						1	
-20	33597-0000	. SPACER						1	
-21	43018-0000	. GEAR ASSEMBLY (ATTACHING PARTS)						1	
-22	301-0008	. SETSCREW, Sch, stl, 1-74 by 1/8 in lg - - - * - - -						2	
-23	43651-0000	. GEAR, Worm (ATTACHING PARTS)						1	
-24	302-0008	. SETSCREW, Sch, stl, 2-56 by 1/8 in lg - - - * - - -						2	
-25	30323-0009	. RING, Retaining						1	
-26	14591-0000	. SHIM, brs, 0.104 I.D. by 0.003 in thk						AR	
-27	33138-0045	. BEARING, Flanged						1	
-28	14591-0000	. WASHER, Flet, brs, 0.104 I.D. by 0.219 O.D. by 0.003 in thk						1	
-29	38562-0000	. PINION						1	
-30	43319-0000	. SPRING, Helical						1	

Figure & Index No.	Part Number	Description 1 2 3 4 5 6	Qty per Assy	Usable on Code
7-2-31	28665-0031	. RING, Retaining	1	
-32	39122-0000	. SPACER	1	
-33	44352-0000	. BEARING, Ball	1	
-34	36293-0007	. SEMICONDUCTOR DEVICE, Diode type 1N647 (CR2, CR3)	2	
-35	39144-000	. SWITCH, Micro, spdt (S1, S2) (ATTACHING PARTS)	2	
-36	102-0024	. SCREW, Bdgh, Brs np, 2-56 by 3/8 in lg	4	
-37	4386-0000	. WASHER, Lock, split, brz, np, No. 2 - - - * - - -	4	
-38	42728-0000	. SPRING, Torsion	1	
-39	3984-0000	. SPRING, Helical	1	
-40	325-2008	. SETSCREW, Sch, sst, 2-56 by 1/8 in lg	7	
-41	42757-0000	. PIN	7	
-42	42764-0000	. HUB (ATTACHING PARTS)	1	
-43	302-0008	. SETSCREW, Sch, stl, 2-56 by 1/8 in lg - - - * - - -	2	
-44	42313-0000	. PLATE (ATTACHING PARTS)	1	
-45	121-0016	. SCREW, Rdh, brs np, 1-72 by 1/4 in lg - - - * - - -	2	
-46	30323-0009	. RING, Retaining	1	
-47	42846-0000	. LEVER	1	
-48	30323-0009	. RING, Retaining	3	
-49	14363-0000	. WASHER, Flat, brs, 0.096 I.D. by 0.156 O.D. by 0.016 in thk	1	
-50	42927-0000	. BEARING, Ball	1	
-51	42777-0000	. ARM ASSEMBLY	1	
-52	17831-0000	. SPRING, Helical	1	
-53	42778-0000	. LEVER ASSEMBLY	1	
-54	43650-0000	. GEAR, Helical (ATTACHING PARTS)	1	
-55	302-0006	. SETSCREW, Sch, stl, 2-56 by 3/32 in lg - - - * - - -	2	
-56	28476-0012	. RING, Retaining	2	
-57	17768-0000	. SHIM, Sst, 0.128 I.D. by 0.187 O.D. by 0.003 in thk	1	
-58	17768-0000	. SHIM, Sst, 0.128 I.D. by 0.187 O.D. by 0.003 in thk	AR	
-59	42812-0000	. BEARING, Ball	2	
-60	42763-0000	. SHAFT	1	
-61	42779-0000	. PLATE ASSEMBLY (ATTACHING PARTS)	1	
-62	144-0012	. SCREW, Flh, brs np, 4-40 by 3/16 in lg	2	
-63	35595-4016	. SCREW, Bdgh, sst, 4-40 by 1/4 in lg	2	
-64	22341-0000	. WASHER, Lock, split, sst, No. 4 - - - * - - -	2	
-65	43877-0000	. PRINTED WIRING ASSEMBLY, A2 (ATTACHING PARTS)	1	
-66	35595-4016	. SCREW, Bdgh, sst, 4-40 by 1/4 in lg - - - * - - -	2	
-67	40878-1474	. RESISTOR, Var, 470.K ohms $\pm 20\%$, 1/2 W (R1)	1	
-70	44409-0000	. THERMISTOR, 1 K $\pm 1\%$ (RT 1)	1	
-71	43078-5401	. CONTACT, Elec	4	
-72	No Number	. PLATE, Bottom (P/O index No. 11) (ATTACHING PARTS)	NP	
-73	35595-4016	. SCREW, Bdgh, sst, 4-40 by 1/4 in lg - - - * - - -	4	
-74	42520-0000	. POST	3	
-75	42902-0000	. POST (ATTACHING PARTS)	1	
-76	504-0032	. SCREW, Assembled washer, bdgh, 4-40 by 1/2 in lg - - - * - - -	4	

