

MODEL A-30 ENCODER FIELD SERVICE AND REPAIR MANUAL

TABLE OF CONTENTS

SECTION		PAGE
1	THEORY OF OPERATION AND SCHEMATICS	1
2	PARTS LIST	7
3	MINOR MODIFICATIONS BY SERIAL NUMBER	12
4	MINIMUM TEST EQUIPMENT REQUIREMENTS	13
5	BASIC FUNCTION TESTING	14
6	TROUBLE SHOOTING AND REPAIR	16
7	CALIBRATION PROCEDURE	19
8	NOTES AND SERVICE BULLETINS	24

THIS MANUAL PROVIDES INFORMATION NECESSARY TO PERFORM FUNCTION TESTING, TROUBLESHOOTING AND REPAIR OF THE MODEL A-30 BLIND ENCODER.

ALL WORK MUST BE PERFORMED ONLY BY QUALIFIED REPAIR FACILITIES.

MANUAL PART NUMBER A30-SM REVISION DATE 05/24/92

PRICE \$25.00

INCLUDES TECHNICAL UPDATE SERVICE

440 WEST JULIAN STREET
SAN JOSE, CA 95110 USA

PHONE 408 287-8021
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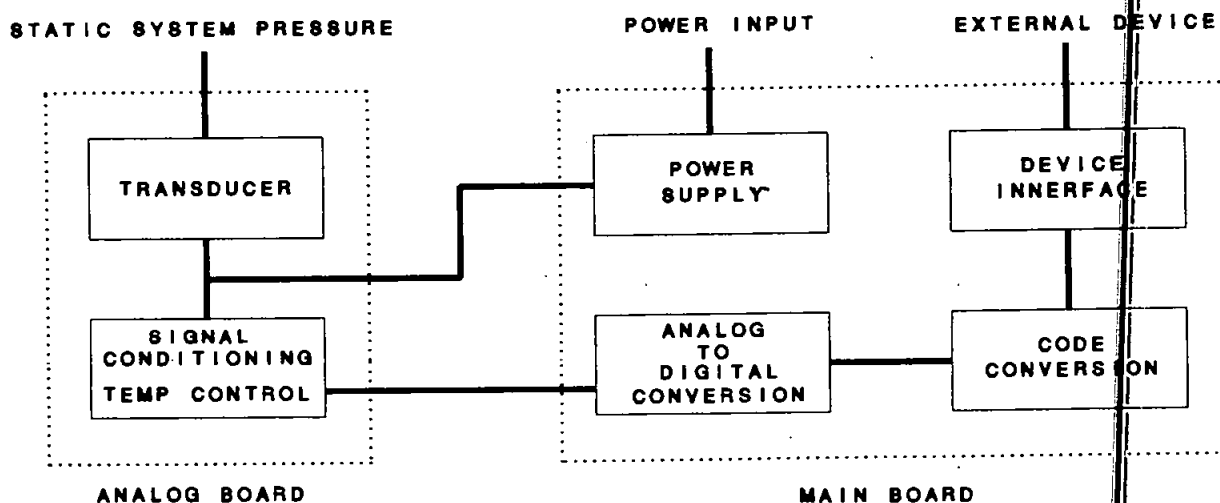
SECTION 1

THEORY OF OPERATION AND SCHEMATICS

THE A-30 ALTITUDE ENCODER IS COMPRISED OF TWO BOARD ASSEMBLIES. THE MAIN BOARD CONSISTS OF THE SYSTEM POWER SUPPLY, A TO D CONVERSION, BINARY TO GRAY CODE CONVERSION AND DEVICE INTERFACE CIRCUITS.

THE ANALOG BOARD ASSEMBLY CONSISTS OF A PRESSURE TRANSDUCER, SIGNAL CONDITIONING, AND TEMPERATURE CONTROL CIRCUITS.

BELOW IS A SIMPLIFIED BLOCK DIAGRAM OF THE MAJOR CIRCUITS



POWER SUPPLY

INPUT POWER (10-32 VOLTS DC) IS REGULATED BY VR1 (LM7805) TO SUPPLY +5 VOLT MAIN BOARD POWER. CAPACITORS C9 AND C10 PROVIDE FILTERING ON THE INPUT LINE. R25 AND D3 PROVIDE OVER VOLTAGE PROTECTION. D2 PROVIDES REVERSE POLARITY PROTECTION. C8 PROVIDES FILTERING ON THE 5 VOLT SIDE. IC3 IS A ICL7660 VOLTAGE CONVERTER WHICH SUPPLIES A -5 VOLTS. C6 AND C7 ARE PUMP CAPACITORS USED BY THE 7660.

TRANSDUCER

THE TRANSDUCER IS AN ABSOLUTE TYPE PIEZORISTIVE STRAIN GAGE. A VACUUM REFERENCE IS PROVIDED WITHIN THE TRANSDUCER. ITS OUTPUT VOLTAGE IS DIRECTLY PROPORTIONAL TO THE APPLIED PRESSURE. THE OUTPUT VOLTAGE AT PINS 4-2 IS ONE HALF THE APPLIED VOLTAGE AT PINS 1-3.

ANALOG SIGNAL CONDITIONING

THREE SECTIONS OF THE QUAD OP AMP (TL084) ALONG WITH RESISTORS R1, R6, R7, R8, R10 AND R11 PROVIDE AMPLIFICATION OF THE DIFFERENTIAL VOLTAGE PRODUCED AT PINS 2 AND 4 OF THE TRANSDUCER AND PROVIDE A SINGLE ENDED OUTPUT AT PIN 8 OF THE INTERFACE CABLE AT THE MAIN BOARD (TP1). R7 SETS THE GAIN.

TEMPERATURE CONTROL

THE ANALOG BOARD ASSEMBLY IS CONTAINED WITHIN A EPS FOAM HOUSING AND IS TEMPERATURE CONTROLLED BY A BRIDGE CIRCUIT COMPRISED OF R3, R4, R5, TM1, AND D1. THE THERMISTOR TM1 PROVIDES THE TEMPERATURE SENSITIVE ELEMENT OF THE BRIDGE. ONE SECTION OF THE TL084 QUAD OP AMP AND R2 PROVIDE AMPLIFICATION AND CONTROL TRANSISTOR T1 (TIP31C) WHICH IS USED AS THE HEATER ELEMENT. TRANSISTORS T11 AND T12 ON THE MAIN BOARD ALONG WITH RESISTORS R22, R23, R24, R13 PROVIDE A DISABLE CIRCUIT WHICH PULLS PIN 18 AND 19 OF THE 7109 A TO D CONVERTER LOW WHEN THE TEMPERATURE CIRCUIT REACHES PROPER TEMPERATURE. THIS CONTROL IS PROVIDED VIA PIN 7 OF THE INTERCONNECT CABLE AT THE MAIN BOARD.

ANALOG TO DIGITAL CONVERSION

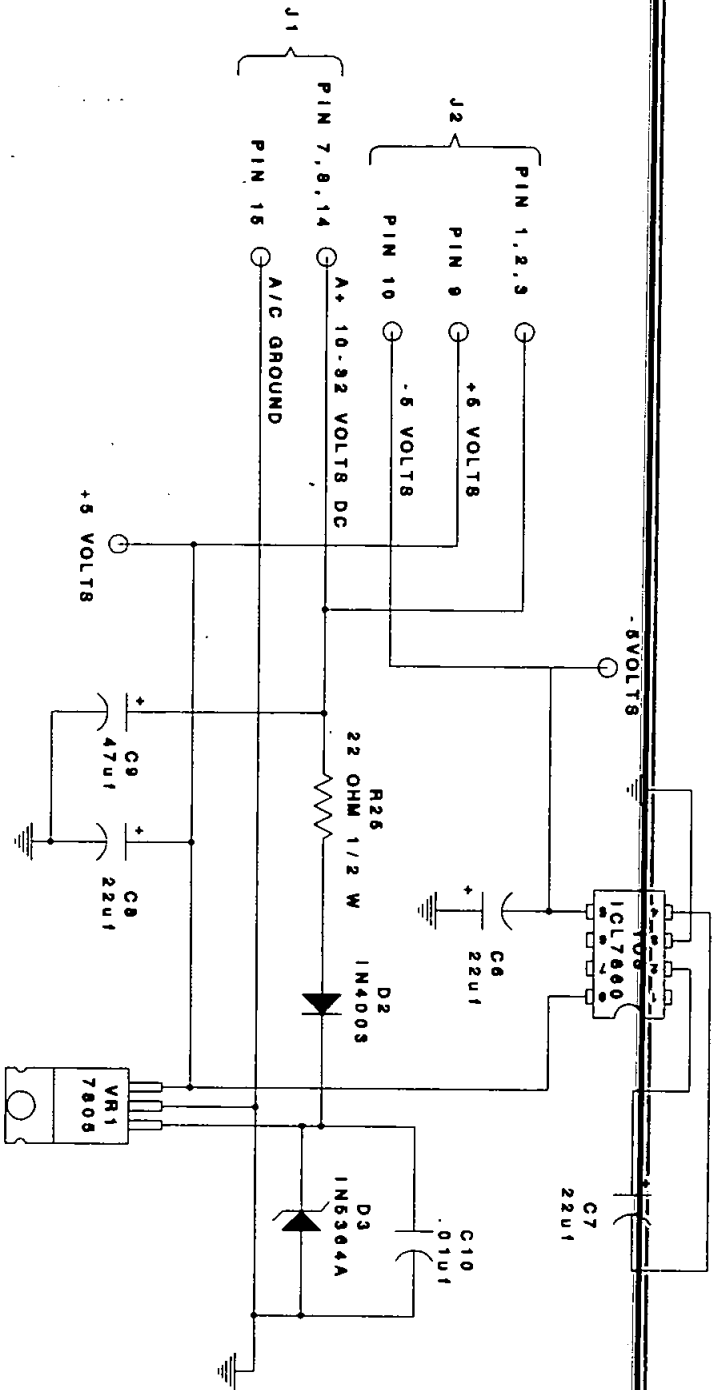
THE ANALOG VOLTAGE IS CONVERTED TO A BINARY CODE BY IC2 (CPL7109) WHICH IS A DUAL SLOPE INTEGRATING TYPE ANALOG TO DIGITAL CONVERTER. A REFERENCE VOLTAGE IS PROVIDED AT PIN 36 OF THE 7109 BY RESISTORS R14 AND R15. AN OFFSET VOLTAGE IS SUPPLIED TO PIN 34 OF THE 7109 BY RESISTORS R19, R21, AND VARIABLE RESISTOR R26 WHICH PROVIDES FOR OFFSET ADJUSTMENT (HIGH ADJUSTMENT). RESISTORS R18, R20 AND VARIABLE RESISTOR R27 PROVIDE FOR SPAN ADJUSTMENT OF THE ANALOG INPUT VOLTAGE (LOW ADJUSTMENT). CAPACITOR C4 AND RESISTOR R17 PROVIDE AN RC EXTERNAL OSCILLATOR FOR THE 7109. C1 IS THE 7109 EXTERNAL REFERENCE CAPACITOR. C5 AND R16 ARE USED IN THE INTEGRATOR CIRCUIT. C3 IS THE AUTO ZERO CAPACITOR.

CODE CONVERSION

THE BINARY CODE GENERATED BY THE 7109 IS CONVERTED TO THE REQUIRED ICAO PRESSURE ALTITUDE TRANSMISSION CODE BY IC1 WHICH IS A FACTORY PROGRAMMED 2716 2K EPROM. THE NINTH BIT (A1) IS GENERATED DIRECTLY BY THE MOST SIGNIFICANT BIT OF THE 7109 CONVERTER TRANSISTOR T9 IS USED FOR LOGIC INVERSION, T10 BEING THE A1 DRIVER.

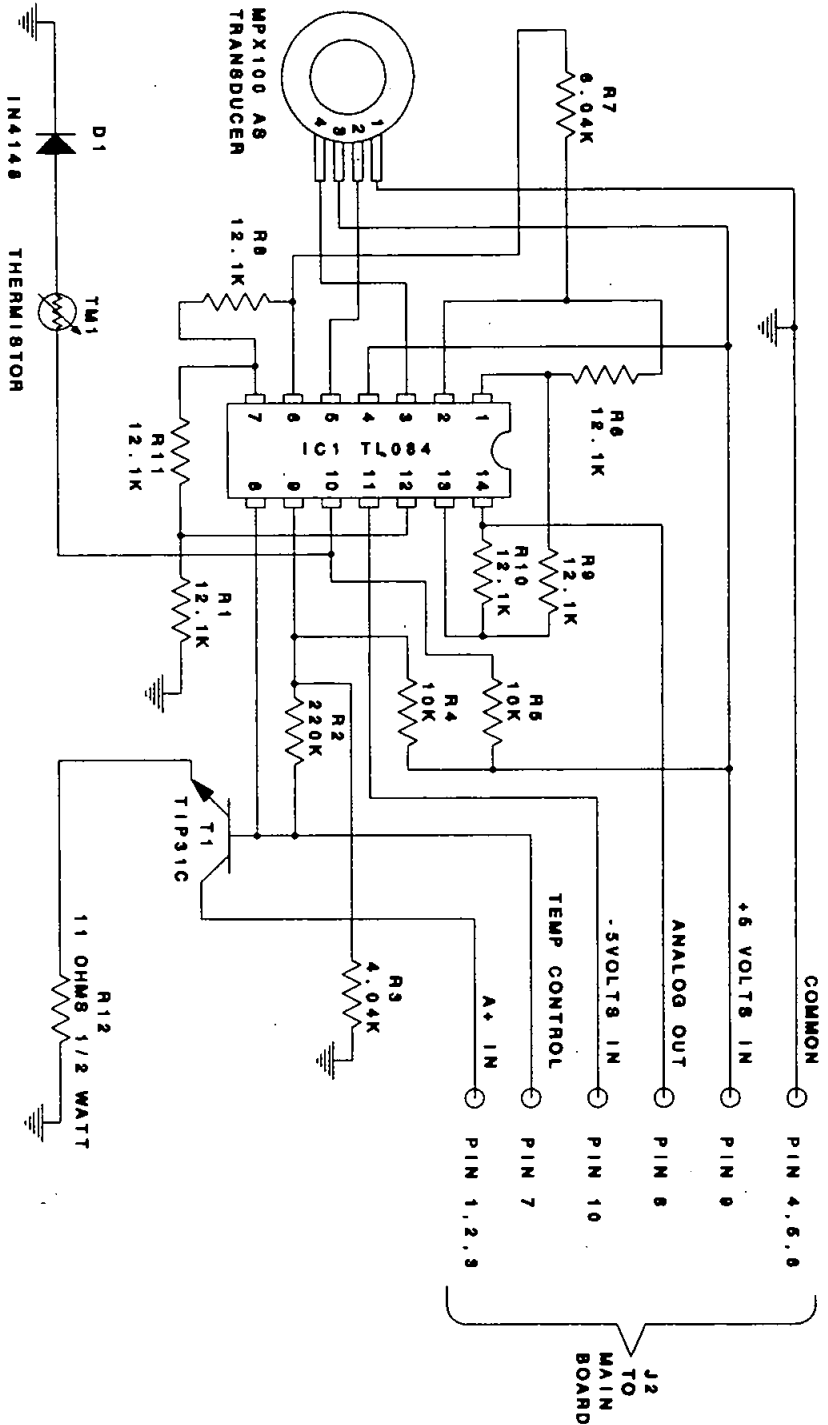
DEVICE INTERFACE

THE OUTPUT OF THE EPROM AND A TO D IS INTERFACED WITH TRANSPONDERS AND OTHER DEVICES BY MEANS OF TRANSISTORS T1 THROUGH T8 AND T10. THESE ARE 2N4402 NPN DEVICES IN AN OPEN COLLECTOR CONFIGURATION. PIN 6 OF THE INTERFACE JACK PROVIDES FOR HANDSHAKE CONTROL WHEN REQUIRED BY THE INTERFACE DEVICE. HANDSHAKE IS ACCOMPLISHED BY PULLING PIN 20 OF THE 7109 AND PIN 18 OF THE 2716 LOW. OVER VOLTAGE PROTECTION IS PROVIDED ON THIS LINE BY DIODE D1 AND RESISTOR R12. WHEN THIS LINE IS PULLED LOW OUTPUT FROM THE ENCODER IS ENABLED.

