

PARKER RESEARCH CORP.

— OPERATION/MAINTENANCE MANUAL —

EC-5000 EDDY CURRENT INSTRUMENT



**MODEL EC-5000
EDDY CURRENT INSTRUMENT**

MANUFACTURED BY:

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INSTRUMENT DESCRIPTION

The EC-5000 Eddy Current instrument is a valuable and reliable inspectors tool for the detection of surface defects in most non-ferrous metals, some ferrous metals and for metals sorting.

BASIC DESCRIPTION:

The EC-5000 is a very portable battery operated Eddy Current instrument designed with sophisticated state-of-the-art electronic components. The variable frequency design allows for a high degree of sensitivity using the single general purpose sense probe supplied with the EC-5000, or a broad range of other probes. The entire instrument weighs less than 2.5 pounds and is contained within a rugged moisture and dust resistant molded case with removable lid.

OPERATING CONTROLS:

1. Meter (Up and Down Scale Readings)
2. Lift-Off/Frequency Control
3. Balance Control
4. Sensitivity Control
5. Power On-Off/Battery-Check Switch
6. Instrument On Light (Green LED)
7. Up-Down Meter Scale Switch
8. Defect Indication Light (Red LED)
9. Audio Alarm On-Off Switch
10. Probe Jack
11. Battery Charger/Power Supply Connector

METER — The meter scale is numbered from 0 to 15 with 30 divisions. Meter readings are down scale on non-ferrous metals and up scale on ferrous metals.

LIFT-OFF/FREQ. — This ten turn potentiometer provides an infinitely variable frequency range adjustment of 55 to 240 kHz. and is used to establish operating frequency and lift-off compensation.

BALANCE CONTROL — The balance control is also a ten turn potentiometer and is used to keep the meter pointer on scale with various settings of the lift-off/frequency control.

SENSITIVITY — The sensitivity control is a one turn potentiometer used to adjust sensitivity level, determined by the type of material being tested and defect size.

ON-OFF SWITCH — This three position switch turns the instrument on and off and provides a momentary battery-check position.

UP-DOWN SCALE SWITCH — This two position switch provides for up or down scale meter readings for either ferrous or non-ferrous metals.

AUDIO ALARM SWITCH — This switch activates the audio alarm when desired. The alarm sounds when the instrument reaches the alarm threshold level, approximately center scale on the meter in either up or down scale. In conjunction, the Red LED also lights when alarm threshold level is reached.

PROBE JACKS — BNC and Amphenol cable connectors.

BATTERY CHARGER CONNECTOR — This jack is provided to accept the male plug from the battery charger supplied with the EC-5000. It should not be used for connection to any other type power source. NOTE: The Green ON/OFF LED will light when the instrument is charging.

SPECIFICATIONS:

Operating Frequency: 55 - 240 kHz.

Battery: 1- Sub "C" Ni-Cad Battery Pack. (P/N EC5001) 7.2 VDC, 1.2 AH.
Charging: 4 to 14 hours, depending on battery level.

Power Consumption: 140 MA. Approximately 10 hours of continuous use.

Case Dimensions: 8½" L x 6½" W x 3½" D.

Weight: 2 lbs., 7 oz. (Less Charger).

Battery Charger/Power Supply: (P/N 5655) Primary - 120VAC, 60 Hz, 8W.
Secondary - 8.7 VDC, 300 MA. (Optional 230 VAC, 50 Hz. available. P/N EC4459.)

Temperature Range: 0 to 120 degrees F.

BATTERY CHARGING — Before operating instrument, hold the On-Off switch to the momentary Battery-Check position to determine battery condition. Maximum charge will be indicated by a full scale meter reading of 15. A meter reading of 13 or less indicates charging is necessary. When battery charge becomes necessary, connect charger and allow 4 to 14 hours for complete charge depending on battery level. NOTE: When the unit is connected to the battery charger the Green ON/OFF LED will be lighted to indicate charging. The EC-5000 may also be operated from the charger/power supply.

— GENERAL OPERATION —

Non-Ferrous Metals — Down Scale Reading

1. Connect the probe cable to the cable connector.
2. Set the UP-DOWN scale switch to the down scale position.
3. Turn on the AUDIO ALARM if desired.
4. Set the LIFT-OFF/FREQ. control, BALANCE control and the SENSITIVITY control to their full counterclockwise positions.
5. Turn the LIFT-OFF/FREQ. control clockwise to approximately 1.50 on the 10 turn dial.
6. With the sense probe placed on the non-ferrous metal surface, turn the BALANCE control clockwise until the meter pointer comes on scale to 10.
7. To check for correct lift-off compensation, place a piece of thin paper (writing paper) between the probe tip and the metal surface. If the deflection on the paper is more than one point down scale, then the LIFT-OFF/FREQ. control needs to be turned clockwise to a slightly higher setting. Reset the BALANCE CONTROL to bring the meter pointer back to 10 and recheck with the paper. Lift-off compensation has been set when there is approximately a one point down scale meter deflection between the paper and metal surface. Defects on the metal surface will now be detected by a down scale reading of the meter pointer, and/or the alarm and Red LED.
8. If a greater meter deflection is required due to the type of metal or size of defects being sought, then a slight clockwise turn of the SENSITIVITY control should be made. After increasing sensitivity, it may be necessary to recalibrate lift-off compensation as described in step 7.