Figure & Index No.	Part Number	Description	Qty per Assy	Usable on Code
		1 2 3 4 5 6		
7-2-77	43779-0000	. KIT, Capsule assembly and gear set (GREEN)	1	
	43779-0001	. KIT, Capsule assembly and gear set (BLACK)	1	
	43779-0002	. KIT, Capsule assembly and gear set (YELLOW)	1	
	43779-0003	. KIT, Capsule assembly and gear set (WHITE)	1	
	43779-0004	. KIT, Capsule assembly and gear set (ORANGE)	1	
		(PARTIAL BREAKDOWN FOLLOWS)		
-78	43928-0000	. . CAPSULE AND SHAFT ASSEMBLY	1	
-79	43928-0000	. . . GEAR AND SHAFT ASSEMBLY	NP	
-80	43775-0000	. . . SPRING	NP	
-81	43778-0000	. . . CAPSULE, Graded (GREEN) (used on 43779-0000)	NP	
	43778-0001	. . . CAPSULE, Graded (BLACK) (used on 43779-0001)	NP	
	43778-0002	. . . CAPSULE, Graded (YELLOW) (used on 43779-0002)	NP	
	43778-0003	. . . CAPSULE, Graded (WHITE) (used on 43779-0003)	NP	
	43778-0004	. . . CAPSULE, Graded (ORANGE) (used on 43779-0004)	NP	
-82	43774-0000	. . GEAR, Spur, green (used on 43779-0000)	1	
	43773-0000	. . GEAR, Spur, black (used on 43779-0001)	1	
	43772-0000	. . GEAR, Spur, yellow (used on 43779-0002)	1	
	42829-0000	. . GEAR, Spur, white (used on 43779-0003)	1	
	43771-0000	. . GEAR, Spur, orange (used on 43779-0004)	1	
		(ATTACHING PARTS)		
-83	302-0006	. . SETSCREW, Sch, stl, 2-56 by 3/32 in lg	2	
		- - - * - - -		
-84	43770-0000	. . GEAR, Spur, green (used on 43779-0000)	1	
	43769-0000	. . GEAR, Spur, black (used on 43779-0001)	1	
	43768-0000	. . GEAR, Spur, yellow (used on 43779-0002)	1	
	42314-0000	. . GEAR, Spur, white (used on 43779-0003)	1	
	43767-0000	. . GEAR, Spur, orange (used on 43779-0004)	1	
		(ATTACHING PARTS)		
-85	28476-0012	. . RING, Retaining	1	
-86	17768-0000	. . SHIM, Sst, 0.187 OD by 0.128 ID by 0.003 in thk	1	
		- - - * - - -		
-87	42442-3092	. . PIN, Male	15	
-88	42442-4001	. . PLUG, Polarizing	1	
-89	42442-5012	. . CONNECTOR, Elec (P3)	1	
-90	42442-0004	. . CONNECTOR, Elec (P2)	1	
-91	42776-0000	. . PLATE ASSEMBLY, Bottom		
-92	8775-0012	. . PIN, Roll	1	
-93	42769-0000	. . BRACKET	1	
		(ATTACHING PARTS)		
-94	102-0012	. . SCREW, Bdgh, brs np, 2-56 by 3/16 in lg	2	
		- - - * - - -		
-95	38538-0000	. . PHOTO ELECTRIC CELL (V1)	1	
-96	42781-0000	. . TUBE ASSEMBLY	1	
		(ATTACHING PARTS)		
-97	302-0008	. . SETSCREW, Sch, stl, 2-56 by 1/8 in lg	1	
		- - - * - - -		
-98	32971-0005	. . LAMP, Incandescent (DS1)	1	
-99	38539-0910	. . TERMINAL, Stud	5	
-100	43385-0001	. . PLATE, Bottom	1	

Figure & Index No.	Part Number	Description 1 2 3 4 5 6	Qty per Assy	Usable on Code
7-3-	42845-2114	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	A
	42845-2214	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	B
	42845-3114	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	C
	42845-3214	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	D
	42845-4114	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	E
	42845-4214	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	F
	42845-2128	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	G
	42845-2228	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	H
	42845-3128	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	J
	42845-3228	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	K
	42845-4128	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	L
	42845-4228	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	M
	42845-5114	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	N
	42845-5214	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	P
	42845-6114	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	Q
	42845-6214	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	R
	42845-7114	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	S
	42845-7214	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	T
	42845-5128	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	U
	42845-5228	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	V
	42845-6128	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	W
	42845-6228	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	X
	42845-7128	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	Y
	42845-7228	COUNTER AND DIAL ASSEMBLY (See Fig 7-1-45 for NHA)	REF	Z
-1	41775-0005	. POST, Threaded (ATTACHING PARTS)	1	
-2	8040-0000	. NUT, Hex brs np, 4-40	1	
-3	22341-0000	. WASHER, Lock split, sst, No. 4 - - - * - - -	1	
-4	42516-0014	. ENCODER ASSEMBLY (MT1)	1	A, B, C, D, E, F, N, P, Q, R, S, T
	42516-0028	. ENCODER ASSEMBLY (MT1) (ATTACHING PARTS)	1	G, H, J, K, L, M, U, V W, X, Y, Z
-5	35595-4016	. SCREW, Bdgh, sst, 4-40 by 1/4 in lg	2	
-6	22341-0000	. WASHER, Lock, split, sst, No. 4	2	
-7	302-0006	. SETSCREW, Sch, stl, 2-56 by 3/32 in lg - - - * - - -	2	
-8	42850-0000	. PLATE ASSEMBLY, Middle (ATTACHING PARTS)	1	
-9	35595-4016	. SCREW, Bdgh, sst, 4-40 by 1/4 in lg	2	
-10	41775-0005	. POST, Threaded - - - * - - - (PARTIAL BREAKDOWN FOLLOWS)	3	
-11	42812-0000	. BEARING, Ball	1	
-12	35595-4016	. SCREW, Bdgh, sst, 4-40 by 1/4	1	
-13	5103-0000	. WASHER, Flat, brs np, No. 4	1	
-14	42857-0000	. GEAR ASSEMBLY (ATTACHING PARTS)	1	
-15	28476-0012	. RING, Retaining - - - * - - -	1	
-16	17768-0000	. SHIM, Sst, 0.187 O.D. by 0.128 I.D. by 0.003 in thk	AR	
-17	42869-0000	. GEAR ASSEMBLY	1	
-18	42826-0000	. GEAR, Spur (ATTACHING PARTS)	1	
-19	302-0004	. SETSCREW, Sch, stl, 2-56 by 1/16 in lg - - - * - - -	2	