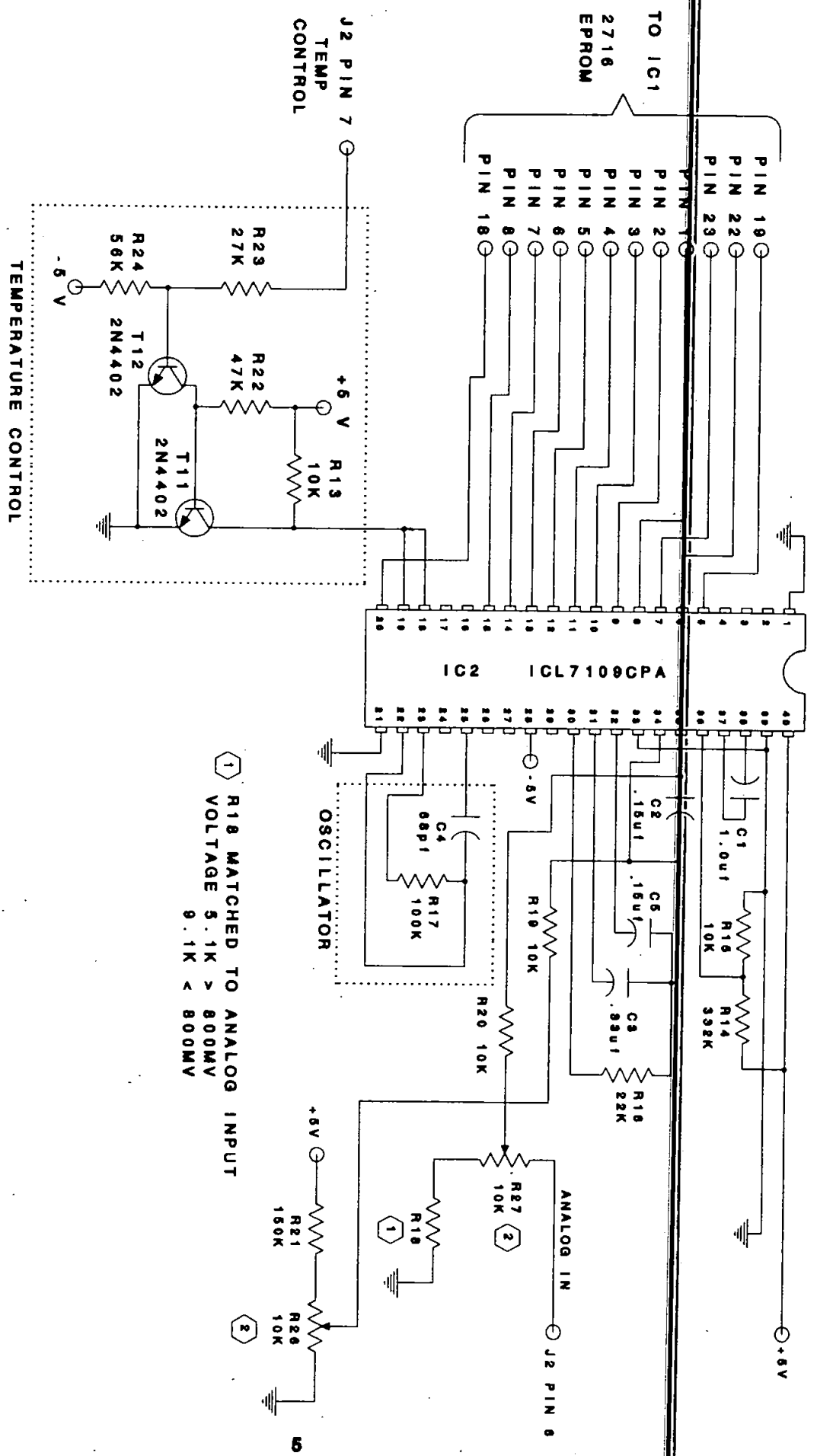


A-30 ENCODER	REV#	DATE	CHANGE J1 GENDER FROM FEMALE TO MALE BEGINNING WITH SERIAL NUMBER 2400. PRIOR TO THIS SERIAL NUMBER PIN 1, 2 ARE POWER INPUT PIN 9 IS GROUND.
MAIN BOARD	1	04/30/88	
POWER SUPPLY	2	09/01/88	PIN 14 SPARE A+ IN BEGINNING SERIAL NUMBER 4400
SCHEMATIC	3	09/08/89	BOARD GROUND ISOLATED BEGINNING SERIAL NUMBER 29850
DRAWING A-30A-1			
DRAWN BY M.A.			
DATE 02/18/87			

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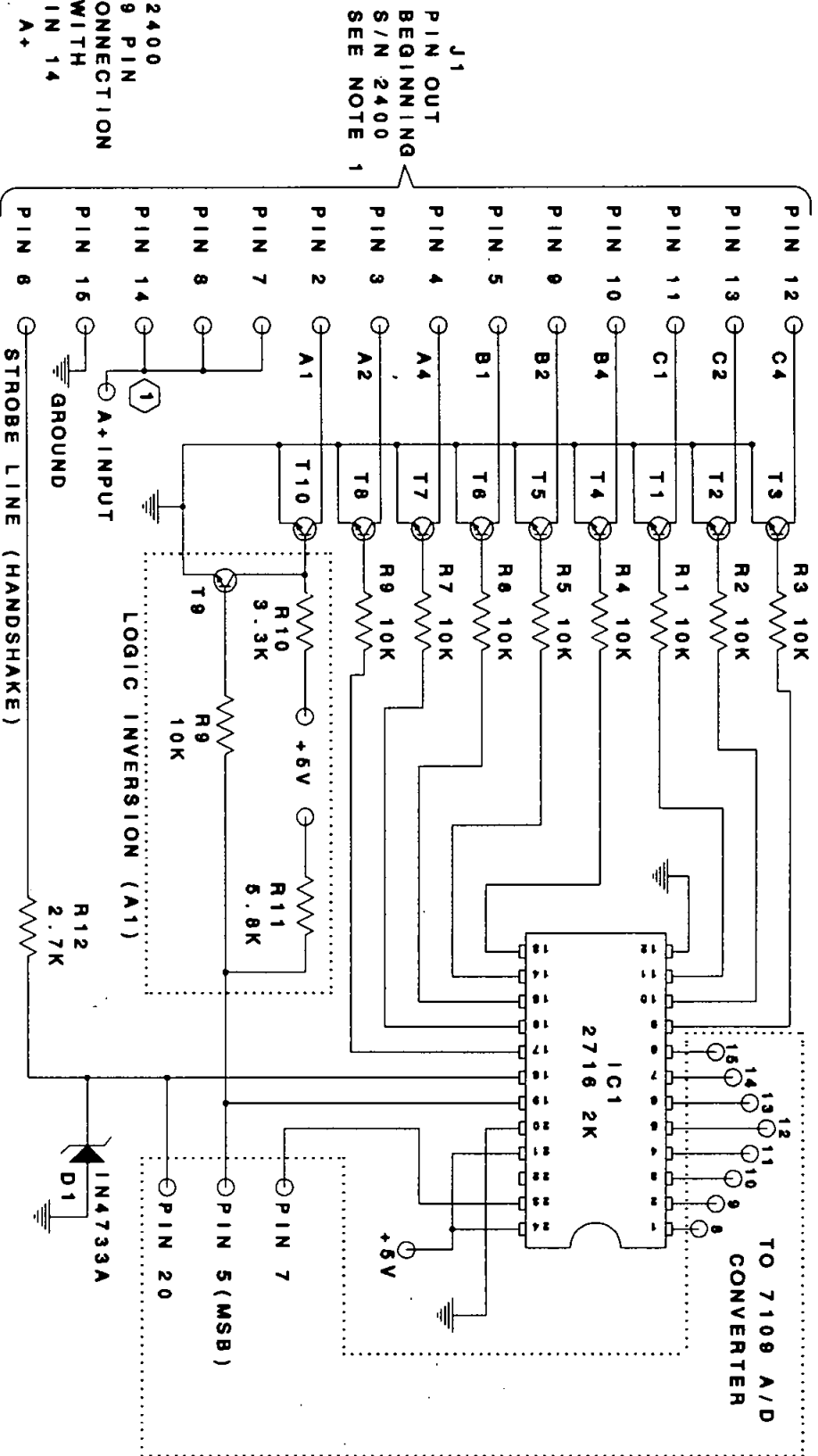
A-90 ENCODER	REV#	DATE	RIBBON CABLE ASSEMBLY REPLACED WITH NEW ASSEMBLY (DRAWING NUMBER A-30P1) BEGINNING WITH SERIAL NUMBER 36568.
ANALOG BOARD	1	12/06/91	
SCHEMATIC			
DRAWING A-30B			
DRAWN BY M.A.			
DATE 02/16/87			
ACK TECHNOLOGIES INC 440 W. JULIAN ST. SAN JOSE, CA 95110			



A-30 ENCODER	REV#	DATE	2	CHANGE FROM 15 TURN POT TO 26 TURN POT
MAIN BOARD	1	03/01/89		BEGINNING SERIAL NUMBER 10025.
A TO D CONVERSION				
SCHEMATIC				
DRAWING A-30A-2				
DRAWN BY M.A.				
DATE 02/16/87				

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J1 PIN OUT PRIOR TO S/N 2400	
1	A+ INPUT
2	SPARE A+
3	STROBE
4	B1
5	A4
6	A2
7	A1
8	N/C
9	GROUND
10	N/C
11	C2
12	C4
13	C1
14	B4
15	B2



NOTE: S/N 2400 TO S/N 4399 PIN 14 IS NO CONNECTION BEGINNING WITH S/N 4400 PIN 14 IS A SPARE A+

A-30 ENCODER	REV#	DATE	CHANGE J1 GENDER FROM FEMALE TO MALE BEGINNING WITH SERIAL NUMBER 2400.	ACK TECHNOLOGIES INC 440 W. JULIAN ST. SAN JOSE, CA 95110
MAIN BOARD	1	04/30/86		
CODE CONVERSION DEVICE INTERFACE	2	09/14/88	PIN 14 SPARE A+ INPUT BEGINNING S/N 4400	
SCHEMATIC				
DRAWING A-30A-3				
DATE 02/16/87			DRAWN BY M.A.	

SECTION 2 PARTS LIST

ELECTRICAL COMPONENTS MAIN BOARD

PART	DESCRIPTION	NOTES	ACK PART #	QTY	PRICE
A-300	MAIN BOARD COMPLETE (LESS IC1 & IC2)	6	A-300	1	\$65.00
T1 THROUGH T12	2N4402 NPN TRANSISTOR TO-92 PACKAGE	1,2	A3MT1	1EA	\$1.50
R1 THROUGH R9	1/4 WATT METAL FILM 10KΩ RESISTOR 5%	1,2	A3MR1	1EA	\$0.50
R10	1/4 WATT METAL FILM 3.3KΩ RESISTOR 5%	1,2	A3MR10	1	\$0.50
R11	1/4 WATT METAL FILM 5.6KΩ RESISTOR 5%	1,2	A3MR11	1	\$0.50
R12	1/4 WATT METAL FILM 2.7KΩ RESISTOR 5%	1,2	A3MR12	1	\$0.50
R13	1/4 WATT METAL FILM 10KΩ RESISTOR 5%	1,2	A3MR13	1	\$0.50
R14	1/4 WATT METAL FILM 332KΩ RESISTOR 1%	1,2	A3MR14	1	\$0.50
R15	1/4 WATT METAL FILM 10KΩ RESISTOR 1%	1,2	A3MR15	1	\$0.50
R16	1/4 WATT METAL FILM 22KΩ RESISTOR 5%	1,2	A3MR16	1	\$0.50
R17	1/4 WATT METAL FILM 100KΩ RESISTOR 5%	1,2	A3MR17	1	\$0.50
R18	1/4 WATT METAL FILM 9.1 OR 5.1KΩ RESISTOR 5%	1,2,6	A3MR18	1	\$0.50
R19,R20	1/4 WATT METAL FILM 10KΩ RESISTOR 5%	1,2	A3MR19	1	\$0.50
R22	1/4 WATT METAL FILM 47KΩ RESISTOR 5%	1,2	A3MR22	1	\$0.50
R23	1/4 WATT METAL FILM 27KΩ RESISTOR 5%	1,2	A3MR23	1	\$0.50
R24	1/4 WATT METAL FILM 56KΩ RESISTOR 5%	1,2	A3MR24	1	\$0.50
R25	1/2 WATT METAL FILM 22kΩ RESISTOR 5%	1,2	A3MR25	1	\$0.50
R26, R27	1 WATT 25 TURN POT 10kΩ	1,2	A3MR26	1	\$4.25
C1	1.0uf 16V POLYCARBONATE CAPACITOR	1,2,3	A3MC1	1	\$7.50
C2,C5	.15uf 16V POLYCARBONATE CAPACITOR	1,2,3	A3MC2	1	\$4.75
C3	.33uf 16V POLYCARBONATE CAPACITOR	1,2,3	A3MC3	1	\$6.50
C4	68pf SILVER MICA 5%	1,2	A3MC4	1	\$2.25
C6,C7,C8	22uf 16V ELECTROLYTIC CAPACITOR	1,2	A3MC6	1	\$2.50
C9	47uf 16V ELECTROLYTIC CAPACITOR	1,2	A3MC9	1	\$3.50
C10	.01pf 50V CERAMIC DISK CAPACITOR	1,2	A3MC10	1	\$1.50
D1	IN4733A 5.1V 1 WATT ZENER DIODE	1,2	A3MD1	1	\$2.50
D2	1N4403 DIODE	1,2	A3MD2	1	\$2.25
D3	1N5364A 33V 5W ZENER DIODE	1,2	A3MD3	1	\$6.50
VR1	7805 1 AMP POSITIVE REGULATOR TO-220 PACKAGE	1,2	A3MVR1	1	\$8.50
IC1	2716 EPROM 450 NS (FACTORY PROGRAMMED)	1,2	A3MIC1	1	\$12.00
IC2	ICL7109CPL A TO D CONVERTER	1,2	A3MIC2	1	\$15.00
IC3	ICL7660CPA VOLTAGE CONVERTER	1,2	A3MIC3	1	\$7.50
J1	15 PIN DP CONNECTOR GOLD PLATED	1,2	A3MJ1	1	\$8.50
J2	10 PIN HEADER GOLD PLATED	1,2	A3MJ2	1	\$3.50