NOTE: Lift-off compensation can usually be obtained at more than one setting of the LIFT-OFF/FREQ. control. However, for maximum sensitivity use the lowest possible setting necessary to obtain compensation.

Ferrous Metals — Up Scale Reading

The same operating outlined above will apply to ferrous metals with the following exceptions.

1. Set the UP-DOWN scale switch to the up scale position.
2. Turn on the AUDIO ALARM, if desired.
3. With all controls set to their counterclockwise positions, turn the LIFT-OFF/FREQ. control clockwise to approximately 4:00 on the 10 turn dial.
4. With the sense probe placed on the ferrous metal surface, turn the BALANCE control clockwise until the meter pointer comes on scale to 5.
5. For correct lift-off compensation follow the same procedures as outlined above, using an up scale reading.

The EC-5000 Eddy Current instrument is designed to give long reliable service for its intended use. As with all electronic instruments, care should be taken to avoid rough handling and conditions that would expose the instrument to extreme mechanical shock. The sense probe provided with the EC-5000 is also designed for normal service life. However, the probe tip will eventually wear to such a point that replacement will become necessary. A damaged probe will generally be indicated by an extreme meter reading in either direction.

CALIBRATION:

A test block standard containing machined slots should be used to regularly check instrument sensitivity and condition of probe and cable.

BATTERY MAINTENANCE AND REPLACEMENT:

To extend battery life, the EC-5000 should occasionally be left in the "on" position, at least 8 to 10 hours, to allow for near complete battery discharge. Battery should then be fully recharged for approximately 14 hours. This procedure will help to prevent battery level "memory" typical of NiCad batteries.

To replace the battery pack in the EC-5000, remove the screws holding the rubber feet on the bottom of the case. **Do not remove screws from the instrument panel.** With the instrument in the up-side-down position, lower the panel out of the case. Slide the battery pack out of the bracket and unsolder the red and black wires. Resolder the red wire to the positive terminal of the new battery pack and the black wire to the negative terminal. Slide the battery back into the bracket and lower the entire panel back into the case. Replace screws and rubber feet. Charge battery.

LIMITED WARRANTY:

The EC-5000 Eddy Current instrument is warranted for a period of 90 days from the time of purchase against defective materials and workmanship. If warranty repair of the instrument becomes necessary, unit should be returned prepaid to Parker Research. If repair is to be made by the user, refer to parts list and schematic diagram located herein.

The obligation of Parker Research is limited to repair or replacement of the defective unit at their discretion. Damage due to misuse will not be covered by the limited warranty. NOTE: The Sense probe, cable and battery are not included under this warranty.

LIABILITY:

Parker Research Corporation will in no way be liable for the use of this equipment or for any claim arising from the use of this equipment.

As with all inspection mediums, training of operating personnel and adherence to the requirements of applicable specifications and procedures are necessary for the proper and effective use of this instrument, and is the obligation of the user.