0392-8

Figure 7-3. Counter and Dial Assembly, Exploded View

Figure & Index No.	Part Number	Description	Qty per Assy	Usable on Code
		1 2 3 4 5 6		
7-3-20	42869-0000	. GEAR ASSEMBLY	1	
-21	42852-0000	. GEAR ASSEMBLY, Split (ATTACHING PARTS)	1	
-22	28476-0012	. RING, Retaining - - - * - - -	1	
-23	17768-0000	. SHIM, Sst, 0.187 O.D. by 0.128 I.D. by 0.003 in thk	AR	
-24	42812-0000	. BEARING, Ball, flanged	2	
-25	42854-0000	. GEAR ASSEMBLY (ATTACHING PARTS)	1	
-26	302-0006	. SETSCREW, Sch, stl, 2-56 by 3/32 in lg - - - * - - -	2	
-27	28476-0012	. RING, Retaining	1	
-28	28558-1003	. WASHER, Flat	1	
-29	13527-0000	. WASHER, Spr tnsn, cop np, 0.128 I.D.	AR	
-30	42833-0000	. POST, Threaded, round	2	
-31	41775-0001	. POST, Threaded, hex	3	
-32	42858-0001	. POINTER ASSEMBLY	1	A, B, G, H, N, P, U, V
	42858-0002	. POINTER ASSEMBLY	1	C, D, E, F, J, K, L, M, Q, R, S, T, W, X, Y, Z
-33	44376-0002	. DIAL, Printed	1	N, U
	44376-0003	. DIAL, Printed	1	P, V
	44376-0004	. DIAL, Printed	1	Q, W
	44376-0005	. DIAL, Printed	1	R, X
	44376-0000	. DIAL, Printed	1	S, Y
	44376-0001	. DIAL, Printed (ATTACHING PARTS)	1	T, Z
-34	33595-2008	. SCREW, Bdgh, sst, 2-56 by 1/8 in lg - - - * - - -	3	N thru Z
-35	42863-0002	. DIAL, Printed	1	A, G
	42863-0003	. DIAL, Printed	1	B, H
	42863-0004	. DIAL, Printed	1	C, J
	42863-0005	. DIAL, Printed	1	D, K
	42863-0000	. DIAL, Printed	1	E, L
	42863-0001	. DIAL, Printed (ATTACHING PARTS)	1	F, M
-36	152-0008	. SCREEN, Flh, brs, blk oxd, 2-56 by 1/8 in lg - - - * - - -	3	A thru N, M
-37	37226-0002	. FILTER, Lamp	2	N thru Z
-38	39847-0386	. LAMP, Incandescent (DS2, DS3)	2	N, P, Q, R, S, T
	39847-0388	. LAMP, Incandescent (DS2, DS3)	2	U, V, W, X, Y, Z
-39	41079-0212	. LAMPHOLDER, Grooved (ATTACHING PARTS)	2	N thru Z
-40	35595-4040	. SCREW, Bdgh, sst, 4-40 by 5/8 in lg	2	N thru Z
-41	22341-0000	. WASHER, Lock, split, sst No. 4 - - - * - - -	2	N thru Z
-42	32849-0032	. SPACER	2	N thru Z
-43	42342-0000	. BEZEL, Flanged	1	
-44	31213-0006	. SEAL, O-ring		
-45	6858-0000	. WASHER, Flat, brs np, 0.130 I.D. by 0.234 O.D., by 0.047 in thk	1	
-46	42818-0000	. TUMBLER	17	
-47	42817-0000	. COLLAR	1	