ELECTRICAL COMPONENTS ANALOG BOARD

PART	DESCRIPTION	NOTES	ACK PART #	QTY	PRICE
A-30P	ANALOG BOARD COMPLETE	6	A-330P	1	\$45.00
R1,R6	1/4 WATT METAL FILM 12.1KΩ RESISTOR 1%	1,2	A3AR1	1EA	\$0.50
R2	1/4 WATT METAL FILM 220KΩ RESISTOR 1%	1,2	A3AR2	1	\$0.50
R3	1/4 WATT METAL FILM 4.02KΩ RESISTOR 1%	1,2	A3AR3	1	\$0.50
R4,R5	1/4 WATT METAL FILM 10KΩ RESISTOR 1%	1,2	A3AR4	1	\$0.50
R7	1/4 WATT METAL FILM 6.04KΩ RESISTOR 1%	1,2	A3AR7	1	\$0.50
R8 THROUGH R11	1/4 WATT METAL FILM 12.1KΩ RESISTOR 1%	1,2	A3AR1	1EA	\$0.50
R12	1/2 WATT METAL FILM 11Ω RESISTOR 5%	1,2	A3AR12	1	\$1.00
TM1	THERMISTOR DALE 7C2002 10%	1,2	A3ATM1	1	\$3.50
D1	IN4148 DIODE	1,2	A3AD1	1	\$2.00
T1	TIP31C TRANSISTOR TO-220 PACKAGE	1,2	A3AT1	1	\$5.00
IC1	TL084CN QUAD OP AMP	1,2	A3AIC1	1	\$6.50
TD1	MONOROLA MPX100AS TRANSDUCER		A3ATD1	1	\$28.00
CB1	CABLE ASSEMBLY		A-30P1	1	\$5.50

MECHANICAL COMPONENTS

PART	DESCRIPTION	NOTES	ACK PART #	QTY	PRICE
A-30D	TOP COVER		A-30D	1	\$12.50
A-30C	BASE CASTING		A-30C	1	\$17.50
A-30E	MOUNTING TRAY (INCLUDES "T" BOLT AND NUT)		A-30E	1	\$12.50
A-30E1	TRAY NUT		A-30E1	1	\$2.50
A-30E2	"T" BOLT		A-30E2	1	\$2.00
A-30N	HEAT SINK		A-30N	1	\$3.50
DF103C	MICA INSULATOR RCA KH3477	2,4	DF103C	1	\$0.75
DF378F	INSULATING SHOULDER WASHER RCA KH3479	2,4	DF378F	3	\$0.50
A-30N1	HEAT SINK AFFIXING SCREW 4-40 X 1/4 PAN HEAD		A-30N1	1	\$0.50
A-30N2	HEAT SINK AFFIXING SCREW FLAT WASHER #4		A-30N2	1	\$0.50
A-30N3	HEAT SINK AFFIXING SCREW HEX NUT 4-40		A-30N3	1	\$0.50
A-30O1	MAIN BOARD ATTACHING SCREW 4-40 X 1/4		A-30O1	2	\$0.50
A-30D2	MAIN BOARD ATTACHING SCREW LOCK WASHER		A-30D2	2	\$0.25
A-30O2	MAIN BOARD 15 PIN JACK SCREW 4-40 X 5/16		A-30O2	2	\$0.75
A-30D2	MAIN BOARD 15 PIN JACK SCREW LOCK WASHER		A-30D2	2	\$0.25
A-30D1	COVER SCREWS		A-30D1	4	\$0.50
A-30D2	COVER SCREW LOCK WASHERS		A-30D2	4	\$0.25
A-30F	FOAM COVER		A-30F	1	\$2.50
A-30P	HEAT SPREADER		A-30P	1	\$7.50
A-30N1	HEAT SPREADER ATTACHING SCREW 4-40 X 1/4		A-30N1	1	\$0.50
A-30N2	HEAT SPREADER ATTACHING HEX NUT 4-40		A-30N2	1	\$0.50
A-30D2	HEAT SPREADER SPLIT LOCK WASHER 4-40		A-30D2	1	\$0.25

MISCELLANEOUS PARTS

PART	DESCRIPTION	NOTES	ACK PART #	QTY	PRICE
A-30Q	INTERFACE CABLE ASSEMBLY 4 FOOT	6	A-30Q	1	\$10.50
A-30R1	ALTIMETER PLACARDS		A-30R	4	\$2.50
A-30R	INSTALL HARDWARE KIT		A-30R	1	\$5.50
A-30IM	INSTALLATION AND OPERATION MANUAL	6	A-30IM	1	\$4.00
A-30SM	SERVICE AND REPAIR MANUAL		A-30SM		\$25.00
A-30-2	MOD 2 SERVICE KIT		A-30-2		\$2.25
A-30-3	MOD 3 SERVICE KIT		A-30-3		\$8.00
A-30M	TSO NAME PLATE LABEL		A-30M	1	NOT SOLD

NOTES:

1. COMPONENTS TO MEET THE FOLLOWING MINIMUM REQUIREMENTS:
 - MIL-STD-1276 TEST METHODS FOR ELECTRICAL AND ELECTRONIC COMPONENTS
 - MIL-STD-1276 LEADS FOR ELECTRONIC COMPONENTS
 - FEDERAL SPECIFICATIONS QQ-S-571 TINNING/SOLDERING SPECIFICATIONS
 - EIA STANDARDS FOR COLOR CODING
2. SUBSTITUTION OF INDUSTRY STANDARD DEVICES THAT MEET OR EXCEED THE ELECTRICAL CHARACTERISTICS OF THE LISTED DEVICES ARE ACCEPTABLE.
3. TEMPERATURE CRITICAL COMPONENT ONLY POLYCARBONATE CAPACITORS MAY BE USED.
4. USED ON SERIAL NUMBER 23850 AND ABOVE OR PRIOR SERIAL NUMBERS THAT HAVE BEEN MODIFIED TO MOD 2 STANDARDS.
5. RESISTOR R18 IS MATCHED TO ANALOG BOARD CHARACTERISTICS WHEN ORDERING PLEASE INDICATE RESISTOR VALUE OF R18 ON THE MAIN BOARD.
6. PLEASE INDICATE SERIAL NUMBER WHEN ORDERING THESE PARTS.

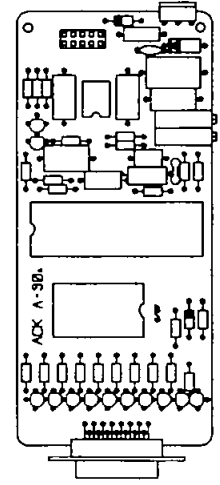
MINIMUM ORDER \$16.00 PRICES SUBJECT TO CHANGE MINIMUM SHIPPING CHARGE \$3.00
NO RETURNS OF ELECTRICAL COMPONENTS A RESTOCK CHARGE OF 20% ON MECHANICAL PARTS
ALL ORDERS SHIPPED COD OR PREPAID ONLY WE ACCEPT VISA AND MASTER CHARGE

ORDER PHONE 408 287-8021

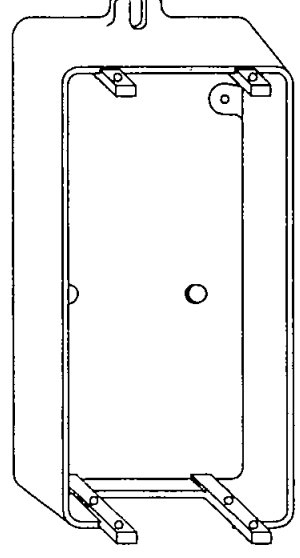
ORDER FAX 408 971-6879

HEAT SINK
P/N A-30N

MAIN BOARD
P/N A-300

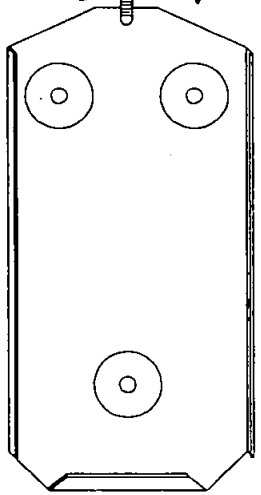


BASE CASTING
P/N A-30C



TRAY
P/N A-30E

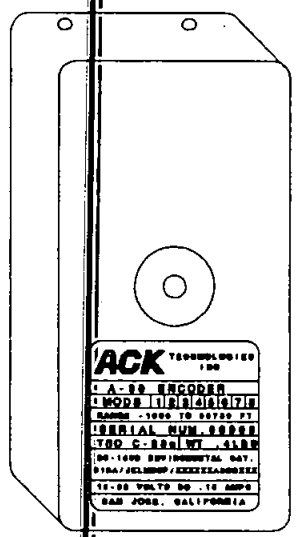
TRAY NUT
P/N A-30E1



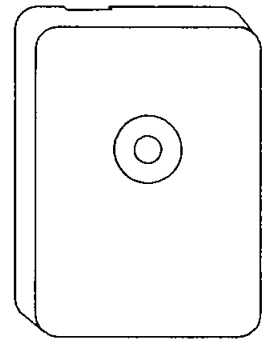
T-BOLT
P/N A-30E2

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INC
MAJOR PARTS LIST
DRAWING # A-30EX
M.A. 05/28/92

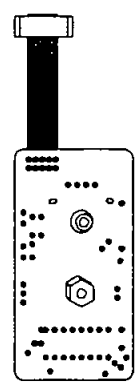
TOP COVER
P/N A-30D



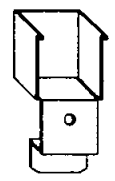
FOAM COVER
P/N A-30F
(TOP)



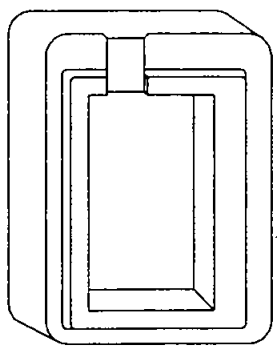
ANALOG BOARD
P/N A-30P

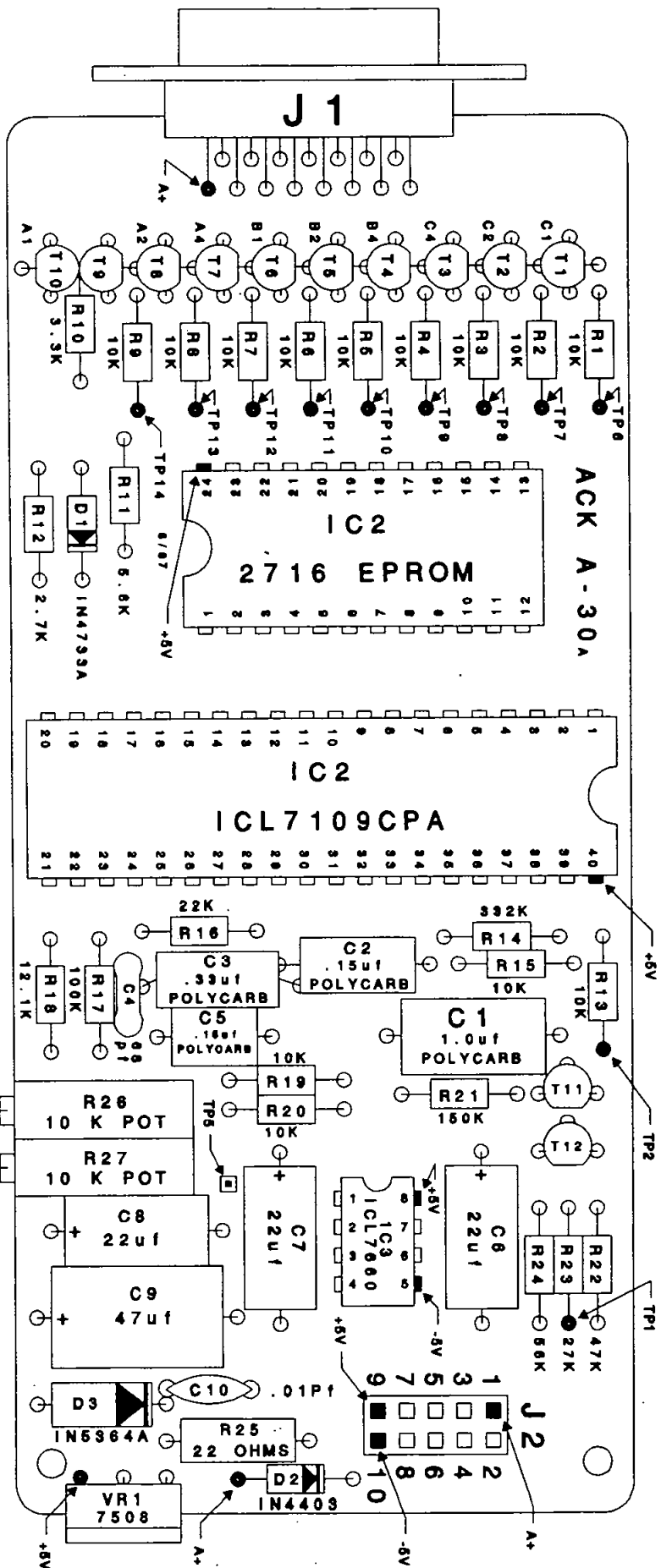


HEAT SPREADER
P/N A-30K



FOAM COVER
P/N A-30F
(BOTTOM)



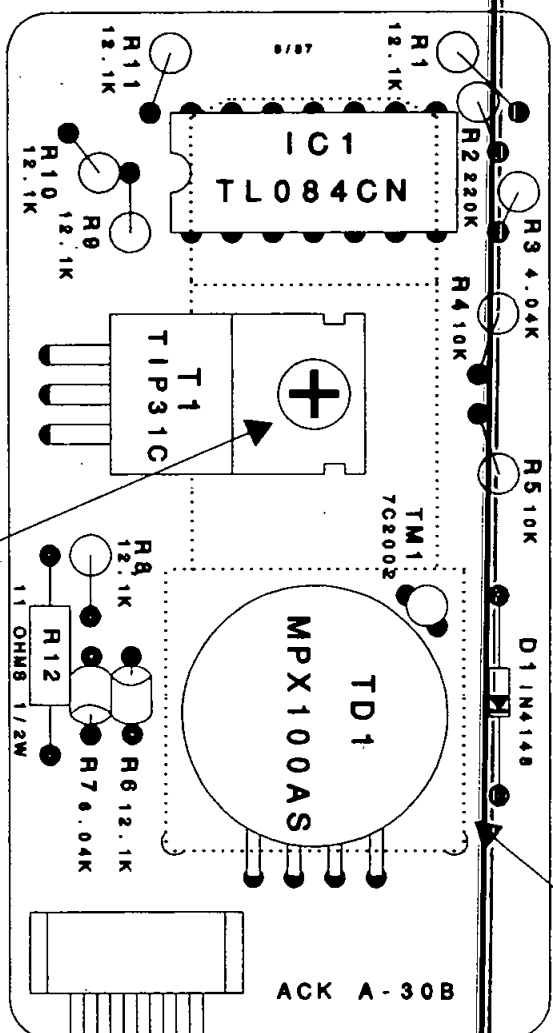


A-30 ENCODER	REV#	DATE	CHANGE J1 GENDER FROM FEMALE TO MALE
MAIN BOARD	1	04/30/88	BEGINNING WITH SERIAL NUMBER 2400.
COMPONENT PLACEMENT	2	03/01/89	R26/R27 26 TURN POT BEGINNING S/N 4400
TEST POINTS	3	09/08/89	BOARD GROUND ISOLATED BEGINNING S/N 23650
DRAWING A-30CP			
DATE 02/18/87			
DRAWN BY M.A.			