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FIG. 1

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FIG. 2

**PARKER RESEARCH CORPORATION
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**EC-5000
INSTRUMENT**

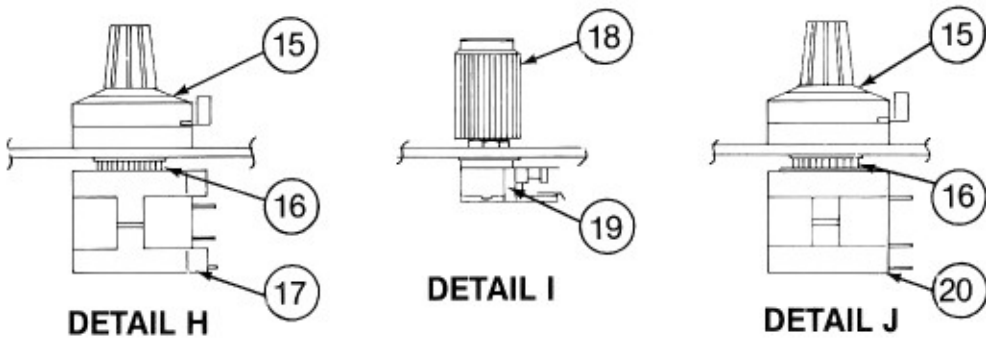
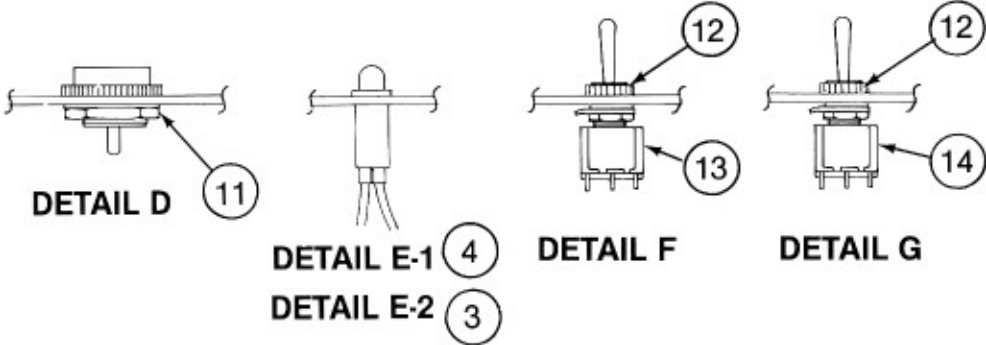
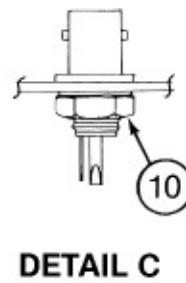
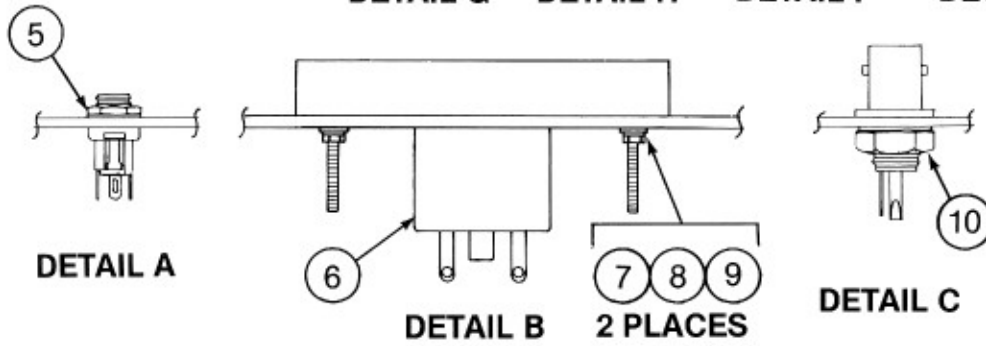
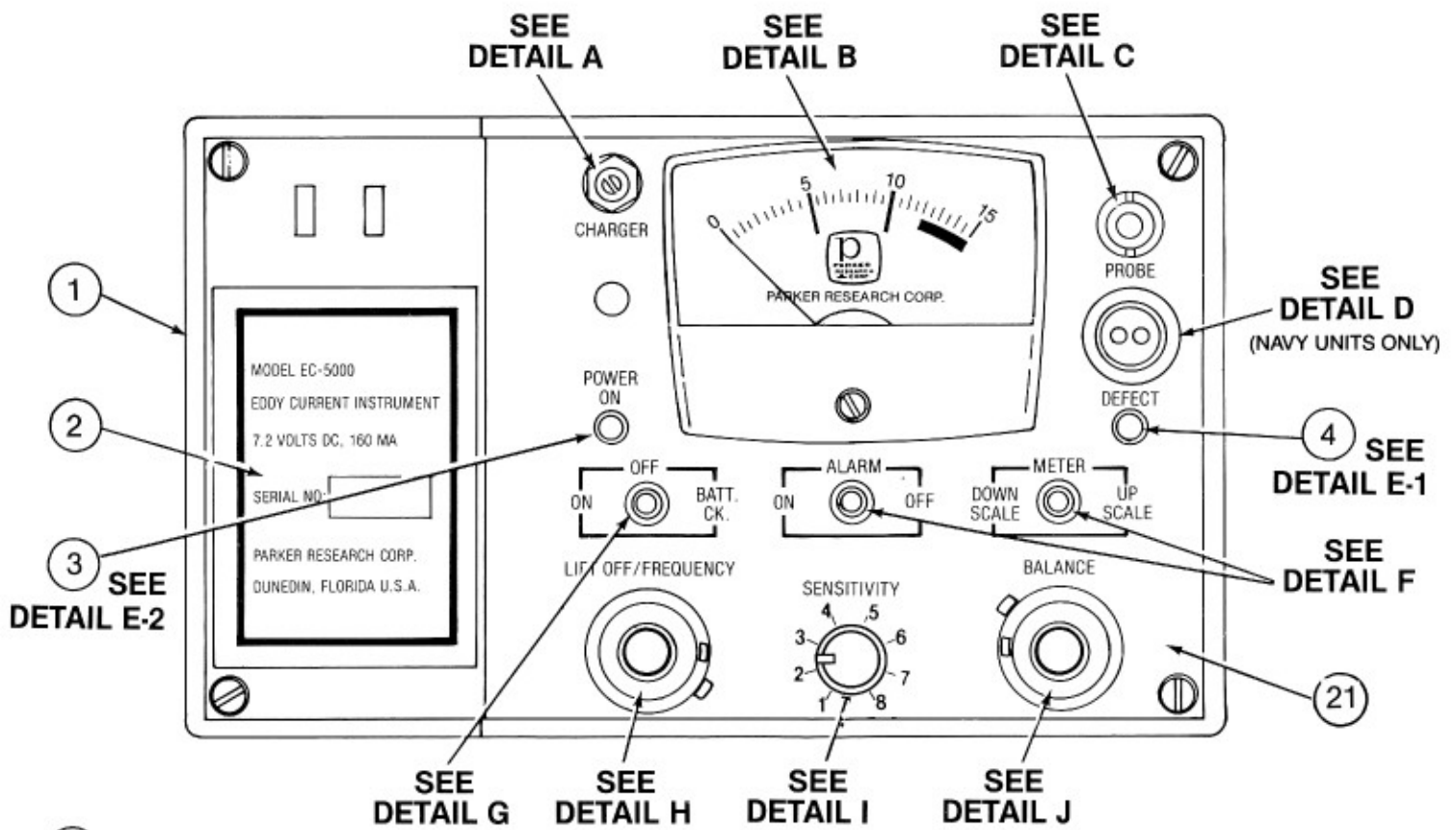