Figure & Index No.	Part Number	Description 1 2 3 4 5 6	Qty per Assy	Usable on Code
7-3		(ATTACHING PARTS)		
-48	302-0006	. SETSCREW, Sch, stl, 2-56 by 3/32 in lg - - - * - - -	2	
-49	28476-0012	. RING, Retaining	1	
-50	17768-0000	. SHIM, Sst, 0.187 O.D. by 0.128 I.D. by 0.003 in thk	1	
-51	42303-0000	. SHAFT	1	
-52	8775-0492	. PIN, Roll	1	
-53	42832-0000	. POST, Threaded, round	2	
-54	42831-0000	. POST, Threaded, hex	3	
-55	43468-0000	. LEVER ASSEMBLY (ATTACHING PARTS)	1	
-56	30323-0009	. RING, Retaining - - - * - - -	1	
-57	42840-0002	. LEVER	1	
-58	30323-0006	. RING, Retaining	2	
-59	45263-0000	. WASHER, Flat, brz, 0.170 O.D. by 0.065 I.D. b 0.002 in thk	1	
-60	42834-0000	. SHAFT	1	
-61	42866-0000	. SPRING, Helical	1	
-62	42966-0000	. SOLENOID, DC (L1)	1	A, B, C, D, E, F, N, P, Q, R, S, T G, H, J, K, L, M, U, V, W, X, Y, Z
	42814-0000	. SOLENOID, DC (L1)	1	
		(ATTACHING PARTS)		
-63	21172-0000	. NUT, Hex, brs sil pl, No. 5116-32	1	
-64	28178-0000	. WASHER, Lock, intl t, sst, No. 5/16 - - - * - - -	1	
-65	42859-0000	. BRACKET ASSEMBLY (ATTACHING PARTS)	1	
-66	35595-4016	. SCREW, Bdgh, sst, 4-40 by 1/4 in lg	2	
-67	45138-0000	. SHIM, Special - - - * - - -	AR	
-68	42868-0000	. BRACKET ASSEMBLY (ATTACHING PARTS)	1	
-69	102-0010	. SCREW, Bdgh, brs np, 2-56 by 5/32 in lg - - - * - - -	2	
-70	44331-0000	. SHIELD	1	N thru Z
-71	42856-0000	. GEAR ASSEMBLY (ATTACHING PARTS)	2	
-72	302-0006	. SETSCREW, Sch, stl, 2-56 by 3/32 in lg - - - * - - -	4	
-73	42746-0000	. COUNTER (ATTACHING PARTS)	1	
-74	39345-0012	. RING, Retaining - - - * - - -	1	
-75	17768-0000	. SHIM, Sst, 0.187 O.D. by 0.128 I.D. by 0.003 in thk	AR	
-76	42273-0000	. GEAR, Miter (ATTACHING PARTS)	1	
-77	302-0004	. SETSCREW, Sch, stl, 2-56 by 1/16 in lg - - - * - - -	2	
-78	42304-0000	. SHAFT (ATTACHING PARTS)	1	
-79	28476-0012	. RING, Retaining - - - * - - -	2	
-80	17768-0000	. SHIM, Sst, 0.187 O.D. by 0.128 I.D. by 0.003 in thk	AR	
-81	42810-0110	. SEMICONDUCTOR DEVICE, Dioder (VR1) IN5348B	1	A, B, C, D, E, F, N, P, Q, R, S, T

Figure & Index No.	Part Number	Description 1 2 3 4 5 6	Qty per Assy	Usable on Code
7-3-81	42810-0220	. SEMICONDUCTOR DEVICE, Diode (VR1) IN5358B	1	G, H, J, K, L, M, U, V, W, X, Y, Z
-82	35954-9471	. SEMICONDUCTOR DEVICE, Diode (VR3) IN4732A	1	
-83	21485-9472	. CAPACITOR, Fxd, elctlt, 0.47 μ F $\pm$ 20%, 35 Vdc (C6)	1	
-84	209-0630	. RESISTOR, Fxd, ww, 63 ohms $\pm$ 5%, 3 W (R17)	1	A, B, C, D, E, F, N, P, Q, R, S, T
	202-0751	. RESISTOR, Fxd, comp, 750 ohms $\pm$ 5%, 1 W (R17)	1	G, H, J, K, L, M, U, V, W, X, Y, Z
-85	209-0120	. RESISTOR, Fxd, ww, 12 ohms $\pm$ 5%, 3 W (R16)	1	A, B, C, D, E, F, N, P, Q, R, S, T
	209-0500	. RESISTOR, Fxd, ww, 50 ohms $\pm$ 5%, 3 W (R16)	1	G, H, J, K, L, M, U, V, W, X, Y, Z
-86	42442-2565	. PIN, Female	3	
-87	42442-0004	. CONNECTOR, Elec (J2)	1	
-88	42442-2565	. PIN, Female	2	A thru M
	42442-2565	. PIN, Female	3	N thru Z
-89	42442-5003	. CONNECTOR, Elec (J5)	1	
-90	42860-0000	. BRACKET, Assembly	1	
		(ATTACHING PARTS)		
-91	35595-4016	. SCREW, Bdgh, sst, 4-40 by 1/4 in lg	2	
		- - - * - - -		
-92	1026-0002	. TERMINAL, Lug	1	
-93	5103-0000	. WASHER, Flat	1	
-94	42275-0000	. GEAR, Face	1	A, C, E, G, J, L, N, Q, S, U, W, Y
	42934-0002	. GEAR, Miter	1	B, D, F, H, K, M, P, R, T, V, X, Z
		(ATTACHING PARTS)		
-95	302-0006	. SETSCREW, Sch, stl, 2-56 by 3/32 in lg	2	
		- - - * - - -		
-96	42853-0000	. GEAR ASSEMBLY	1	A, C, E, G, J, L, N, Q, S, U, W, Y
	42936-0000	. GEAR ASSEMBLY	1	B, D, F, H, K, M, P, R, T, V, X, Z
		(ATTACHING PARTS)		
-97	302-0006	. SETSCREW, Sch stl, 2-56 by 3/32 in lg	2	
		- - - * - - -		
-98	42308-0000	. SHAFT	1	A, C, E, G, J, L, N, Q, S, U, W, Y
	42939-0000	. SHAFT	1	B, D, F, H, K, M, P, R, T, V, X, Z