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COPPER HEAT SPREADER
P/N A-30K



NOTE: FILL AREA BETWEEN COPPER HEAT SPREADER AND TRANSDUCER WITH SILICON HEAT SINK COMPOUND. USE HEAT SINK COMPOUND BETWEEN BACK OF TRANSISTOR T1 AND HEAT SPREADER AND BETWEEN HEAT SPREADER AND PC BOARD. ALSO APPLY COMPOUND BETWEEN HEAT SPREADER AND TOP OF TLO84.

CAUTION

WHEN REPLACING TRANSISTOR T1 OR REPLACING COPPER HEAT SPREADER P/N A-30K DO NOT OVER TORQUE RETAINING SCREW. MAXIMUM TORQUE 2 - 2.5 IN OZ. APPLY NUT LOCK COMPOUND TO THREADS.

CABLE ASSEMBLY CB1

NOTE: CABLE ASSEMBLY CB1 DISCONTINUED. BEGINNING WITH S/N 38568 A NEW CABLE ASSEMBLY P/N A-30P1 IS USED. TO REPLACE OLD STYLE ASSEMBLY WITH NEW CABLE ASSEMBLY SEE SERVICE BULLETIN A-30-3.

A-30 ENCODER	REV#	DATE	CB1 ASSEMBLY REPLACED WITH P/N A-30P1
ANALOG BOARD	1	12/08/91	BEGINNING WITH SERIAL NUMBER 38568
COMPONENT PLACEMENT			
DRAWING A-30CP1			
DATE 02/16/87			
DRAWN BY M.A.			

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SECTION 3

SERVICE HISTORY AND MINOR MODIFICATIONS

THE A-30 BLIND ENCODER RECEIVED FAA TSO-C88a APPROVAL ON DECEMBER 4, 1987. PRODUCTION COMMENCED THAT SAME MONTH. THE FIRST PRODUCTION UNITS WERE SHIPPED IN JANUARY OF 1988. UNITS ARE CONSECUTIVELY NUMBERED BEGINNING WITH SERIAL NUMBER 1001. UNTIL THE RELEASE OF THIS MANUAL NO FIELD REPAIR OF THE UNIT WAS PERMITTED. ALL UNITS NEEDING SERVICE OR REPAIR WERE REQUIRED TO BE RETURNED TO OUR MANUFACTURING FACILITY. WITH THE RELEASE OF THIS MANUAL REPAIR OR MAINTENANCE MAY BE PERFORMED BY APPROPRIATELY RATED AND EQUIPPED FACILITIES.

MOD 1

THE FIRST MINOR MODIFICATION, INITIATED ON APRIL 30, 1988, WAS A CHANGE IN GENDER OF THE INTERFACE JACK (J1). THIS WAS A PRODUCTION LEVEL MODIFICATION BEGINNING WITH SERIAL NUMBER 2400. FIELD MODIFICATION IS NOT ALLOWED. THE CHANGE CONSISTED OF CHANGING THE INTERFACE JACK (J1) FROM A FEMALE TYPE TO A MALE TYPE. THE PURPOSE WAS TO MAKE THE ENCODER DIRECTLY PIN COMPATIBLE WITH A NUMBER OF OTHER COMMONLY USED ENCODERS. THE TSO LABEL IS FACTORY MARKED AS MOD 1 ON THESE UNITS.

MOD 2

THE SECOND MINOR MODIFICATION WAS INITIATED IN PRODUCTION BEGINNING WITH SERIAL NUMBER 23850 ON SEPTEMBER 6, 1989. THIS MOD REMOVED THE CASE GROUND PATH FROM THE ENCODER. FIELD EXPERIENCE INDICATED WHEN THE ENCODER WAS CORRESPONDED WITH THE AIRCRAFT ALTIMETER ON THE BENCH AND SUBSEQUENTLY INSTALLED IN THE AIRCRAFT A GROUND LOOP ERROR COULD BE INTRODUCED INTO THE SYSTEM. WHEN THE GROUND POTENTIAL AT THE MOUNTING LOCATION WAS SIGNIFICANTLY DIFFERENT FROM HARNESS GROUND RETURN POTENTIAL, THE CHANGE IN POTENTIAL CREATED A SLIGHT CHANGE IN THE REFERENCE VOLTAGE AT PIN 38 OF THE 7109 A TO D CONVERTER. SERVICE BULLETIN A-30-1 DATED APRIL 10, 1989 ADDRESSED THIS PROBLEM. SERVICE BULLETIN A-30-2 DATED NOVEMBER 11, 1989 ALLOWS FOR FIELD MODIFICATION OF EXISTING OLDER UNITS WHEN REQUIRED.

MOD 3

THE THIRD MINOR MODIFICATION WAS INITIATED IN PRODUCTION BEGINNING WITH SERIAL NUMBER 38568 ON DECEMBER 6, 1991. AS THE UNITS AGE, SERVICE HISTORY HAS SHOWN THAT THE ORIGINAL RIBBON CABLE WHICH INTERFACES THE MAIN BOARD TO THE ANALOG BOARD CAN BE AFFECTED BY THERMAL CYCLING. THE CABLE END THAT TERMINATES ON THE ANALOG BOARD IS THERMAL CYCLED FROM AMBIENT TEMPERATURE TO APPROXIMATELY 170° FAHRENHEIT EACH TIME POWER IS APPLIED TO THE UNIT. A NEW CABLE ASSEMBLY IS USED ON MOD 3 UNITS AND IS SOLDERED DIRECTLY TO THE ANALOG BOARD REPLACING THE ORIGINAL MECHANICAL CONNECTION. THE TERMINATING END OF THE CABLE USES INDIVIDUALLY CRIMPED GOLD PLATED HIGH PRESSURE CONNECTORS FOR IMPROVED RELIABILITY. SERVICE BULLETIN A-30-3 ALLOWS FOR FIELD MODIFICATION OF EXISTING OLDER UNITS WHEN REQUIRED.

FACTORY REBUILD AND UPDATE SERVICE IS AVAILABLE FOR OLDER UNITS.

SECTION 4

MINIMUM TEST EQUIPMENT REQUIREMENTS

THE FOLLOWING MINIMUM EQUIPMENT IS REQUIRED FOR BASIC FUNCTION TESTING

QUANTITY	DESCRIPTION
1	0 - 30 VOLT DC .5 AMP DUEL METERED POWER SUPPLY
1	VACUUM/PRESSURE SOURCE
1	SENSITIVE ALTIMETER -1000 TO 20,000 FT.
1	CODE MONITORING DEVICE (NOTE 1)

THE FOLLOWING MINIMUM TEST EQUIPMENT IS REQUIRED FOR TROUBLESHOOTING AND REPAIR

QUANTITY	DESCRIPTION
1	0 - 30 VOLT DC .5 AMP DUEL METERED POWER SUPPLY
1	4 1/2 DIGIT DIGITAL VOLT METER MINIMUM 10M Ω INPUT IMPEDANCE
1	ANALOG OSCILLOSCOPE 20MHz DC-COUPLED BANDWIDTH.
1	VACUUM/PRESSURE SOURCE
1	CODE MONITORING DEVICE WITH INDIVIDUAL BIT INDICATION (NOTE 1)

THE FOLLOWING MINIMUM TEST EQUIPMENT IS REQUIRED FOR CALIBRATION

QUANTITY	DESCRIPTION
1	0 - 30 VOLT DC .5 AMP DUEL METERED POWER SUPPLY
1	CALIBRATED PITOT-STATIC TEST SET
1	CODE MONITORING DEVICE (NOTE 1)

THE FOLLOWING ADDITIONAL EQUIPMENT IS RECOMMENDED IF A SUBSTANTIAL AMOUNT OF REPAIR AND CALIBRATION IS ANTICIPATED.

1	4 1/2 DIGIT DIGITAL VOLT METER MINIMUM 10M Ω INPUT IMPEDANCE 0.03% ACCURACY
1	PROGRAMMABLE DC POWER SUPPLY -1 TO +1 VOLTS 5 MA CAPABLE OF .0005 VOLT RESOLUTION 0.05% ACCURACY.

NOTE 1:

SECTION 8 PAGE 25 SHOWS HOW TO FABRICATE A INEXPENSIVE BIT MONITORING DEVICE OR HOW TO INTERFACE A DAVTRON® MODEL 630 FOR USE AS A MONITORING DEVICE. COMMERCIAL ENCODER TEST EQUIPMENT SUCH AS THE IFR® MODEL ATC-600A IS RECOMMENDED FOR THESE TEST FUNCTIONS WHEN AVAILABLE.

SECTION 5

BASIC FUNCTION TESTING

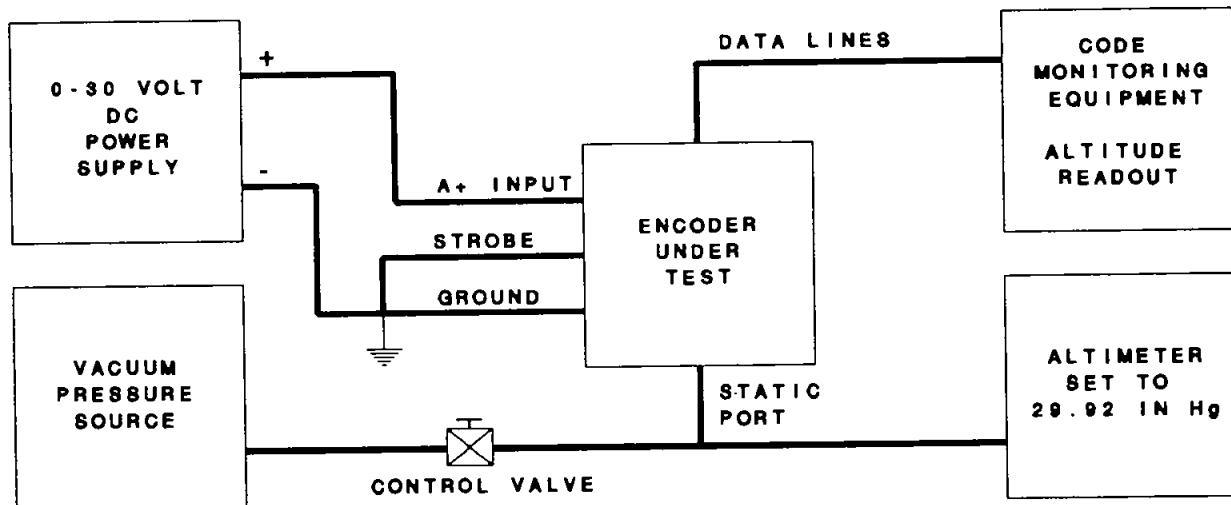
THE FOLLOWING PROCEDURES PROVIDE FOR BASIC FUNCTION TESTING OF THE A-30 BIND ENCODER. THE PROCEDURE IS DESIGNED TO BE USED FOR SYSTEM TROUBLESHOOTING TO VERIFY THE BASIC FUNCTIONING OF THE ENCODER. THIS PROCEDURE DOES NOT PROVIDE FOR VERIFICATION OF ACCURACY OR CALIBRATION. **NO UNIT SHALL BE AUTHORIZED AS AIR WORTHY OR SUITABLE FOR RETURN TO SERVICE SOLELY UPON THE BASIS OF THESE BASIC FUNCTION TESTS.**

NOTE:

"ALTITUDE READOUT" WHEN USED IN THIS SECTION REFERS TO A CODE OR ALTITUDE INDICATION ON THE CODE MONITORING EQUIPMENT BEING USED.

"BIT" REFERS TO A INDIVIDUAL INTERFACE LINE SUCH AS C2 A4 ETC.

**CONNECT THE UNIT TO THE POWER SUPPLY, CODE MONITORING DEVICE
ALTIMETER AND VACUUM/PRESSURE SOURCE AS SHOWN BELOW.**



CHECKING THE HEATER CIRCUIT AND CODE DISABLE CIRCUITS

1. SYSTEM PRESSURE SHOULD BE SET TO BETWEEN -400 TO +1000 FT FOR THIS INITIAL TEST WITH THE ALTIMETER SET AT 29.92 IN Hg. APPLY 14 VOLTS OF INPUT POWER TO THE UNIT AND OBSERVE THE CURRENT DRAW. CURRENT DRAW SHOULD BE 300 TO 400 mA.
2. ADJUST POWER SUPPLY TO 28 VOLTS CURRENT DRAW SHOULD REMAIN CONSTANT WITHIN +- 5% OF THE 14 VOLT VALUE.
3. LEAVE INPUT POWER AT 28 VOLTS AND OBSERVE CURRENT DRAW. CURRENT SHOULD DROP OFF SHARPLY WHEN UNIT REACHES PROPER OPERATING TEMPERATURE THEN STABILIZE TO 50 TO 100 mA WITHIN ONE MINUTE OF INITIAL DROP OFF.

4. WHILE PERFORMING THE ABOVE FUNCTION TESTS THERE SHOULD BE NO ALTITUDE READOUT UNTIL THE UNIT HAS WARMED UP AND THE CURRENT HAS DROPPED OFF. IF CURRENT DRAW IS LOW OR CODE IS PRESENT DURING WARM UP THIS INDICATES A MALFUNCTION OF THE HEATER CIRCUIT OR DISABLE CIRCUIT.

5. AFTER WARM UP THE ALTITUDE CODE SHOULD BE PRESENT. REMOVE POWER FROM THE UNIT FOR 1 MINUTE. THERE SHOULD BE NO ALTITUDE READOUT WHEN POWER IS REAPPLIED. AFTER 20 TO 40 SECONDS CODE OR ALTITUDE READOUT SHOULD REAPPEAR.

NOTE:

A CONTINUOUS C2 BIT OR -1000 FT INDICATION DURING WARM-UP MAY BE DUE TO BADLY UN CALIBRATED ENCODER RATHER THAN HEATER CIRCUIT OR DISABLE CIRCUIT MALFUNCTION.

CHECKING ALTITUDE CODE AND HANDSHAKE LINE

1. AFTER PERFORMING THE ABOVE TESTS LEAVE POWER APPLIED TO THE UNIT INCREASE PRESSURE IN THE SYSTEM UNTIL ONLY THE C2 BIT IS ON OR THE ALTITUDE READOUT INDICATES -1000 FT, THEN SLOWLY DECREASE PRESSURE IN THE SYSTEM WHILE OBSERVING THE ALTITUDE READOUT. CONTINUE DECREASING PRESSURE UNTIL THE ALTITUDE READOUT INDICATES ABOVE 14,700 FT OR UNTIL ALL BITS HAVE BEEN OBSERVED TO CYCLE ON AND OFF. ANY BIT WHICH IS CONTINUOUSLY ON OR OFF DURING THIS PRESSURE TRANSITION OR ANY ALTITUDE READOUT THAT BECOMES INVALID, COUNTS BACKWARD OR CHANGES IN A NON LINER MANOR INDICATES A MALFUNCTION.

2. WITH SYSTEM PRESSURE SET AT 6,000 TO 15,000 FT DISCONNECT THE HANDSHAKE (STROBE) LINE FROM GROUND. THE ALTITUDE CODE SHOULD BE DISABLED AND THEN ENABLED WHEN THE LINE IS THEN AGAIN GROUNDDED.