**PROBE
AND
CABLE**

Fig. 3



**BATTERY
CHARGER**

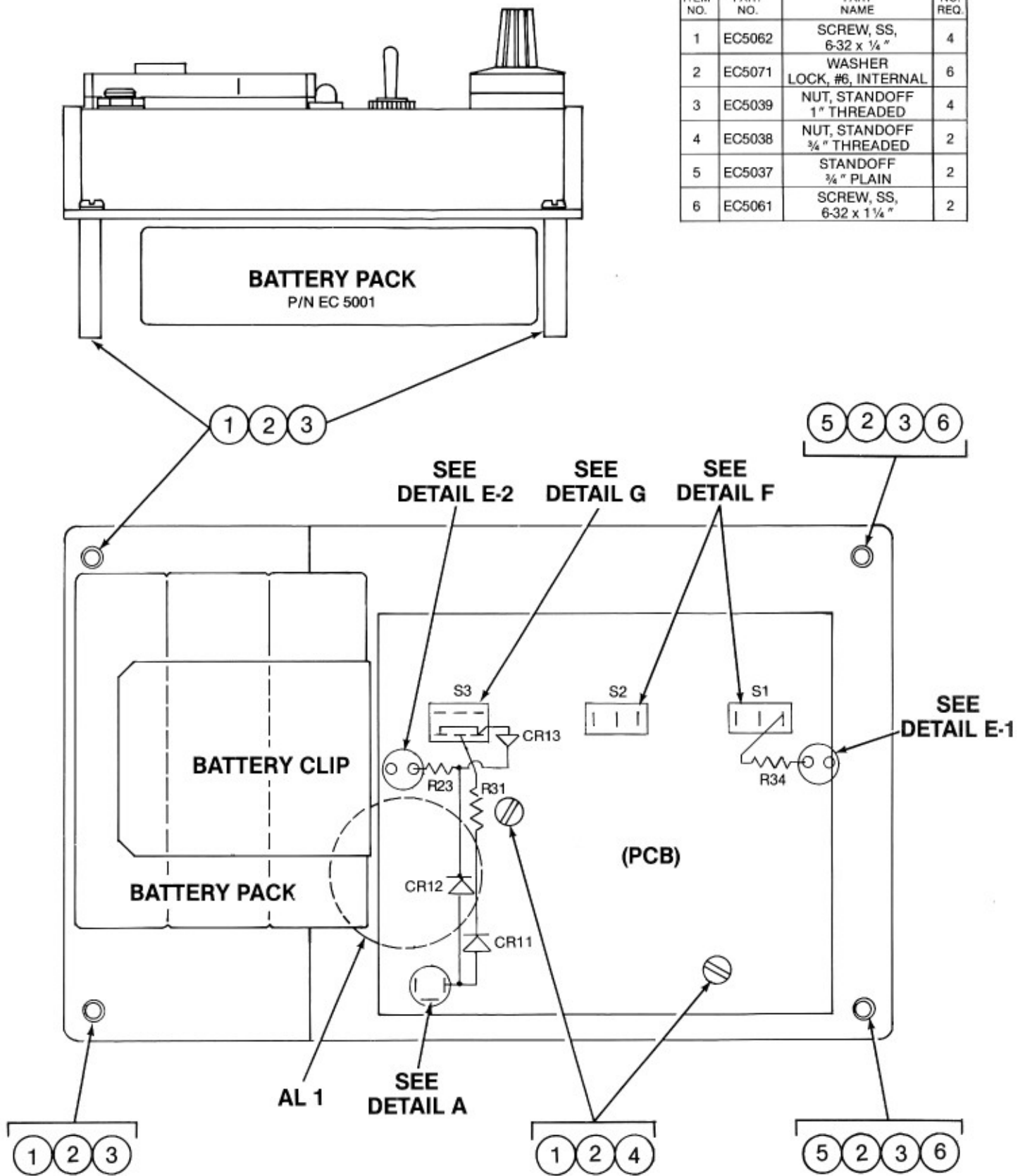


ITEM NO.	PART NO.	PART NAME	NO. REQ.
1	EC5025	GASKET, PANEL	1
2	EC5018	DECAL, NAMEPLATE, SERIAL	1
3	EC5034	LED, GREEN	1
4	EC5033	LED, RED	1
5	EC5015	CONNECTOR, BAT. CHR.G. W/HDW	1
6	EC5035	METER, 0-1.0 MA	1
7	EC5072	WASHER, #4 FLAT	2
8		WASHER, SPLIT LOCK, SUPPLIED W/METER	2
9		NUT, SUPPLIED W/METER	2
10	EC5016	CONNECTOR, BNC, CABLE, W/HDW	1