Figure & Index No.	Part Number	Description 1 2 3 4 5 6	Qty per Assy	Usable on Code
7-3-99	28476-0012	(ATTACHING PARTS) RING, Retaining	2	
-100	42830-0000	GEAR, Spur	1	A, C, E, G, J, L, N, Q, S, U, W, Y
	42934-0001	GEAR, Miter	1	B, D, F, H, K, M, P, R, T, V, X, Z
-101	301-0004	(ATTACHING PARTS) SETSCREW, Sch, stl, 1-72 by 1/16 in lg	1	
-102	42747-0000	COUNTER, Baroset, in. hg	1	A, C, E, F, J, L, N, Q, S, U, W, Y
	42754-0000	COUNTER, Baroset, millibars	1	B, D, F, H, K, M, P, R, T, V, X, Z
-103	42918-0012	(ATTACHING PARTS) SCREW, Rdh, brs np, 1-64 by 3/16 in lg	2	
-104	43777-0000	SPACER	1	
-105	43975-0000	PRINTED WIRING ASSEMBLY, A3	1	
-106	8040-0000	(ATTACHING PARTS) NUT, Hex, brs np, 4-40	2	
-107	22341-0000	WASHER, Lock split, sst, No. 4	2	
-108	15155-0000	WASHER, Flat, al, 0.234 O.D. by 0.120 I.D. by 0.032 in thk	2	
-109	201-0112	RESISTOR, Fxd, comp, 1.1 k ohms $\pm 5\%$, 1/2 W (R27)	1	
-110	200-0271	RESISTOR, Fxd, comp, 270 ohms $\pm 10\%$, 1/4 W (R28)	1	
-111	37287-0000	TRANSISTOR, Type 2N4037 (Q1)	1	
-112	50334-0001	INSULATOR, Transistor	1	
-113	36961-4124	TRANSISTOR, Type 2N4124 (Q2, Q3)	2	
-114	200-0272	RESISTOR, Fxd, comp, 2.7 k ohms $\pm 10\%$, 1/4 W (R23, R24, R25)	3	
-115	200-0332	RESISTOR, Fxd, comp, 3.3 k ohms $\pm 10\%$, 1/4 W (R22)	1	
-116	200-0223	RESISTOR, Fxd, comp, 22 k ohms $\pm 10\%$, 1/4 W (R21)	1	
-117	200-0820	RESISTOR, Fxd, comp, 82 ohms $\pm 10\%$, 1/4 W (R26)	1	
-118	42861-0000	BRACKET ASSEMBLY	1	
-119	35595-4028	(ATTACHING PARTS) SCREW, Bdgh, sst, 4-40 by 7/16 in lg	2	
-120	42274-0000	GEAR, Bevel	1	
-121	302-0004	(ATTACHING PARTS) SETSCREW, Sch, stl, 2-56 by 1/16 in lg	2	
-122	42309-0000	SHAFT, Pointer	1	
-123	42851-0000	DIFFERENTIAL ASSEMBLY	1	
-124	28665-0031	(ATTACHING PARTS) RING, Retaining	1	
-125	43458-0000	SHIM, Sst, 0.453 O.D. by 0.313 I.D. by 0.003 in thk	AR	
-126	42855-0000	GEAR ASSEMBLY	1	
-127	28476-0012	(ATTACHING PARTS) RING, Retaining	1	
-128	17768-0000	SHIM, Sst, 0.187 O.D. by 0.128 I.D. by 0.003 in thk	AR	
-129	42812-0000	BEARING, Ball	2	

Figure & Index No.	Part Number	Description						Qty per Assy	Usable on Code
		1	2	3	4	5	6		
7-3-130	42825-0000	.	.	GEAR, Spur	.	.	.	2	
-131	42305-0000	.	.	PINION	.	.	.	1	
		.	.	(ATTACHING PARTS)	.	.	.		
-132	8275-0000	.	.	NUT, Hex, brs np No. 2-56	.	.	.	1	
		.	.	- - - * - - -	.	.	.		
-133	42865-0000	.	.	SPACER	.	.	.	1	
-134	42811-0000	.	.	BEARING, Ball	.	.	.	2	
-135	42864-0000	.	.	HUB ASSEMBLY	.	.	.	1	
-136	42813-0000	.	.	BEARING, Ball	.	.	.	1	
-137	42849-0000	.	.	PLATE ASSEMBLY, Front	.	.	.	1	
-138	17805-0910	.	.	TERMINAL, Feed thru	.	.	.	9	
-139	33138-0055	.	.	BEARING, Flanged	.	.	.	2	
-140	42293-0000	.	.	PLATE, Front	.	.	.	1	