CHECKING FOR INTERNAL RIBBON CABLE MALFUNCTIONS

THE FOLLOWING PROCEDURE MAY BE USED TO VERIFY THE INTEGRITY OF THE INTERNAL RIBBON CABLE ASSEMBLY.

1. WITH POWER APPLIED TO THE UNIT VENT THE SYSTEM PRESSURE TO ATMOSPHERIC PRESSURE. THE ALTITUDE READOUT SHOULD BE STEADY. IF THE PRESSURE IS VERY NEAR A TRANSITION POINT, THE READOUT MAY CONTINUOUSLY FLUCTUATE 100 FT OR ONE BIT MAY CONTINUOUSLY FLUCTUATE. THIS IS NORMAL.

2. PLACE THE UNIT ON A HARD SURFACE AND PLACE YOUR THUMBS ON THE TOP COVER ON EACH SIDE OF THE TRANSDUCER PORT. PRESS FIRMLY DOWN ON THE COVER AND FLEX IT DOWN. OBSERVE THE ALTITUDE READOUT IF IT CHANGES SUDDENLY OR ERRATICALLY THIS INDICATES AN INTERNAL RIBBON CABLE PROBLEM. IF THE ALTITUDE CHANGES JUST ONE TRANSITION POINT (100 FT) AND RETURNS TO ITS ORIGINAL READING WHEN THE CASE PRESSURE IS RELEASED, THIS IS NORMAL AND DOES NOT INDICATE A MALFUNCTION.

SECTION 6

TROUBLE SHOOTING AND REPAIR

THE FOLLOWING PROCEDURES PROVIDE FOR TROUBLE SHOOTING AND REPAIR OF THE MODEL A-30 BLIND ENCODER. AFTER REPAIR THE UNIT MUST BE CALIBRATED AS PER SECTION 6 BEFORE THE UNIT IS RETURNED TO SERVICE.

REMOVE TOP COVER FROM UNIT BEFORE PROCEEDING.

ALL WORK SHOULD BE PERFORMED AT A STATIC SAFE WORK STATION.

NOTE:

"ALTITUDE READOUT" WHEN USED IN THIS SECTION REFERS TO A CODE OR ALTITUDE INDICATION ON THE CODE MONITORING EQUIPMENT BEING USED.

"BIT" REFERS TO A INDIVIDUAL INTERFACE LINE SUCH AS C2 A4 ETC.

"TP " UNLESS OTHERWISE NOTED REFER TO DRAWING A-30-CP ON PAGE 10

**CONNECT THE UNIT TO THE POWER SUPPLY, CODE MONITORING DEVICE AND
ALTIMETER AND VACUUM/PRESSURE SOURCE AS SHOWN IN SECTION 5.**

VOLTAGE TESTS BASIC POWER SUPPLY

1. WITH INPUT POWER SET TO 28 VOLTS MEASURE VOLTAGE AT POINTS SHOWN ON DRAWING A-30CP PAGE 10. + 5V MAIN BOARD SUPPLY SHOULD BE +/- .1 VOLT. THE -5 VOLT SUPPLY SHOULD MEASURE - 4.9 VOLTS +/- .2 VOLTS. IF THE + 5 VOLT AND -5 VOLT SUPPLIES ARE OUT OF RANGE REPLACE VR1. IF THE - 5 VOLT SUPPLY IS OUT OF RANGE CHECK OR REPLACE IC3 AND PUMP CAPACITORS C6 AND C7.

CHECKING CURRENT DRAW

1. APPLY 14 VOLTS INPUT POWER TO THE UNIT AND OBSERVE THE CURRENT DRAW CURRENT DRAW SHOULD BE BETWEEN 300 AND 400 mA.

2. INCREASE INPUT VOLTAGE TO 28 VOLTS. CURRENT DRAW SHOULD REMAIN CONSTANT WITHIN +/- 5% OF THE 14 VOLT VALUE.

IF CURRENT DRAW IS NORMAL OR LOW PROCEED TO THE HEATER CIRCUIT AND CODE DISABLE SECTION.

IF THE CURRENT DRAW IS EXCESSIVE, DISCONNECT POWER AND UNPLUG THE ANALOG BOARD ASSEMBLY FROM THE MAIN BOARD. REAPPLY POWER AND OBSERVE CURRENT DRAW. CURRENT DRAW SHOULD BE APPROXIMATELY 7 TO 12 mA. IF CURRENT DRAW IS IN EXCESS OF THIS RANGE LEAVE POWER APPLIED TO BOARD FOR SEVERAL MINUTES THEN FEEL RESISTOR R25 IF THE RESISTOR APPEARS TO BE HEATING UP REPLACE DIODE D3 AND RE-CHECK CURRENT DRAW. IF THE OVER VOLTAGE PROTECTION CIRCUIT APPEARS OK, REMOVE THE 7109 A TO D AND RECHECK, IF CURRENT DRAW IS STILL HIGH REMOVE THE EPROM AND RECHECK CURRENT DRAW. REPLACE A TO D OR EPROM IF EITHER DEVICE CAUSES EXCESSIVE CURRENT DRAW.

IF CURRENT DRAW IS NORMAL ON MAIN BOARD REPLACE T1 ON ANALOG BOARD. TO REPLACE T1 CUT FOAM COVER OFF OF THE ANALOG BOARD AND REMOVE T1. IF R12

APPEARS TO BE DISCOLORED OR BURNT REPLACE R12. WHEN REPLACING T1 USE AMPLE SILICON HEAT SINK COMPOUND BETWEEN THE COPPER HEAT SPREADER AND T1. **CAUTION DO NOT OVER TIGHTEN RETAINING SCREW. SEE DRAWING A-30-CP1 PAGE 11 FOR TORQUE SPECIFICATIONS. INSTALL NEW FOAM COVER ON ANALOG BOARD ASSEMBLY. PLACE THE TOP HALF OF THE FOAM COVER IN THE ENCODER TOP COVER TO ASSIST IN LOCATING THE BOARD ASSEMBLY. USING A HOT GLUE GUN PLACE A SMALL BEAD OF GLUE AROUND THE PERIMETER OF THE FOAM COVER. PRESS THE TWO HALVES TOGETHER USE A WEIGHT TO HOLD THE ASSEMBLY TOGETHER WHILE THE GLUE COOLS.**

CHECKING THE HEATER CIRCUIT AND TEMPERATURE CONTROL CIRCUITS

1. SYSTEM PRESSURE SHOULD BE SET TO BETWEEN -400 TO +1000 FT FOR THIS INITIAL TEST WITH THE ALTIMETER SET AT 29.92 IN Hg.
2. APPLY 28 VOLT INPUT POWER AND OBSERVE CURRENT DRAW. CURRENT SHOULD DROP OFF SHARPLY WHEN UNIT REACHES PROPER OPERATING TEMPERATURE THEN STABILIZE TO 50 TO 100 mA WITHIN ONE MINUTE OF INITIAL DROP OFF. NORMAL WARM UP TIME AT 28 VOLTS IS 2 TO 4 MINUTES WHEN STARTING WITH A COLD UNIT AT 70° FAHRENHEIT AMBIENT TEMPERATURE. WARM UP TIME IS 4 TO 8 MINUTES AT 14 VOLTS.
4. WHILE PERFORMING THE ABOVE FUNCTION TESTS THERE SHOULD BE NO ALTITUDE READOUT UNTIL THE UNIT HAS WARMED UP AND THE CURRENT HAS DROPPED OFF. IF CURRENT DRAW IS LOW OR CODE IS PRESENT DURING WARM UP THIS INDICATES A MALFUNCTION OF THE HEATER CIRCUIT OR DISABLE CIRCUIT.
5. AFTER WARM UP THE ALTITUDE CODE SHOULD BE PRESENT. REMOVE POWER FROM THE UNIT FOR 1 MINUTE. THERE SHOULD BE NO ALTITUDE READOUT WHEN POWER IS REAPPLIED. AFTER 20 TO 40 SECONDS CODE OR ALTITUDE READOUT SHOULD REAPPEAR.

NOTE:

A CONTINUOUS C2 BIT OR -1000 FT INDICATION DURING WARM-UP MAY BE DUE TO BADLY UN CALIBRATED ENCODER RATHER THAN HEATER CIRCUIT OR DISABLE CIRCUIT MALFUNCTION.

IF ALTITUDE READOUT IS PRESENT AS SOON AS POWER IS APPLIED, THIS INDICATES A MALFUNCTION OF THE HEATER OR DISABLE CIRCUIT. IF THE CURRENT DRAW IS LOW THIS INDICATES A BAD T1 (TIP31C) TRANSISTOR ON THE ANALOG BOARD. REPLACE T1 FOLLOWING THE PREVIOUSLY DESCRIBED PROCEDURE.

TO CHECK THE FUNCTIONING OF THE TEMPERATURE CONTROL BRIDGE CIRCUIT MEASURE VOLTAGE AT TP2. WHEN FIRST APPLYING POWER TO A COLD UNIT THE VOLTAGE AT THIS TEST POINT SHOULD BE > +3.5V AS THE UNIT REACHES OPERATING TEMPERATURE THE VOLTAGE SHOULD RAPIDLY DROP OFF. THE VOLTAGE WILL OSCILLATE WITH DECREASING VOLTAGE SWINGS UNTIL THE OVEN TEMPERATURE HAS STABILIZED AT WHICH TIME THE VOLTAGE SHOULD REMAIN RELATIVELY STABLE.

IF CURRENT DRAW IS NORMAL CHECK THE TEMPERATURE CONTROL CIRCUIT DRAWING A-30A-2 PAGE 5. UNPLUG THE ANALOG BOARD ASSEMBLY FROM THE MAIN BOARD PLACE A JUMPER BETWEEN TP1 AND THE +5 VOLT MAIN BOARD SUPPLY VOLTAGE AT TP2 SHOULD BE < +.5 VOLTS. WHEN THE JUMPER IS REMOVED VOLTAGE SHOULD BE > +3.0 VOLTS.

CHECKING THE A TO D CONVERTER AND SUPPORT CIRCUITS

1. WITH POWER APPLIED TO THE UNIT CHECK THE OSCILLATOR CLOCK WAVE FORM AND FREQUENCY USING AN OSCILLOSCOPE AT PIN 25 (TP3) OF THE A TO D CONVERTER. FIGURE 1 BELOW SHOWS THE SCOPE TRACE FOR THIS TEST POINT. THE CLOCK FREQUENCY SHOULD BE 68 KHz \pm 10%.

2. WITH POWER APPLIED TO THE UNIT CHECK THE INTEGRATOR RAMP VOLTAGE AT PIN 32 (TP4) OF THE A TO D CONVERTER. FIGURE 2 BELOW SHOWS THE SCOPE TRACE FOR THIS TEST POINT AT 0 FEET PRESURE.

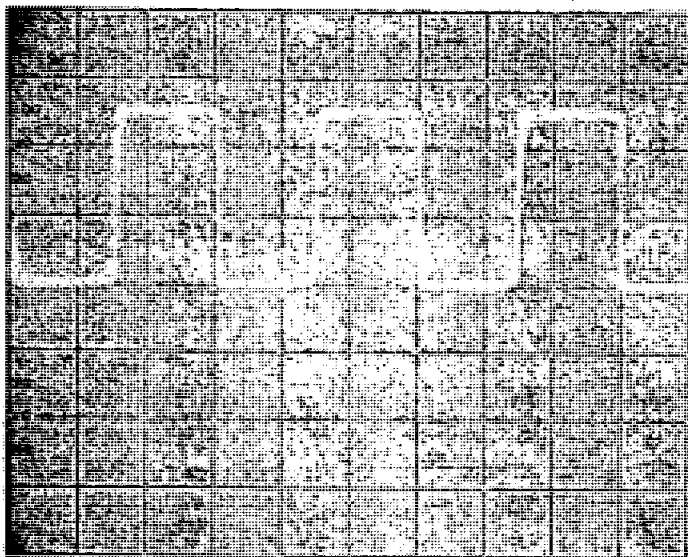


FIGURE 1
VOLTS/DIV 2 GATE 5 μ SEC

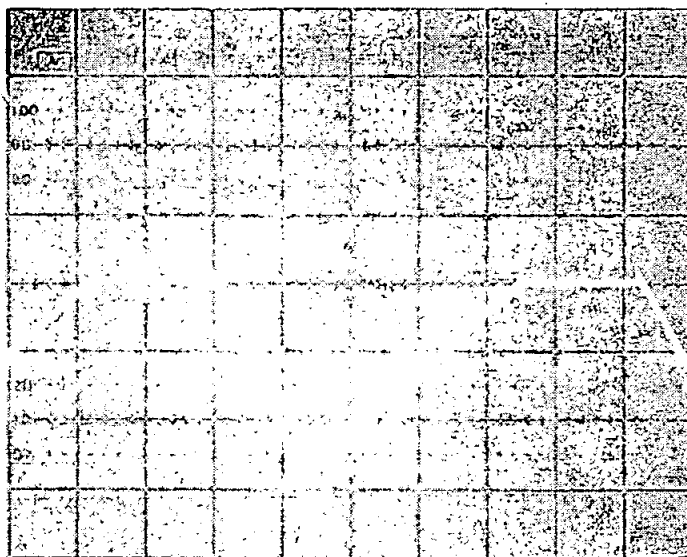


FIGURE 2
VOLTS/DIV 1 GATE 20m SEC

TESTING OUTPUT DRIVERS

NOTE:

A CODE MONITORING DEVICE WHICH WILL INDICATE THE STATE OF INDIVIDUAL LINES IS NEEDED FOR THESE TESTS.