11	EC5017	CONNECTOR, AMPHENOL, CABLE, W/HDW	1
12	EC5036	NUT, SWITCH	3
13	EC5066	SWITCH, SPDT, WITH HARDWARE	2
14	EC5065	SWITCH, DPDT, NO-OF-MOM, W/HDW	1
15	EC5021	DIAL, 10 TURN	2
16	EC5073	SPACER (NUT IS USED)	2
17	EC5043	POT, 10 TURN 5K, WITH HARDWARE	1
18	EC5032	KNOB, CONTROL SENSITIVITY W/ BUSHING	1
19	EC5045	POT, 1-TURN 250K, WITH HARDWARE	1
20	EC5042	POT, 10-TURN 200OHM WITH HARDWARE	1
21	EC5040	PANEL, CONTROL	1

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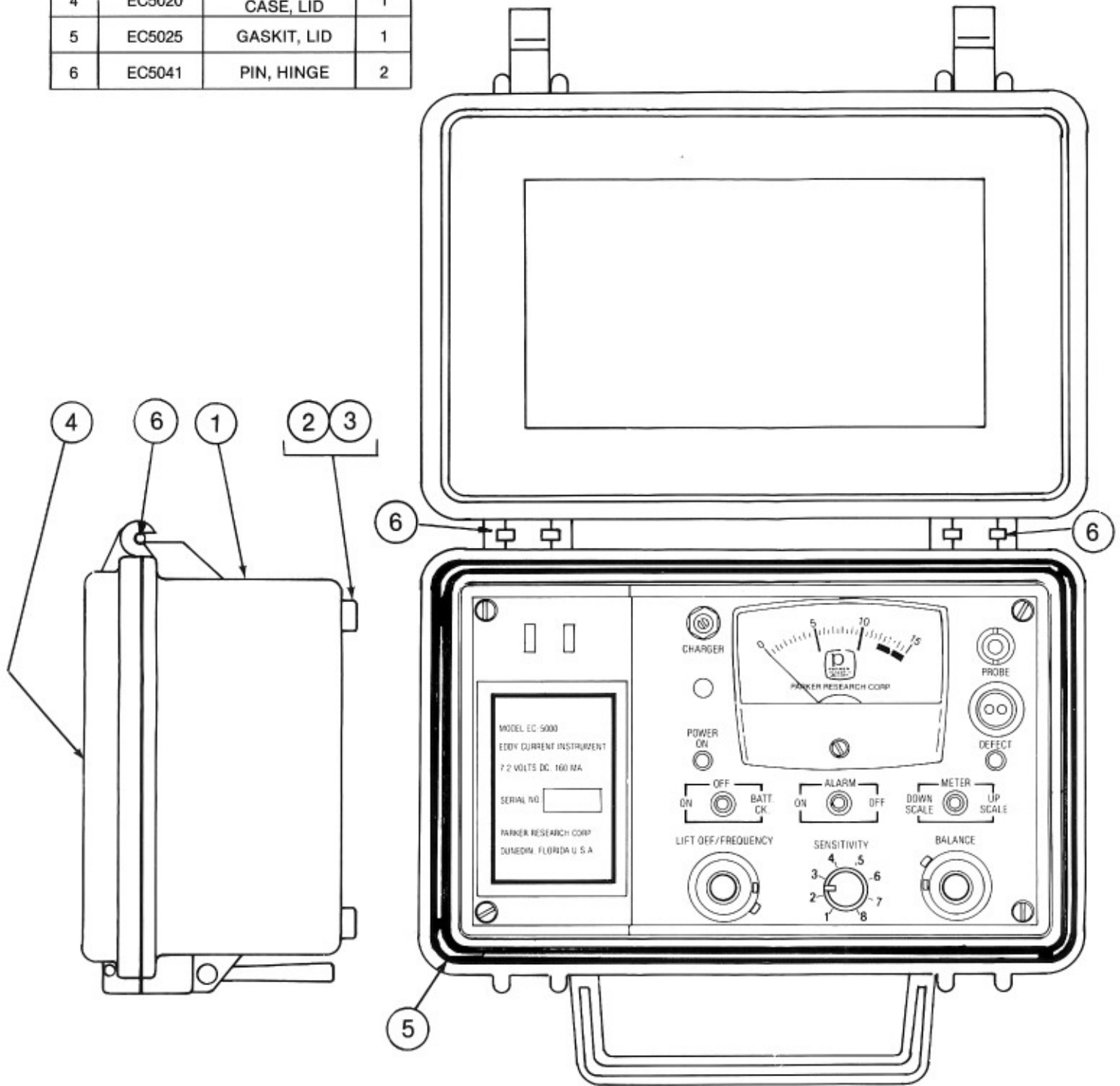
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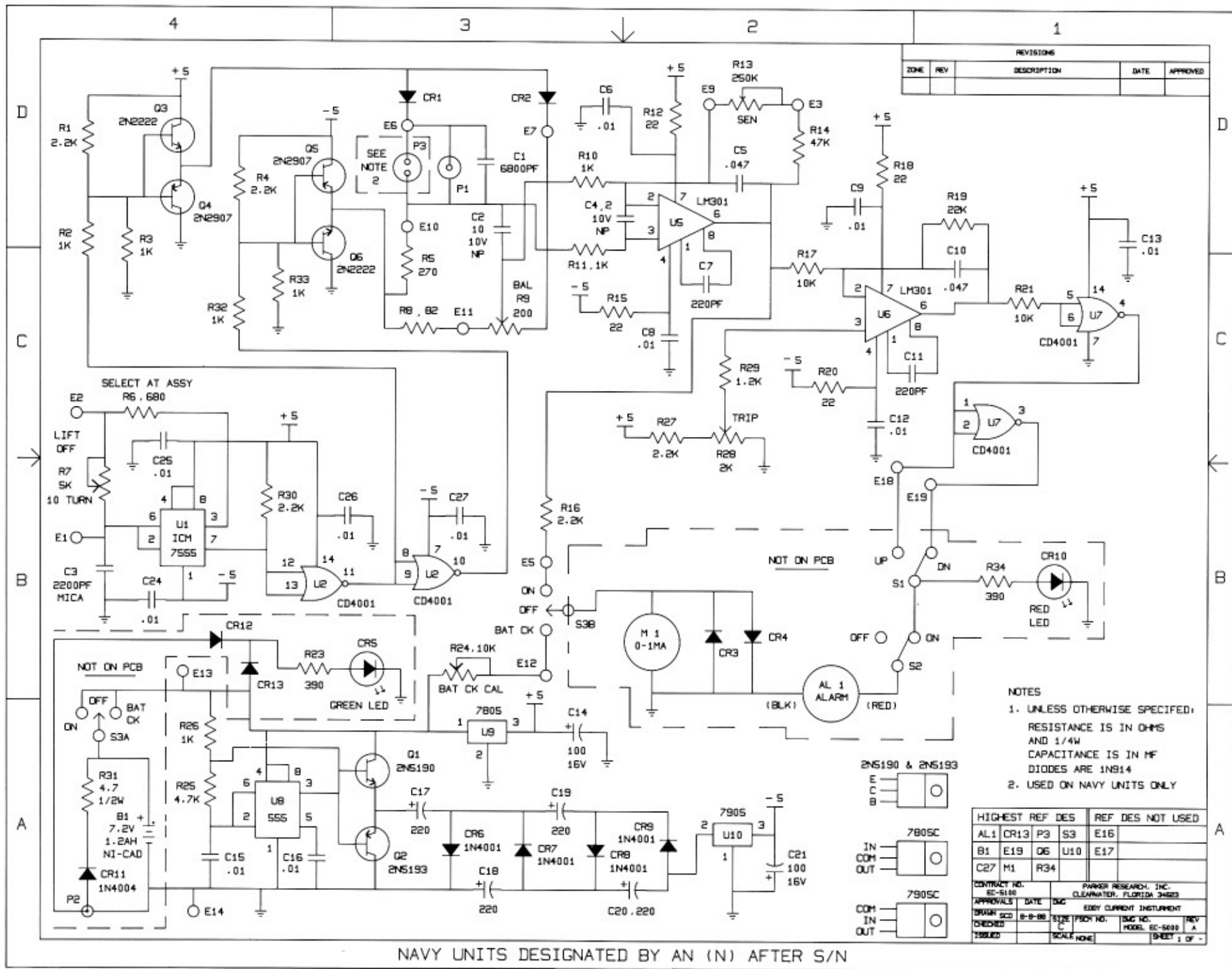
ITEM NO.	PART NO.	PART NAME	NO. REQ.
1	EC5062	SCREW, SS, 6-32 x 1/4"	4
2	EC5071	WASHER LOCK, #6, INTERNAL	6
3	EC5039	NUT, STANDOFF 1" THREADED	4
4	EC5038	NUT, STANDOFF 3/4" THREADED	2
5	EC5037	STANDOFF 3/4" PLAIN	2
6	EC5061	SCREW, SS, 6-32 x 1/4"	2