Figure 7-4. A1, Printed Wiring Assembly, Parts Location Diagram

Figure & Index No.	Part Number	Description 1 2 3 4 5 6	Qty per Assy	Usable on Code
7-4-	42892-0000	PRINTED WIRING ASSEMBLY, A1 (See Fig 7-1-31 for NHA)	REF	
AR1	41754-0001	. INTEGRATED CIRCUIT, Opnl ampl, type MC1747L	1	
AR2	42909-0000	. INTEGRATED CIRCUIT, Audio ampl, type SL60937	1	
AR3	42909-0000	. Same as AR2	1	
CR1	36632-4002	. SEMICONDUCTOR DEVICE, Diode, type IN4002	1	
C1	38269-6305	. CAPACITOR, Fxd, elctlt, 4.7 μ F $\pm$ 100 $-$ 10% 63 Vdc	1	
C2	38269-6305	. Same as C1	1	
C3	21485-9472	. CAPACITOR, Fxd, elctlt, 0.47 μ F $\pm$ 2%, 35 Vdc	1	
C4	21485-9472	. Same as C3	1	
C5	21485-9472	. Same as C3	1	
C7	38269-4003	. CAPACITOR, Fxd, elctlt, 15 μ F $\pm$ 100 $-$ 10%, 40 Vdc	1	
C8	38269-4003	. Same as C7	1	
C9	32423-9223	. CAPACITOR, Fxd, plstc, 0.022 μ F $\pm$ 10%, 80 Vdc	1	
R1	200-0102	. RESISTOR, Fxd, cmpsn, 1 k ohms $\pm$ 10%, 1/4 W	1	
R2	341-0752	. RESISTOR, Fxd, cmpsn, 7.5 k ohms $\pm$ 5%, 1/4 W	1	
R3	200-0105	. RESISTOR, Fxd, cmpsn, 1 meg ohms $\pm$ 10%, 1/4 W	1	
R4	200-0102	. Same as R1	1	
R5	200-0182	. RESISTOR, Fxd, cmpsn, 1.8 k ohms $\pm$ 10%, 1/4 W	1	
R6	39408-2501	. RESISTOR, Var, 500 ohms $\pm$ 30%, 1/2 W	1	
R9	200-0103	. RESISTOR, Fxd, cmpsn, 10 k ohms $\pm$ 10%, 1/4 W	1	
R10	200-0103	. Same as R9	1	
R11	200-0103	. Same as R9	1	
R12	200-0103	. Same as R9	1	
R13	200-0562	. RESISTOR, Fxd, cmpsn, 6.8 k ohms $\pm$ 10%, 1/4 W	1	
R14	200-0562	. Same as R13	1	
R18	341-9301	. RESISTOR, Fxd, cmpsn, 3 ohms $\pm$ 5%, 1/4 W	1	
R19	341-9301	. Same as R18	1	
R20	200-0101	. RESISTOR, Fxd, cmpsn, 100 ohms $\pm$ 10%, 1/4 W	1	
U1	42647-0000	. INTEGRATED CIRCUIT, Linear, type CA3146AE	1	
U2	42646-0000	. INTEGRATED CIRCUIT, Res ntwk, type 899-1R10K	1	
U3	42647-0000	. Same as U1	1	
-1	44349-0000	. HEATSINK	1	
-2	8819-0016	. WIRE, Solid, AWG 16	AR	

SECTION 8

EA-801A DIFFERENCE DATA

8-1. SCOPE.

This section contains information concerning the EA-801A Encoding Altimeter (EA-801A) and describes only those differences that distinguish an EA-801A from an EA-401A Encoding Altimeter. The EA-801A is always used with an external aircraft instrument that requires specific altitude information for part of its functional operation.

8-2. EQUIPMENT SUPPLIED.

The EA-801A is supplied for 28 volt operation only and with a barometric readout in either in. Hg or in millibars.

The unit is available with illuminated panel only. A resolver, included in the EA-801A, is the only functional difference between EA-801A and EA-401A Encoding Altimeters.

8-3. REFERENCE DATA.

Table 8-1 provides a complete listing of specifications for the EA-801A.

8-4. FUNCTIONAL DESCRIPTION.

The EA-801A is, with one exception, functionally identical to the EA-401A Encoding Altimeter described in the front

TABLE 8-1. EA-801A SPECIFICATIONS

Parameter	Specifications and/or Range
Certification	TSO-C10b, TSO-C88 (MTG-IP)
Encoded Output: Logic "0": Logic "1":	Open, typically +5 volts from transponder +0.7 volts, 0.2 mA (maximum)
Input Voltage:	28 Vdc only
Lag:	Instantaneous altitude tracking greater than 20,000 feet/minute
Model Identification: 43300-6128 43300-6228	Barometric readout: in. Hg Barometric readout: millibars
Panel Lighting	Illuminated panel only
Physical Characteristics: Dimensions: Weight:	3¼" X 3¼" X 8" long 2.7 pounds
Ranges: Barometric Scale: Display and Encoding: Resolver Analog Output:	28.10 in. Hg to 31 in. Hg or 946 millibars to 1049 millibars —1000 feet to 35,000 feet (@ 29.92 in. Hg) Effective altitude range is from 0.0 feet to 35,000 feet. Analog output voltage is offset by adjustment of BAROSET knob.

of this manual. The addition of resolver RS1 provides the EA-801A with an analog output voltage that is proportional to indicated altitude. (See figures 4-1, 6-1, 8-1, and 8-2.) The EA-801A output analog voltage satisfies a functional requirement for an external aircraft instrument requiring specific altitude information. This analog voltage is used to signal aircraft arrival at or transition through preselected altitude within the specified range of operation.