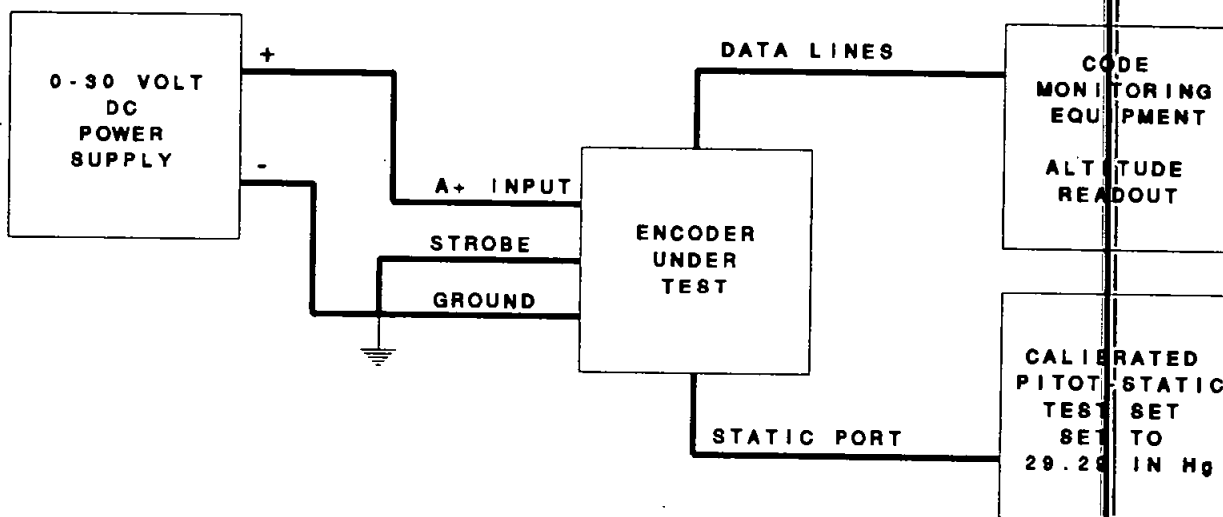
1. APPLY POWER TO THE UNIT AND DISCONNECT THE HANDSHAKE LINE (STROBE) FROM GROUND. NO OUTPUT CODE SHOULD BE PRESENT. CONNECT A JUMPER FROM THE MAIN BOARD +5 VOLT SUPPLY TO ONE OF THE TEST POINTS SHOWN AS TP6 TO 13. RESISTOR R1 CONTROLS TRANSISTOR T1 R2 CONTROLS T2 ETC. WHEN +5 VOLT POWER IS APPLIED TO THESE POINTS THE CORRESPONDING BIT SHOULD TURN ON. TO TEST THE A1 BIT CONNECT A JUMPER FROM GROUND TO TEST POINT T14. A MORE PRECISE TEST CAN BE PERFORMED AS FOLLOWS. DISCONNECT THE CODE MONITORING DEVICE AND CONNECT A 1K Ω RESISTOR THROUGH A DIGITAL AMMETER TO THE A+ POWER INPUT. CONNECT THIS CIRCUIT TO GROUND AND OBSERVE THE CURRENT DRAW. CONNECT THIS TEST SETUP TO EACH INDIVIDUAL BIT AND ACTIVATE THAT BIT AS DESCRIBED ABOVE. THE CURRENT DRAW SHOULD BE SLIGHTLY LESS THAN WHEN THE LINE IS HARD GROUNDING WHEN THE BIT IS ACTIVATED. WITH THE BIT DEACTIVATED THERE SHOULD BE NO MEASURABLE CURRENT DRAW.

SECTION 7

CALIBRATION PROCEDURE USING BASIC EQUIPMENT

THIS PROCEDURE ALLOWS FOR CALIBRATION USING A MINIMUM OF TEST EQUIPMENT AND IS BEST USED FOR UNITS WHICH HAVE PREVIOUSLY BEEN CALIBRATED AND HAVE RECEIVED MINOR REPAIR IN WHICH THE MAIN OR ANALOG BOARDS HAVE NOT BEEN CHANGED. THIS PROCEDURE CAN BE USED TO CALIBRATE ANY UNIT; HOWEVER IF THE UNIT IS BADLY OUT OF CALIBRATION, IT CAN BE VERY TIME CONSUMING.

1. HOOK UP THE TEST EQUIPMENT AS SHOWN BELOW.

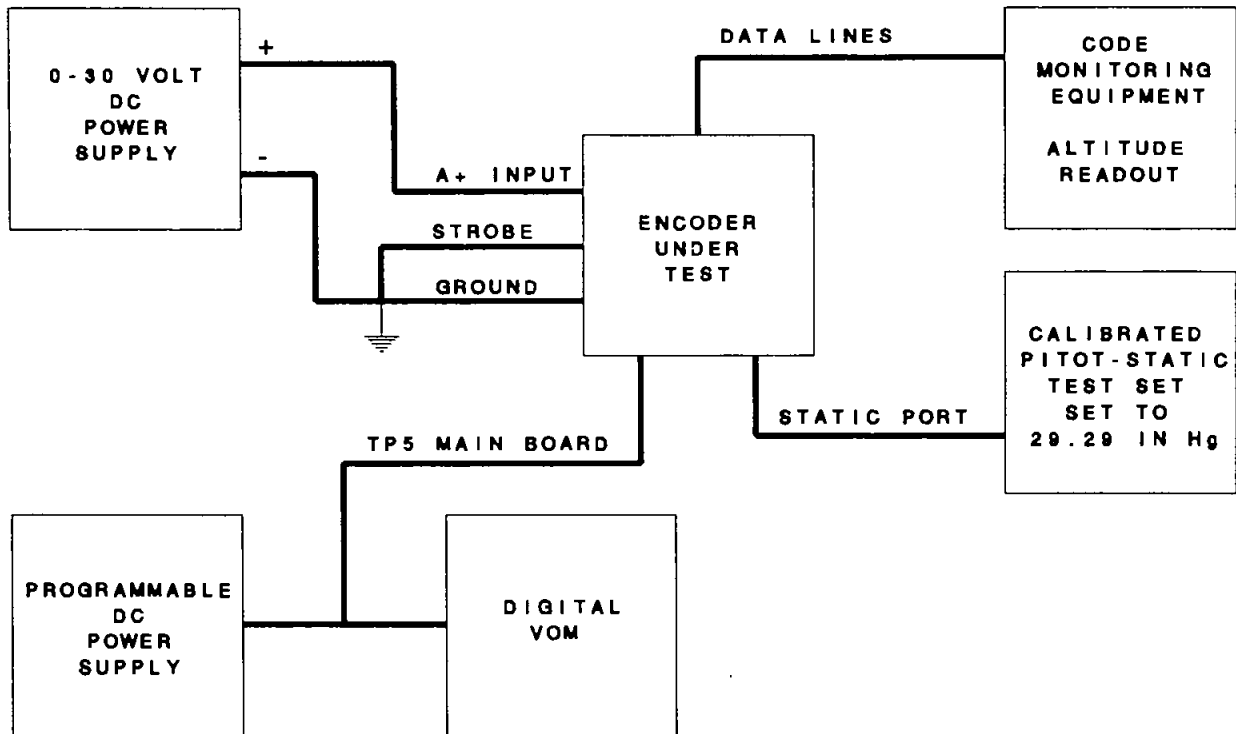


1. APPLY +14 VOLTS INPUT POWER TO THE UNIT. ALLOW UNIT TO WARM UP A MINIMUM OF 10 MINUTES. CALIBRATION SHOULD BE DONE WITH THE AMBIENT TEMPERATURE BETWEEN +55 TO +95 DEGREES FAHRENHEIT.
2. WITH THE PITOT-STATIC TEST EQUIPMENT REFERENCED TO 29.92 IN Hg DECREASE SYSTEM PRESSURE TO 30,650 FEET. ADJUST THE LOW ALTITUDE POT (R26) UNTIL THE ALTITUDE READOUT INDICATES THE SAME ALTITUDE.
3. VARY THE SYSTEM PRESSURE +/- 100 FEET AND ADJUST THE TRANSITION POINT TO 30,650 FEET +/- 50 FEET.
4. INCREASE SYSTEM PRESSURE TO 0 FEET NOTE THE AMOUNT THE ALTITUDE READOUT VARIES FROM THE TRUE ALTITUDE. EXAMPLE: SYSTEM PRESSURE SET AT -0 FEET ALTITUDE READOUT INDICATES +400 FEET = A DIFFERENCE OF 400 FEET.
5. ADJUST THE LOW POT (R27) TO CORRECT THE ERROR PLUS ONE HALF OF THE TOTAL ERROR. EXAMPLE: DIFFERENCE IN THE ABOVE EXAMPLE WAS 400 FEET HIGH. ADJUST ALTITUDE TO READ -200 FEET WITH SYSTEM PRESSURE SET TO 0 FEET.
6. DECREASE PRESSURE AGAIN TO 30,650 FT AND ADJUST HIGH POT AS IN STEP 3.
7. REPEAT STEPS 2 THROUGH 6 UNTIL THE TRANSITION POINTS AT EACH ALTITUDE IS WITHIN +/- 50 FEET FOR BOTH INCREASING AND DECREASING PRESSURE.

CALIBRATION PROCEDURE USING PROGRAMMABLE POWER SUPPLY

THE FOLLOWING PROCEDURE ALLOWS FOR RAPID RE CALIBRATION OF UNITS IN WHICH THE ANALOG BOARD, MAIN BOARD, OR TRANSDUCER HAS BEEN REPLACED OR RE CALIBRATION OF UNITS THAT ARE BADLY OUT OF CALIBRATION.

1. HOOK UP THE TEST EQUIPMENT AS SHOWN BELOW.



2. REMOVE TOP COVER FROM UNIT AND APPLY +14 VOLTS INPUT POWER TO THE UNIT. ALLOW UNIT TO WARM UP A MINIMUM OF 10 MINUTES. CALIBRATION SHOULD BE DONE WITH THE AMBIENT TEMPERATURE BETWEEN +55 TO +95 DEGREES FAHRENHEIT.
3. WITH THE PITOT-STATIC TEST EQUIPMENT REFERENCED TO 29.92 IN Hg HOLD SYSTEM PRESSURE AT -950 FEET.
4. MEASURE VOLTAGE AT TP5, USING THE DIGITAL VOM, AND RECORD THIS VOLTAGE (V1) TO .0001 VOLT.
5. DECREASE SYSTEM PRESSURE AND HOLD AT 30,650 FEET. RECORD VOLTAGE (V2) AT TP5 TO .0001 VOLT.
6. REMOVE POWER FROM UNIT AND UNPLUG THE ANALOG BOARD ASSEMBLY.

7. REAPPLY POWER TO THE UNIT AND PROGRAM THE POWER SUPPLY TO DUPLICATE THE VOLTAGE RECORDED AT TP5 AT -950 FEET (V1) AND THE VOLTAGE +.0002 VOLTS (V1 + .0002 VOLTS) AND TO ALTERNATE BETWEEN THESE TWO VOLTAGES EVERY .5 SECONDS. (PROGRAM 1)

8. PROGRAM THE POWER SUPPLY AS ABOVE FOR THE VOLTAGE RECORDED AT TP5 AT 30,650 FEET. (PROGRAM 2)

9. RUN PROGRAM 1 AND ADJUST THE LOW POT (R27) UNTIL THE ALTITUDE READOUT ALTERNATES BETWEEN THE -950 FOOT AND -850 FOOT TRANSITION POINT. MONITOR THE DVM AND MAKE SURE THE PROGRAMMED VOLTAGE IS CORRECT. IF NOT ADJUST PROGRAM VOLTAGE VALUES TO CORRECT THE DIFFERENCE IN VOLTAGE.

10. RUN PROGRAM 2 AND ADJUST THE HIGH POT (R26) UNTIL THE ALTITUDE READOUT ALTERNATES BETWEEN THE 30,850 FOOT AND 30,750 TRANSITION POINT. USE THE DVM TO MONITOR AND CORRECT VOLTAGES IF NECESSARY AS ABOVE.

11. REPEAT STEPS 9 AND 10 UNTIL BOTH ADJUSTMENTS REMAIN CORRECT WHEN SWITCHING BETWEEN PROGRAMS 1 AND 2. A DEGREE OF OVER ADJUSTMENT IS REQUIRED AS EXPLAINED IN THE PRECEDING BASIC CALIBRATION SECTION TO RAPIDLY BRING THE UNIT IN TO ROUGH ADJUSTMENT. THIS BECOME A RAPIDLY ACQUIRED SKILL AFTER CALIBRATING SEVERAL UNITS.

12. AFTER CALIBRATING THE UNIT REPLACE THE COVER AND CHECK THE TRANSITION POINTS AT BOTH 0 FEET AND 30,650 FEET MAKING SURE THEY ARE WITHIN +/- 50 FEET. IF NOT ADJUST HIGH AND LOW POTS UNTIL CORRECT.

FOLLOWING IS A COMPLETE LISTING OF ICAO CODE FROM -950 TO 30,650 FEET

RANGE	INCREMENTS (Feet)		PULSE POSITIONS (0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)													
			D ₂	D ₁	A ₁	A ₂	A ₃	A ₄	B ₁	B ₂	B ₃	B ₄	C ₁	C ₂	C ₃	C ₄
-1000 to -950	to	-950	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-950 to -850	to	-850	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-850 to -750	to	-750	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-750 to -650	to	-650	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-650 to -550	to	-550	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-550 to -450	to	-450	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-450 to -350	to	-350	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-350 to -250	to	-250	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-250 to -150	to	-150	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-150 to -50	to	-50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-50 to 50	to	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50 to 150	to	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 to 250	to	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0
250 to 350	to	350	0	0	0	0	0	0	0	0	0	0	0	0	0	0
350 to 450	to	450	0	0	0	0	0	0	0	0	0	0	0	0	0	0
450 to 550	to	550	0	0	0	0	0	0	0	0	0	0	0	0	0	0
550 to 650	to	650	0	0	0	0	0	0	0	0	0	0	0	0	0	0
650 to 750	to	750	0	0	0	0	0	0	0	0	0	0	0	0	0	0
750 to 850	to	850	0	0	0	0	0	0	0	0	0	0	0	0	0	0
850 to 950	to	950	0	0	0	0	0	0	0	0	0	0	0	0	0	0
950 to 1050	to	1050	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1050 to 1150	to	1150	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1150 to 1250	to	1250	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1250 to 1350	to	1350	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1350 to 1450	to	1450	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1450 to 1550	to	1550	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1550 to 1650	to	1650	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1650 to 1750	to	1750	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1750 to 1850	to	1850	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1850 to 1950	to	1950	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1950 to 2050	to	2050	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2050 to 2150	to	2150	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2150 to 2250	to	2250	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2250 to 2350	to	2350	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2350 to 2450	to	2450	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2450 to 2550	to	2550	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2550 to 2650	to	2650	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2650 to 2750	to	2750	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2750 to 2850	to	2850	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2850 to 2950	to	2950	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2950 to 3050	to	3050	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3050 to 3150	to	3150	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3150 to 3250	to	3250	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3250 to 3350	to	3350	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3350 to 3450	to	3450	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3450 to 3550	to	3550	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3550 to 3650	to	3650	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3650 to 3750	to	3750	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3750 to 3850	to	3850	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3850 to 3950	to	3950	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3950 to 4050	to	4050	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4050 to 4150	to	4150	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4150 to 4250	to	4250	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4250 to 4350	to	4350	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4350 to 4450	to	4450	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4450 to 4550	to	4550	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4550 to 4650	to	4650	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4650 to 4750	to	4750	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SECTION 8

NOTES AND SERVICE BULLETINS

MISCELLANEOUS NOTES

THE PURCHASE OF THIS MANUAL INCLUDES A TECHNICAL UPDATE SERVICE.
PLEASE NOTIFY US OF ANY CHANGE OF ADDRESS.

EXPERIENCE HAS SHOWN, IF AN INSTALLED SYSTEM IS REPORTING WILDLY ERRATIC MODE C ALTITUDE OR MODE C INFORMATION IS PERIODICALLY LOST BY ATC IN FLIGHT, THIS CONDITION IS ALMOST ALWAYS CAUSED BY A MALFUNCTIONING TRANSPONDER. OR DATA INTERFACE LINES WHICH ARE OPEN OR INTERMITTENT.

THE CURRENT AIR TRAFFIC CONTROL SYSTEM STANDARD ALLOWS FOR USE OF MODE C ALTITUDE INFORMATION THAT IS UP TO 300 FEET IN ERROR. A PROPERLY FUNCTIONING AND CALIBRATED ENCODER MAY REPORT ALTITUDE DEVIATIONS OF UP TO +/-200 FEET TO ATC. THIS IS CAUSED BY A NUMBER OF FACTORS WHICH ARE INHERENT TO BOTH THE ATC AND AIRCRAFT SYSTEMS. ATC FACILITY COMPUTER SYSTEM CORRECTION FOR BAROMETRIC PRESSURE, SLIGHT ERRORS IN SETTING THE BAROMETRIC PRESSURE CORRECTION BY THE PILOT, ALTIMETER/ENCODER CORRELATION ERROR ALL CONTRIBUTE TO AN OVERALL SYSTEM ERROR OF +/-200 FEET. MUCH WASTED TIME AND EFFORT HAS BEEN SPENT IN THE FIELD TRYING TO ACHIEVE PERFECT CORRELATION OF THE AIRCRAFT ALTIMETER/ENCODER WHEN USED IN THE ATC SYSTEM. THE PROPER CRITERIA TO USE FOR DETERMINING WHETHER THE SYSTEM NEEDS REPAIR OR RE CALIBRATION IS AN INSTRUCTION FROM ATC TO "STOP ALTITUDE SQUAWK".