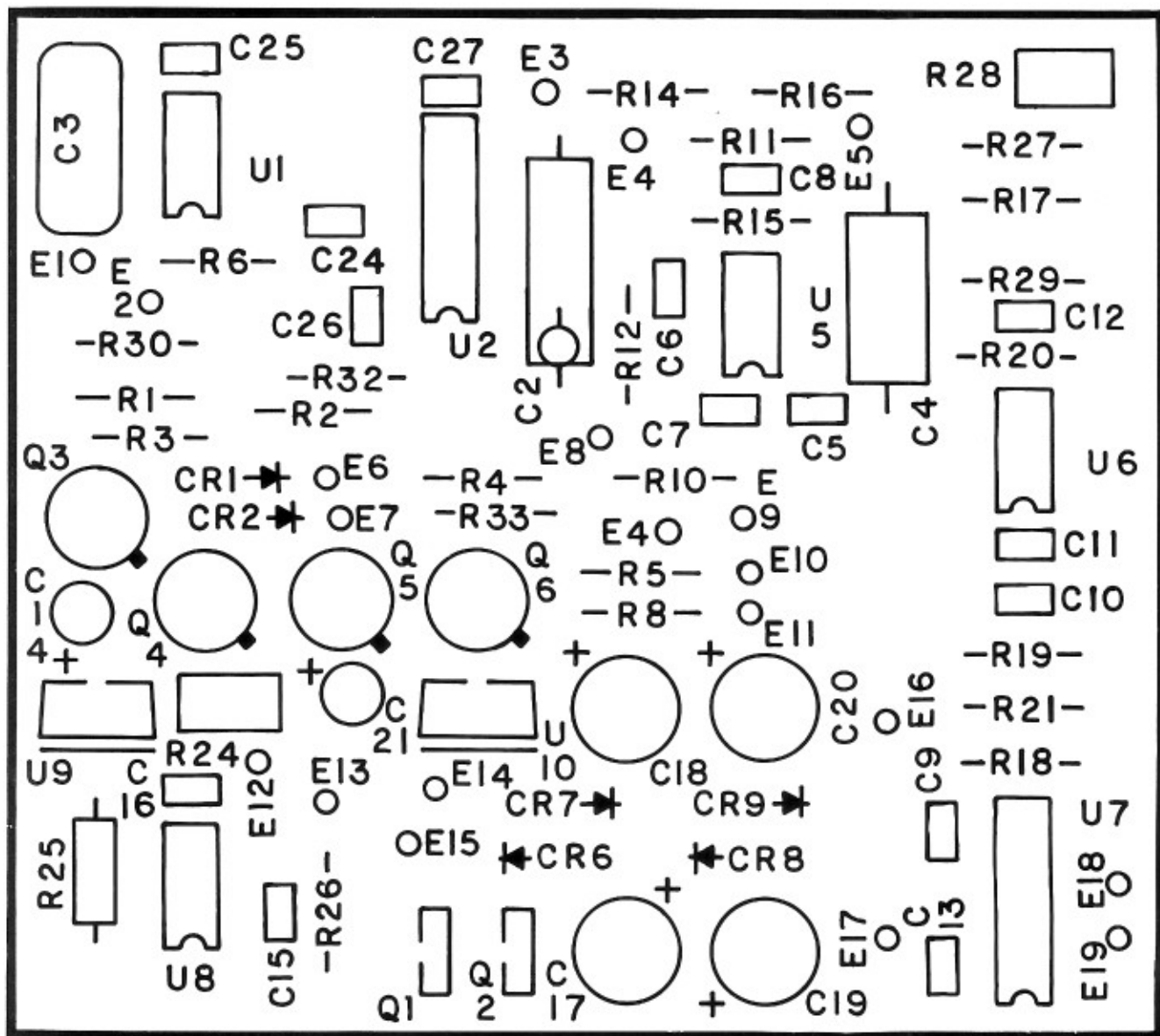
ITEM NO.	PART NO.	PART NAME	NO. REQ.
1	EC5013	CASE WITH LID & HANDLE	1
2	EC5024	RUBBER FOOT	4
3	EC5060	SCREW, SS, 6-32 x 1/2"	4
4	EC5020	DECAL CASE, LID	1
5	EC5025	GASKIT, LID	1
6	EC5041	PIN, HINGE	2