The resolver rotor is mechanically driven, through reduction gearing, by servomotor B1. Throughout the entire range of operation of servomotor B1, the resolver rotor completes only one revolution (360°). The external aircraft instrument provides a signal input to the resolver's rotor winding. Two signals are then generated in the resolver's stator windings. The resolver's analog output voltage is comprised of these two phase dependent stator voltages. These voltages provide specific altitude information to the external aircraft instrument.

8-5. INSTALLATION.

Electrical interconnections for the EA-801A are shown in figure 2-2 and the following items are of primary concern.

- a. Rated voltage for the EA-801A is 28 vdc only and it is applied at connector pin P1-N.
- b. This instrument is supplied with an illuminated front panel only. Connector pin P1-V should be interconnected with the aircraft light dimmer circuit.
- c. For specific interconnections between resolver RS1 and the external aircraft instrument in use, refer to the interconnection diagram for the particular equipment in use.

8-6. ILLUSTRATED PARTS LIST.

The illustrated Parts List contains items used on the EA-801A only. These items are shown in red on figure 7-3, index numbers 201 and above, unless otherwise noted in the description column of the Illustrated Parts List.

ILLUSTRATED PARTS LIST

Fig & Index No.	Part Number	Description 1 2 3 4 5 6	Units per Assy	Usable on Code
7-3	43300-6128	ENCODING ALTIMETER, EA-801A	1	A
	43300-6228	ENCODING ALTIMETER, EA-801A	1	B
	43302-6128	. NAMEPLATE (See Fig 7-1-3 for location)	1	A
	43302-6228	. NAMEPLATE (See Fig 7-1-3 for location)	1	B
-201	5216-0000	. TERMINAL, Lug (ATTACHING PARTS)	1	
-202	103-0012	. SCREW, Bdgh, brs np, 3-48 by 3/16 in lg	1	
-203	4559-0000	. WASHER, Lock, split, No. 3 - - - * - - -	1	
-204	42442-2565	. PIN, Female	4	
-205	42442-0004	. CONNECTOR, Elec (J6)	1	
-206	42442-3092	. PIN, Male	4	
-207	42442-0004	. CONNECTOR, Elec (P6)	1	
-208	44919-0000	. GEARING UNIT ASSEMBLY (ATTACHING PARTS)	1	
-209	35595-4016	. SCREW, Bdgh, sst, 4-40 by 1/4 in lg	2	
-210	22341-0000	. WASHER, Lock, split, No. 4 - - - * - - -	2	
-211	44946-0000	. . GEAR ASSEMBLY, Split (ATTACHING PARTS)	1	
-212	302-0006	. . SETSCREW, Sch, stl, 2-56 by 3/32 in. lg - - - * - - -	2	
-213	44749-0000	. . SYNCHRO RESOLVER (RS1) (ATTACHING PARTS)	1	
-214	603-0014	. . SCREW, Filh, brs np, 3-56 by 7/32 in. lg	2	
-215	4559-0000	. . WASHER, Lock, split, No. 3	2	
-216	26804-0000	. . CLAMP, Rim clenching	2	
-217	26805-0001	. . SPACER, Sleeve - - - * - - -	2	
-218	30323-0009	. . RING, Retaining	2	
-219	44927-0000	. . SHIM, sst, 0.156 O.D. by 0.0015 in thk	AR	
-220	42811-0000	. . BEARING, Ball, flanged	4	
-221	43449-0000	. . WASHER, Flat, sst, 0.156 O.D. by 0.094 I.D. by 0.003 in thk	2	
-222	44952-0000	. . PINION AND GEAR ASSEMBLY	1	
-223	44954-0000	. . PINION AND GEAR ASSEMBLY	1	
-224	44889-0000	. . PLATE, Mounting	1	