WE HAVE NUMEROUS REPORTS THE PRECUT SECTIONS OF TUBING WHICH ARE SUPPLIED WITH THE INSTALL KIT HAVE DETERIORATED AND CRACKED OR SPLIT AFTER VARIOUS PERIODS OF SERVICE. WHEN REPAIRING OR RE CALIBRATING VISUALLY INSPECT THESE RUBBER COMPONENTS IF USED FOR SIGNS OF CRACKING OR SPLITTING. REPLACE WITH NEOPREAM OR EPDM TUBING IF CRACKED OR SPLIT.

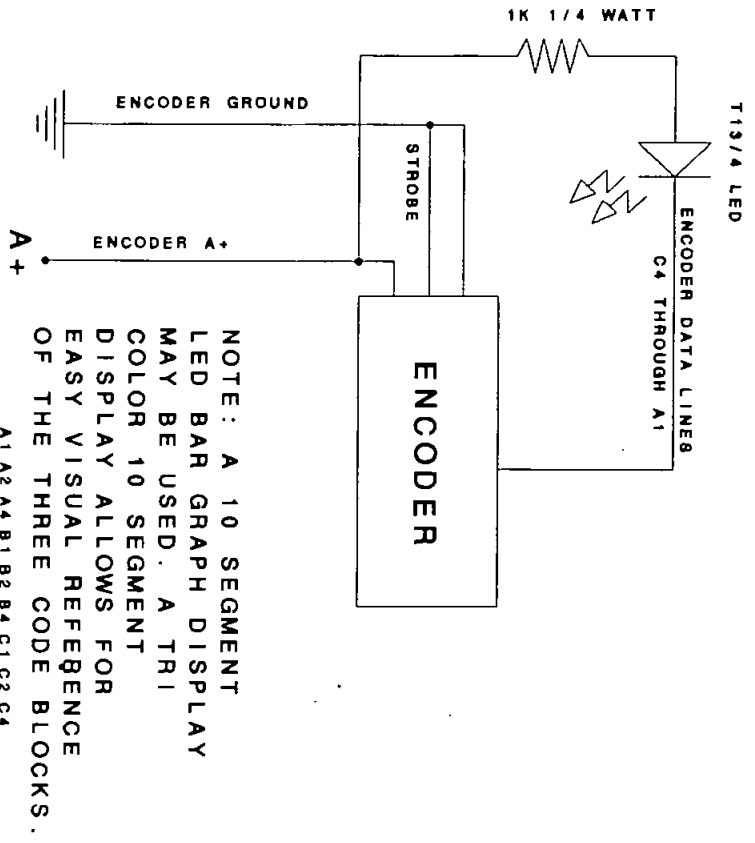
AFTER 4 1/2 YEARS OF PRODUCTION AND 40,000 + UNITS IN SERVICE, THE ONLY RECURRING SERVICE PROBLEM WE ARE ENCOUNTERING IS THE DETERIORATION OF THE RIBBON CABLE, AFTER VARIOUS LENGTHS OF SERVICE. WE STRONGLY RECOMMEND BRINGING OLDER UNITS UP TO MOD 2 AND MOD 3 STATUS WHEN EVER SERVICE IS PERFORMED ON THE UNITS. WE CURRENTLY OFFER A FACTORY REBUILD AND UPDATE PROGRAM FOR OLDER UNITS. THE SERVICE INCLUDES BASIC REBUILD OF THE UNIT, UPDATE TO MOD 2 AND MOD STATUS. CURRENT COST FOR THIS SERVICE IS \$35.00 PLUS A \$3.00 SHIPPING CHARGE FOR UPS GROUND SERVICE. UPS 2nd DAY SERVICE IS \$6.00. UPS NEXT DAY AIR SERVICE IS \$14.00. CANADIAN SHIPPING IS \$3.00 VIA AIR MAIL SERVICE. A \$4.00 UPS COD FEE IS ADDED TO ALL ORDERS NOT PREPAID. ALL CANADIAN ORDERS MUST BE PREPAID. WE ACCEPT VISA AND MASTER CHARGE. THESE PRICES ARE SUBJECT TO CHANGE.

FOREIGN APPROVALS

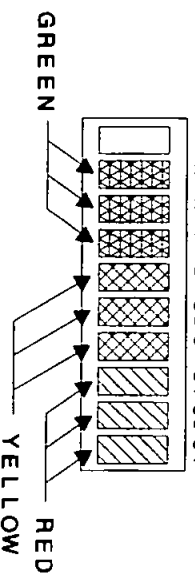
THE UNIT HAS RECEIVED GERMAN TYPE APPROVAL. THE GERMAN TYPE APPROVAL NUMBER IS 10.221/4. THE UNIT IS ALSO ACCEPTED BY CANADIAN, AUSTRALIAN ITALIAN, AUSTRIAN, SWISS AND MOST OTHER FOREIGN CIVIL AVIATION AUTHORITIES.

CODE MONITORING
SCHEMATIC FOR
INDIVIDUAL BITS

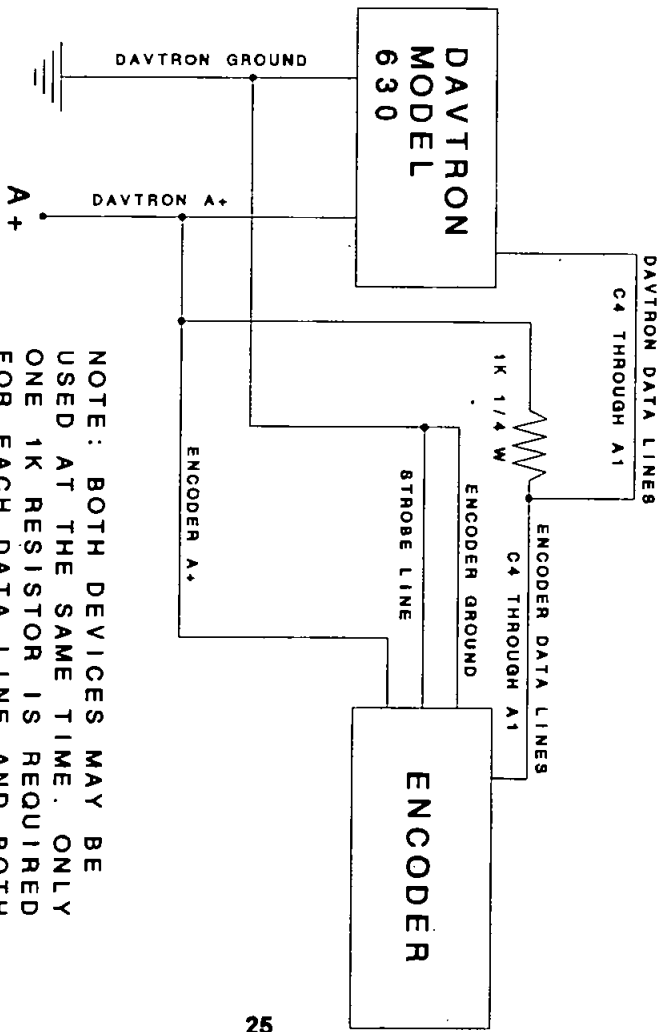
CODE MONITORING
SCHEMATIC USING
A DAVTRON MODEL
630 READOUT



NOTE: A 10 SEGMENT
LED BAR GRAPH DISPLAY
MAY BE USED. A TRI
COLOR 10 SEGMENT
DISPLAY ALLOWS FOR
EASY VISUAL REFERENCE
OF THE THREE CODE BLOCKS.



TRI COLOR LED BAR GRAPH DISPLAY



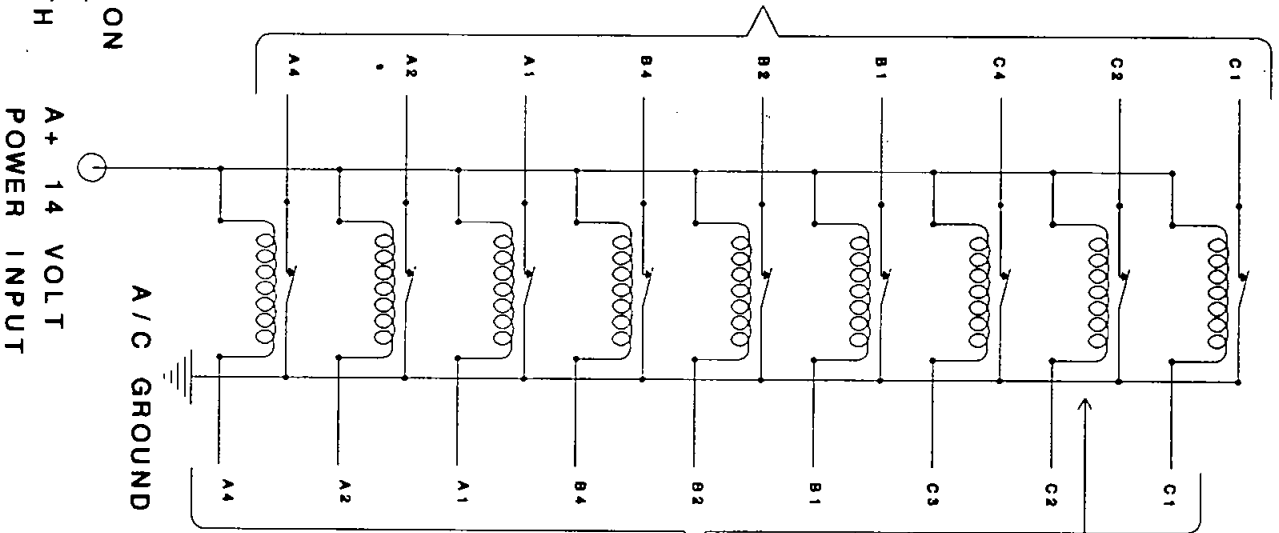
NOTE: BOTH DEVICES MAY BE
USED AT THE SAME TIME. ONLY
ONE 1K RESISTOR IS REQUIRED
FOR EACH DATA LINE AND BOTH
DISPLAYS SHOULD BE CONNECTED
IN PARALLEL.

AGK TECHNOLOGIES
INC
DRAWING A30READ.DWG
MA 06/09/92

TO WILCOX 814B
OR OTHER REVERSE
LOGIC TRANSPONDER

NOTE: THIS REVERSAL SCHEMATIC IS PROVIDED FOR INFORMATION ONLY DETERMINING THE SUITABILITY FOR USE WITH ANY TRANSPONDER OR OTHER EQUIPMENT IS THE SOLE RESPONSIBILITY OF THE PERSON FABRICATING AND INSTALLING SUCH EQUIPMENT.

NOTE: FOR 28 V OPERATION PLACE A 500 OHM 1 WATT RESISTOR IN SERIES WITH THE POWER INPUT.



TO ACK A-30 ENCODER

DIP REED RELAYS (NORMALLY CLOSED)
MOUSER # 433 D31B510

OR EQUIVALENT

HAMLIN 700 SERIES
GORDOS 83 SERIES
CLARE PRM SERIES
ELECTROL RA SERIES
DOUGLAS RANDALL 5 DIP SERIES
STRUTHERS-DUNN MMR SERIES

ACK TECHNOLOGIES
INC

LOGIC INVERTER A-30 ENCODER
DRAWING # A-30LOG
NOVEMBER 8, 1991
M.A.

ACK TECHNOLOGIES **INC.**

424 W. JULIAN ST., SAN JOSE, CA 95110
FAX (408) 295-1712 (408) 287-8021 TELEX 4992505 (VIA ITT)

SERVICE BULLETIN A-30-1 **AFFECTING A-30 ALTITUDE ENCODER ALL SERIAL NUMBERS** **APRIL 10, 1989**

TO: ACK A-30 ALTITUDE ENCODER DISTRIBUTORS.
PLEASE PROVIDE COPIES OF THIS LETTER TO ALL
INSTALLING DEALERS.

RE: GROUNDING OF A-30 DURING CALIBRATION AND CORRESPONDENCE
TESTING.

RECENT FIELD SERVICE HISTORY HAS INDICATED THAT THE A-30 CALIBRATION MAY BE AFFECTED BY THE LOCATION OF ITS MOUNTING TRAY IN RELATION TO THE AIRCRAFT GROUND POINT SELECTED WHEN CORRESPONDENCE ADJUSTMENT IS MADE OR A FINAL CORRESPONDENCE CHECK IS DONE WITH THE ENCODER REMOVED FROM ITS MOUNTING TRAY.

THE A-30 WAS DESIGNED TO BE ESSENTIALLY RATIO-METRIC IN REGARD TO INPUT VOLTAGE AND IS VIRTUALLY NOT AFFECTED BY WIDE CHANGES IN INPUT VOLTAGE. HOWEVER A SLIGHT DIFFERENCE IN POTENTIAL BETWEEN A+ AND THE GROUND POINTS SELECTED FOR THE GROUND WIRE CONNECTION AND THE MOUNTING LOCATION OF THE ENCODER CAUSES A SLIGHT CHANGE IN THE INTERNAL REFERENCE VOLTAGE OF THE A-30. WE BELIEVE OLDER AIRFRAMES OR CORRODED AIRFRAMES WILL BE MORE SUBJECT TO THIS CONDITION. FOLLOWING THESE RECOMMENDED PROCEDURES WILL ASSURE THAT THIS CONDITION, IF PRESENT, DOES NOT AFFECT FINAL CALIBRATION OF THE ENCODER.

IF THE MOUNTING TRAY IS NOT CONNECTED TO THE AIRFRAME GROUND, e.g.: MOUNTED ON THE NON-METALIC GLOVE BOX OF SOME AIRCRAFT OR MOUNTED TO A COMPOSITE MATERIAL COMPONENT OF THE AIRFRAME, THE GROUNDING REQUIREMENTS OF THIS SERVICE BULLETIN DO NOT APPLY.

OUR TWO RECOMMENDED METHODS OF COMPLYING WITH THIS SERVICE BULLETIN ARE AS FOLLOWS:

1. WHEN DOING FINAL CORRESPONDENCE VERIFICATION OF THE ENCODER AND ALTIMETER THE ENCODER SHOULD BE SECURELY FASTENED INTO ITS MOUNTING TRAY. THE MOUNTING TRAY MUST BE IN ITS FINAL MOUNTING LOCATION IN THE AIRCRAFT AND SECURELY TIGHTENED PRIOR TO TESTING.