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PRINTED CIRCUITBOARD



P/N EC 5014

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— PARTS LIST —

REFERENCE DESIGNATION	PART NUMBERS	DESCRIPTION	MFG. CODE	UNITS FOR ASSEMBLY
B1	EC5001	BATTERY PACK, 7.2V, 1.2AH BATTERY FABRICATORS INC., ATLANTA, GA		1
AL1	EC5002	BUZZER, PIEZO, 5MA		1
C6, 8, 9, 12, 13, 16, 24, 25, 26 & 27	CZ15C103Z97	CAP., CERAMIC, .01MF, 10%	/56289	10
C5 & C10	CZ20C473Z97	CAP., CERAMIC, .047MF	/56289	2
C14 & C21	VTL110S10	CAP., ELECTROLYTIC, 100MF, 10V	/90201	2
C2	EC5006	CAP., 10MF, NON-POLARIZED		1
C4	EC5007	CAP., 2.2MF, NON-POLARIZED		1
C3	CD19-FD222J03	CAP., MICA, 2200PF	/90201	1
C17, 18, 19 & 20	VTL220S16	CAP., ELECTROLYTIC, 220MF, 25V	/90201	4
C7 & C11	SR211A221JAA	CAP., CERAMIC, 220PF	/56289	2
C15	CK05BX103K	CAP., CERAMIC, .01MF, 5%	/90201	1
C1	CK05BX682K	CAP., MICA, 6800PF	/90201	1
PAGE 10, REF. 1	EC5013	CASE, W/LID AND HANDLE		1
A1	EC5014	CIRCUITBOARD, PRINTED		1
P2	712A	CONNECTOR, BAT. CHRG.	/82389	1
P1	31-10	CONNECTOR, CABLE, BNC	/13511	1
P3	80PC2F	CONNECTOR, CABLE, AMPHENOL	/13511	1
PAGE 8, REF. 2	EC5018	DECAL, NAMEPLATE, SERIAL		1
PAGE 10, REF. 4	EC5020	DECAL, CASE LID		1
VD1 & VD2	MG22	DIAL, 10-TURN	/15636	2
CR6, 7, 8, 9, 11, 12 & 13	1N4004	DIODE, 1N4004	/04713	7
CR1, 2, 3 & 4	1N914	DIODE, 1N914	/04713	4
PAGE 10, REF. 2 & 3	EC5024	FEET, RUBBER, 1/2"		4
PAGE 10, REF. 5	EC5025	GASKET, PANEL		1
U2 & U7	CD4001BCN	IC, CD4001BCN	/04713	2
U9	MC7805CT	IC, MC7805CT	/04713	1
U8	NE555P	IC, NE555P	/01295	1
U5 & U6	LM301AN	IC, LM301AN	/04713	2
U1	ICM7555IPA	IC, ICM7555IPA	/27014	1
U10	MC7905CT	IC, MC7905CT	/04713	1
PAGE 8, REF. 18	KN-500A-1/8	KNOB, CONTROL, SENSITIVITY	/91506	1
CR10	5100H-R	LED, RED	/74276	1
CR5	5100H-G	LED, GREEN	/74276	1
M1	EC5035	METER, 0-1.0 MA		1
PAGE 8, REF. 12	EC5036	NUT, SWITCH		3
PAGE 9, REF. 5	EC5037	NUT, STANDOFF, 3/4", PLAIN		2
PAGE 9, REF. 4	EC5038	NUT, STANDOFF, 3/4", THREADED		2
PAGE 9, REF. 3	EC5039	NUT, STANDOFF, 1", THREADED		4
PAGE 8, REF. 21	EC5040	PANEL, CONTROL		1
PAGE 10, REF. 6	EC5041	PIN, HINGE, CASE		2
R9	MW22-10-200	POT, 10-TURN, 200 OHM	/15636	1
R7	3590S-1-502	POT, 10-TURN, 5K	/32997	1
R24	364W-10K	POT, 1-TURN, 10K	/12697	1
R13	B12-254SL	POT, 1-TURN, 250K	/71590	1
R28	364W-2K	POT, TRIM, 2K	/12697	1
R29	RC07GF122J	RESISTOR, 1.2K, 1/4W, 5%		1
R2, 3, 10, 11, 26, 32 & 33	RC07GF102J	RESISTOR, 1K, 1/4W, 5%		7
R1, 4, 16, 27 & 30	RC07GF222J	RESISTOR, 2.2K, 1/4W, 5%		5
R31	RC20GF4R7K	RESISTOR, 4.7 OHM, 1/2W, 10%		1
R12, 15, 18 & 20	RC07GF220J	RESISTOR, 22 OHM, 1/4W, 5%		4
R19	RC07GF223J	RESISTOR, 22K, 1/4W, 5%		1
R5	RC07GF271J	RESISTOR, 270 OHM, 1/4W, 5%		1
R23 & 34	RC07GF391J	RESISTOR, 390 OHM, 1/4W, 5%		2
R25	RC07GF472J	RESISTOR, 4.7K, 1/4W, 5%		1
R17 & 21	RC07GF103J	RESISTOR, 10K, 1/4W, 5%		2
R14	RC07GF473J	RESISTOR, 47K, 1/4W, 5%		1
R6	RC07GF681J	RESISTOR, 680 OHM, 1/4W, 5%		1
R8	RC07GF820J	RESISTOR, 82 OHM, 1/4W, 5%		1
PAGE 10, REF. 3	EC5060	SCREW, SS, SLPH, 6-32x1/2		4
PAGE 9, REF. 6	EC5061	SCREW, SS, SLPH, 6-32x1-1/4		2
PAGE 9, REF. 1	EC5062	SCREW, SS, SLPH, 6-32x1/4		4
	ICU-143-S6-TG	SOCKET, IC, 14-PIN	/27264	2
	ICU-083-S6-TG	SOCKET, IC, 8-PIN	/27264	4
SW3	8012B	SWITCH, DPDT, ON-OFF-MOM	/09353	1
S2 & S1	8013	SWITCH, SPDT	/09353	2
Q2	2N5193	TRANSISTOR, 2N5193	/04713	1
Q1	2N5190	TRANSISTOR, 2N5190	/04713	1
Q3 & Q6	2N2222	TRANSISTOR, 2N2222	/04713	2
Q4 & Q5	2N2907	TRANSISTOR, 2N2907	/04713	2
PAGE 9, REF. 2	EC5071	WASHER, LOCK #6, INTERNAL		6

REFERENCE DESIGNATION	PART NUMBERS	SUB ASSEMBLIES DESCRIPTION	
PAGE 11	EC5100	SCHEMATIC	1
	EC5014SA	CIRCUITBOARD, COMPLETE ALL COMPONENTS	1
PAGE 7 PHOTO	5655	BATTERY CHARGER, 300MA EDS, INC., DANVILLE, VA	1
PAGE 7 PHOTO	PRC2500F-4	PROBE, SENSE, 200KHZ.	/60761
PAGE 7 PHOTO	VM99BM	CABLE, PROBE, 6'	/60761