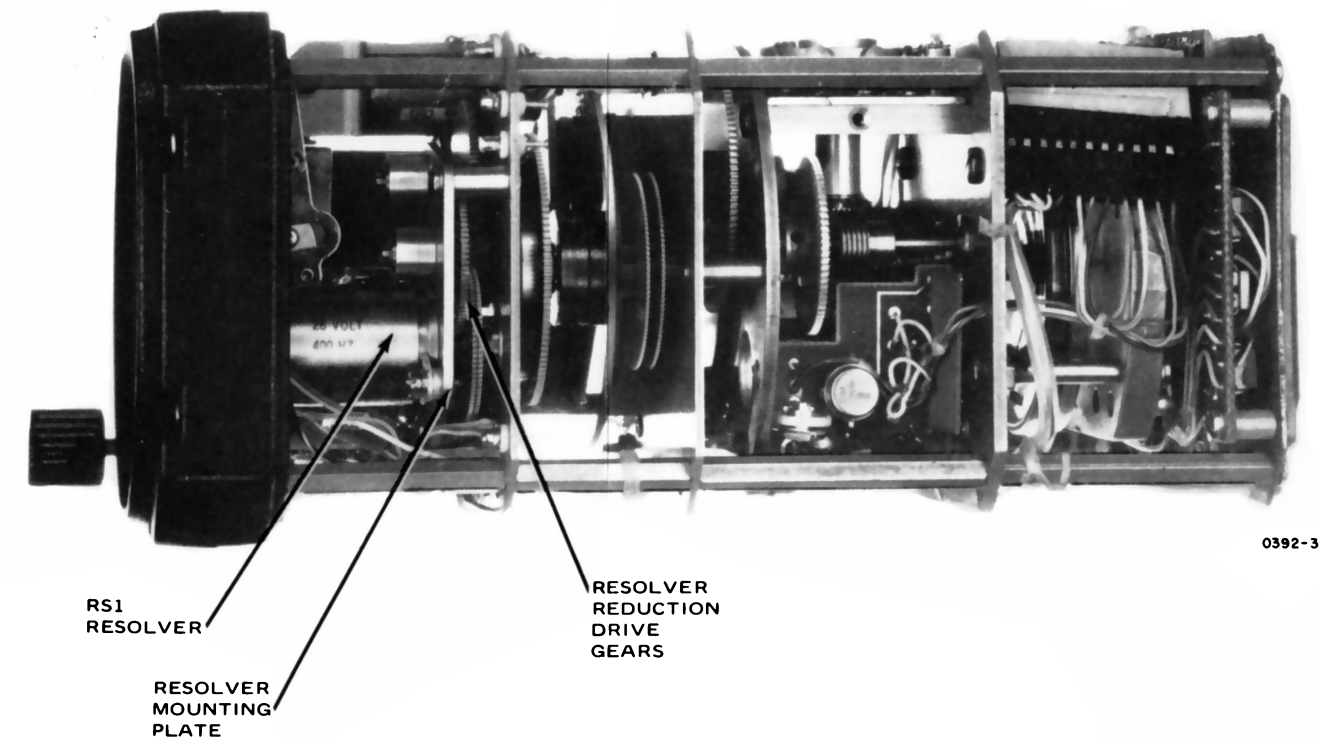


Figure 8-1. EA-801A Encoding Altimeter, Right-Side View

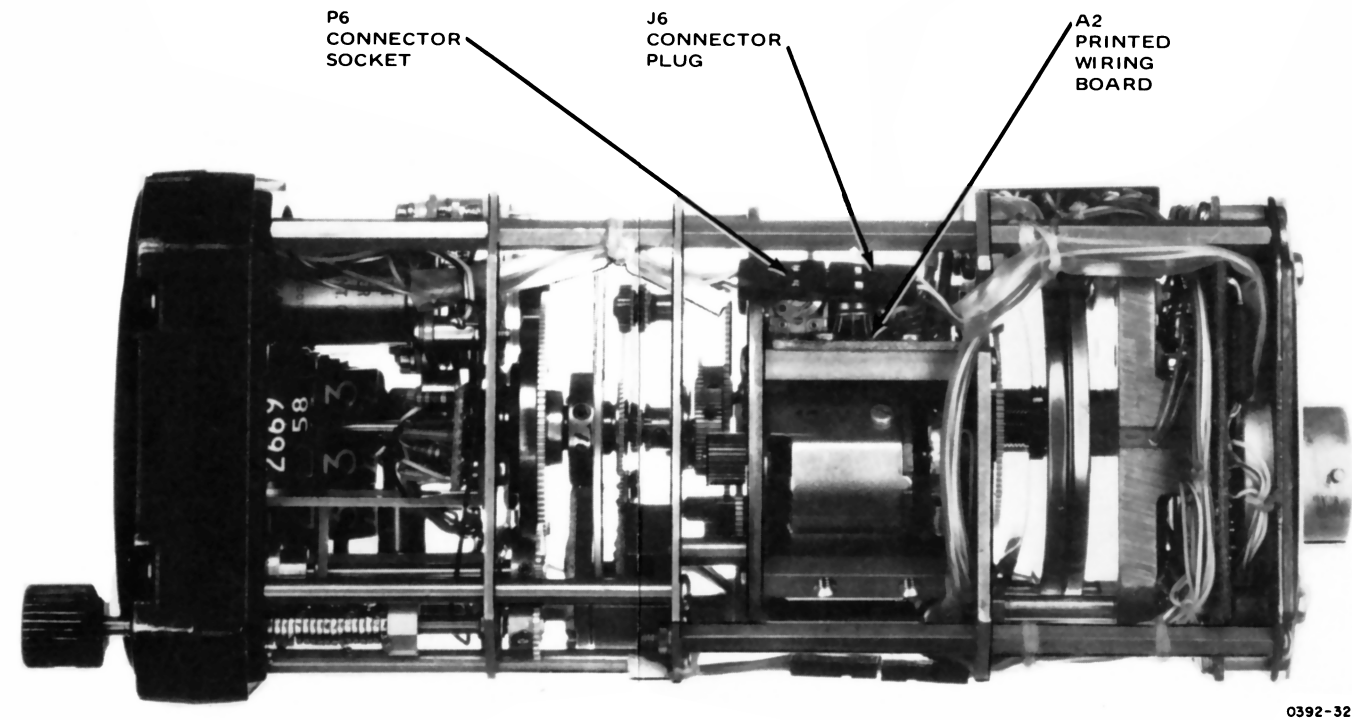


Figure 8-2. EA-801A Encoding Altimeter, Bottom View

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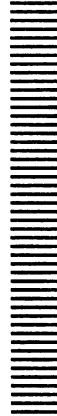
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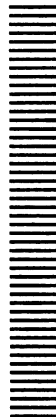
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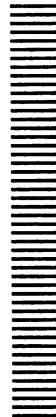
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