OR

2. IF THE ENCODER IS REMOVED FROM ITS MOUNTING TRAY DURING FINAL CORRESPONDENCE ADJUSTMENT AND VERIFICATION, ATTACH A HEAVY JUMPER CABLE BETWEEN THE DIE CAST ENCODER CHASSIS AND ITS MOUNTING TRAY. THE MOUNTING TRAY MUST BE IN ITS FINAL MOUNTING LOCATION IN THE AIRCRAFT AND SECURELY TIGHTENED PRIOR TO TESTING. THE JUMPER SHOULD BE AWG 16 OR HEAVIER WIRE WITH HEAVY SPRING TYPE ALLIGATOR CLIPS ON EACH END ITS LENGTH SHOULD NOT EXCEED 3 FEET.

**** END ****



SERVICE BULLETIN
A-30-2

AFFECTING A-30 ALTITUDE ENCODERS TO SERIAL NUMBER 23849

NOVEMBER 11, 1989

TO: ACK A-30 ALTITUDE ENCODER DISTRIBUTORS
PLEASE PROVIDE COPIES OF THIS LETTER
TO ALL INSTALLING DEALERS.

RE: MODIFICATION OF THE A-30 TO MOD 2 STATUS

BEGINNING WITH SERIAL NUMBER 23850 ALL INTERNAL GROUND POINTS HAVE BEEN ISOLATED FROM THE A-30 CASE. THE ONLY GROUND PATH AVAILABLE TO THE A-30 IS THROUGH PIN 15 OF THE CONNECTING JACK. BEGINNING WITH SERIAL NUMBER 23850 THE RECOMMENDATIONS OF SERVICE BULLETIN A-30-1 DATED APRIL 10, 1989 ARE NO LONGER APPLICABLE.

THE FOLLOWING PROCEDURE DESCRIBES MODIFICATIONS WHICH MAY BE DONE IN THE FIELD TO BRING EARLIER SERIAL NUMBERS TO MOD LEVEL 2. THIS MOD NEED ONLY BE DONE ON UNITS WHERE A GROUND LOOP PROBLEM AS DESCRIBED IN OUR SERVICE BULLETIN A-30-1 IS ENCOUNTERED.

THE FOLLOWING PARTS ARE REQUIRED FOR THIS FIELD MODIFICATION:

QTY	<u>DESCRIPTION</u>
1	DF103C TO-220 MICA INSULATOR RCA TYPE KH3477 OR EQUIVALENT
3	DF378F INSULATING SHOULDER WASHER RCA TYPE KH3479 OR EQUIVALENT

OUR SERVICE KIT A-30-2 CONTAINING THE ABOVE PARTS MAY BE ORDERED FROM US AT THE ADDRESS LISTED BELOW.

ACK TECHNOLOGIES INC.
440 W. JULIAN ST.
SAN JOSE, CA 95110

MODIFICATION PROCEDURE

ALL WORK SHOULD BE PERFORMED AT A STATIC SAFE WORK AREA

1. REMOVE THE A-30 TOP COVER BY REMOVING THE FOUR RETAINING SCREWS WHICH AFFIX IT TO THE DIE CAST ALUMINUM BASE. (SEE FIGURE 1)
2. REMOVE THE ANALOG BOARD ASSEMBLY BY DISCONNECTING THE IDS 10 PLUG LOCATED AT THE END OF THE RIBBON CABLE FROM THE MAIN BOARD ASSEMBLY.

3. REMOVE THE MAIN BOARD ASSEMBLY FROM DIE CAST BASE BY REMOVING THE TWO 4-40 SECURING SOCKET HEAD SCREWS SECURING IT TO THE BASE ASSEMBLY AND THE TWO HEX HEAD SHOULDER SCREWS WHICH SECURE THE 15 PIN CONNECTOR TO THE EXTERIOR OF THE DIE CAST BASE.

4. REMOVE THE SCREW WHICH ATTACHES THE VOLTAGE REGULATOR HEAT SINK TO THE VOLTAGE REGULATOR. (SEE FIGURE 2)

5. USING A 5/32" DRILL ENLARGE THE TWO MAIN BOARD ATTACHING SCREW HOLES (SEE FIGURE 2) MAKING SURE THAT THE DRILL REMOVES ALL OF THE CONDUCTIVE TRACE MATERIAL BETWEEN THE UPPER AND LOWER LAYER OF THE BOARD. IF ANY CONDUCTIVE MATERIAL REMAINS IN THE HOLE REMOVE ANY REMAINDER WITH A BEARING SCRAPER OR EXACTO KNIFE.

6. REASSEMBLE THE UNIT INSTALLING THE INSULATOR BUSHINGS AND MICA INSULATOR AS SHOWN IN FIGURE 2. A NON CONDUCTIVE GREASE OR ADHESIVE MAY BE USED TO HOLD THE INSULATOR BUSHINGS IN PLACE DURING ASSEMBLY.

7. BEFORE REPLACING THE TOP COVER CHECK THE RESISTANCE BETWEEN PIN 15 OF THE CONNECTOR JACK AND THE DIE CAST BASE. THIS RESISTANCE SHOULD BE 10 MEGOHM OR GREATER. IF IT IS NOT CHECK FOR PROPER REMOVAL OF CONDUCTIVE TRACE MATERIAL STEP 5 ABOVE AND PROPER PLACEMENT OF INSULATORS STEP 6 ABOVE.

8. REPLACE THE TOP COVER FACING THE END WITH THE TSO LABEL TOWARDS THE 15 PIN CONNECTOR. AFTER REPLACING THE TOP COVER DOUBLE CHECK THE CASE GROUND AS IN STEP 7 ABOVE. MARK THE MOD 2 BOX ON THE TSO LABEL TO INDICATE THAT THIS MODIFICATION HAS BEEN DONE.

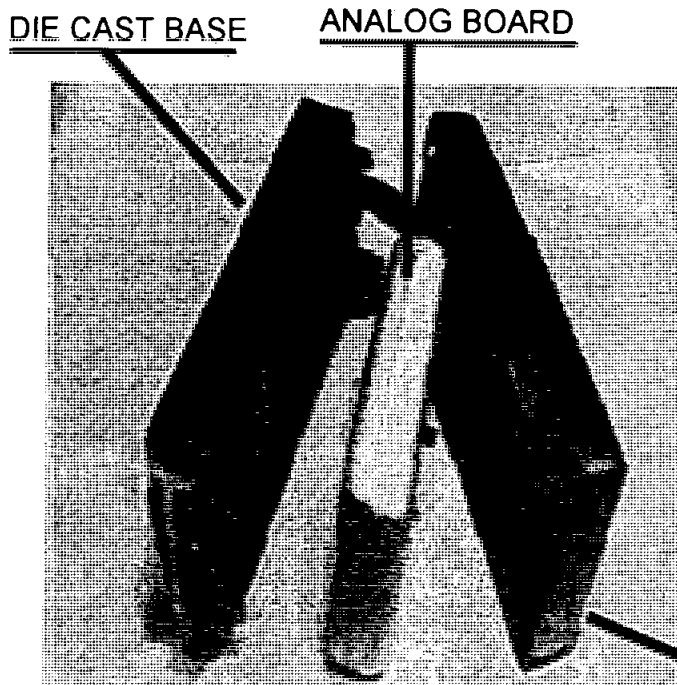


FIGURE 1

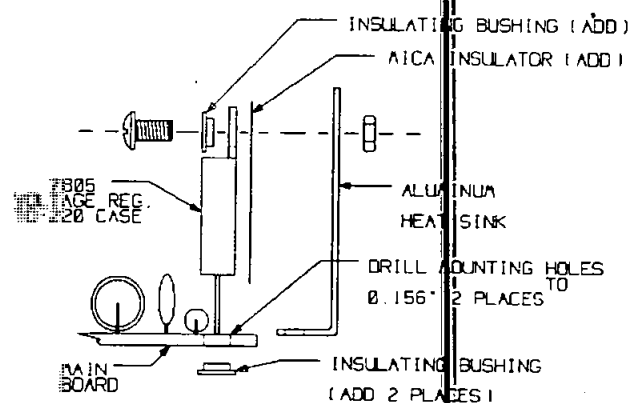


FIGURE 2

TOP COVER

*** END ***



SERVICE BULLETIN

A-30-3

AFFECTING MODEL A-30 ENCODERS TO SERIAL NUMBER 38567

JUNE 12, 1990

TO: ALL A-30 ALTITUDE ENCODER DISTRIBUTORS
PLEASE PROVIDE COPIES OF THIS LETTER
TO ALL INSTALLING DEALERS

RE: MODIFICATION OF THE A-30 TO MOD 3 STATUS

BEGINNING WITH SERIAL NUMBER 38568 A NEW IMPROVED CABLE ASSEMBLY IS USED ON THE MODEL A-30.

THE ORIGINAL CABLE ASSEMBLY WAS A RIBBON CABLE IN WHICH THE TERMINATING HEADERS ARE A MECHANICAL CONNECTION. AS THE UNIT HAVE AGED SERVICE HISTORY HAS SHOWN THAT THE THERMAL CYCLING TO WHICH THIS CABLE IS SUBJECTED HAS CAUSED THE MECHANICAL CONNECTION TO BECOME UNRELIABLE ON SOME UNITS.

TO CHECK FOR THIS CONDITION APPLY POWER TO THE UNIT AND ALLOW TO WARM UP. VENT STATIC PORT TO THE ATMOSPHERE AND MONITOR THE CODE OUTPUT. IF THE AMBIENT PRESSURE IS VERY CLOSE TO A TRANSITION POINT THE READOUT MAY BE FLUCTUATING ± 100 FEET. THIS IS NORMAL OPERATION. WITH THE ENCODER ON A HARD SURFACE PLACE YOUR THUMBS ON THE TOP COVER ON EACH SIDE OF THE TRANSDUCER STATIC PORT. PRESS FIRMLY DOWN ON THE COVER AND OBSERVE THE CODE READOUT. IF THE CODE CHANGES MORE THAN 100 FEET THIS INDICATES A BAD CABLE ASSEMBLY. IF THE CODE CHANGES ONLY 100 FEET BUT RETURN TO ITS ORIGINAL READING WHEN THE CASE PRESSURE IS RELEASED, THIS IS NORMAL CONDITION.

OUR SERVICE KIT P/N A-30-3 CONTAINS THE NEW CABLE ASSEMBLY AND REPLACEMENT FOAM COVER AND MAY BE ORDERED DIRECTLY FROM US OR FROM YOUR ACK DISTRIBUTOR.

IMPORTANT CHECK THE CABLE FOR PROPER WIRE COLOR POSITION AGAINST THE DRAWING BELOW BEFORE INSTALLING.

TO REPLACE THE RIBBON CABLE ASSEMBLY DISCONNECT POWER AND REMOVE THE TOP COVER. UNPLUG THE ANALOG BOARD ASSEMBLY AND REMOVE THE FOAM COVER. THERE ARE TWO METHODS FOR REPLACING THE CABLE.

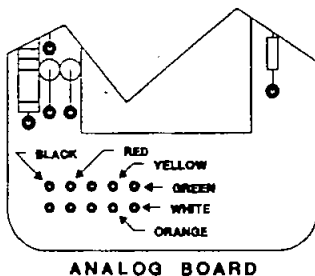
1. IF DE SOLDERING EQUIPMENT IS AVAILABLE DE SOLDER THE RIBBON CABLE HEADER FROM THE ANALOG BOARD ASSEMBLY AND SOLDER THE NEW CABLE ASSEMBLY AS SHOWN BELOW.

2. THE CABLE MAY BE REPLACED WITHOUT DE SOLDERING BY REMOVING THE RIBBON CABLE HEADER RETAINING COVER AND PULLING THE RIBBON CABLE OFF OF THE HEADER. CUT THE TWO LUGS ON THE HEADER AND BEND THE REMAINING LUGS AS SHOWN BELOW. SOLDER IN THE NEW CABLE ASSEMBLY AS SHOWN BELOW.

REPLACE THE FOAM COVER BY PLACING THE TOP HALF IN THE TOP COVER OF THE ENCODER FOR ALIGNMENT. USE A HOT GLUE GUN TO PLACE A BEAD OF GLUE ALL AROUND THE MATING SURFACES. PLACE THE BOTTOM HALF IN PLACE AND USE A WEIGHT TO HOLD IN PLACE WHILE THE GLUE COOLS.

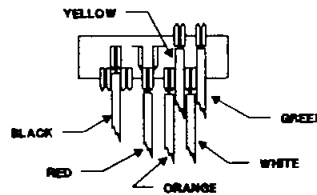
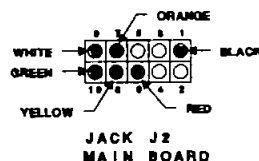
PLUG THE ANALOG BOARD ASSEMBLY BACK IN TO THE MAIN BOARD AS SHOWN BELOW. REPLACE THE TOP COVER AND RE CALIBRATE THE UNIT.

CABLE REPLACEMENT WITH RIBBON CABLE HEADER REMOVED

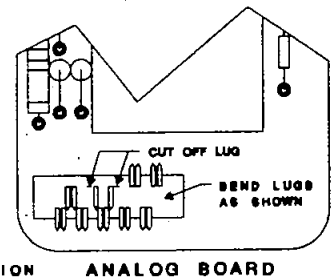


CABLE REPLACEMENT LEAVING OLD RIBBON CABLE HEADER IN PLACE

VIEW FROM TOP OF PLUG LOOKING DOWN ON MAIN BOARD



SOLDER WIRES AS SHOWN SOLDER FRONT WIRES FIRST TO AVOID MELTING INSULATION



LIMITED WARRANTY

THE A-30 ALTITUDE ENCODER IS GUARANTEED BY ACK TECHNOLOGIES INC. AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF PURCHASE OR 1 YEAR AND SIX MONTHS FROM THE DATE OF ITS MANUFACTURE. THIS WARRANTY IS VOID UNLESS THE WARRANTY CARD HAS BEEN COMPLETED AND RETURNED TO ACK TECHNOLOGIES INC., WITHIN 15 DAYS OF ITS INSTALLATION. THIS WARRANTY IS LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE A-30 ENCODER UNIT WHEN RETURNED FREIGHT PREPAID TO OUR MANUFACTURING FACILITY. THIS WARRANTY DOES NOT INCLUDE REPAIR OR REPLACEMENT OF ANY UNIT WHICH HAS BEEN IMPROPERLY USED, INSTALLED OR WHICH IS PHYSICALLY DAMAGED. EXCEPT AS PROVIDED HEREIN ACK TECHNOLOGIES INC. MAKES NO EXPRESS WARRANTIES AND ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS LIMITED IN ITS DURATION TO THE DURATION OF THE WRITTEN LIMITED WARRANTIES SET FORTH HEREIN. ACK TECHNOLOGIES INC. SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR MISUSE OF THIS PRODUCT. EXCEPT AS PROVIDED HEREIN NO EMPLOYEE, AGENT, DEALER OR OTHER PERSON IS AUTHORIZED TO GIVE ANY WARRANTIES OF ANY NATURE ON BEHALF OF ACK TECHNOLOGIES INC.

YOU MAY HAVE ADDITIONAL LEGAL RIGHTS WHICH VARY FROM STATE TO STATE.

ACK A-30 DISTRIBUTORS

UNITED STATES AND CANADA

EDMO DISTRIBUTORS INC.
E. 5505 RUTTER AVENUE
SPOKANE, WA 99212
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AVIONICS INTERNATIONAL SUPPLY, INC.
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DENTON MUNICIPAL AIRPORT
DENTON, TEXAS 76207
PHONE 800 553-2233

COOPER AVIATION SUPPLY CO.
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ELK GROVE VILLAGE, IL 60007
PHONE 800 654-4944

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