# ENDEVCO

# 2718A

## INSTRUCTION MANUAL

INSTRUCTION MANUAL

FOR MODEL 2718A

SHOCK AMPLIFIER

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# INSTRUCTION MANUAL
# MODEL 2718A SHOCK AMPLIFIER

## 1.0 INTRODUCTION

### 1.1 General Description

The Model 2718A Shock Amplifier is a charge amplifier designed specifically to meet the signal conditioning requirements of shock measurement. The wide frequency range and dynamic range of the amplifier permits accurate measurement of wide variety of shock pulses — from rapid rise times to long durations. It is also suitable for measuring random and sinusoidal vibration.

The Model 2718A Shock Amplifier Module contains a regulated power supply, charge converter, capacitance coupled voltage amplifier, filters, calibration oscillator, and a power amplifier.

Charge amplifiers sense charge at the input and produce a voltage output directly proportional to the input charge. This permits the use of long cable without attenuation effects. Signal cables may be changed without requiring system recalibration. Low frequency response is independent of transducer and cable capacitance.

The Model 2718A's modular design allows it, and its associated accessories, to be mounted in a number of configurations. The Model 2718A can be housed in a portable carrying case (Model 2991A or 2992A), or in a 19" rack (Model 4992A) with one, two or three amplifiers per rack.

A Peak Holding Meter, Model 2954A, is available for use with the Model 2718A to indicate the maximum amplitude of a pulse or a series of pulses from any piezoelectric transducer. It permits the operator to visually determine the pulse amplitude. The Model 2954A can be mounted in a portable configuration or in a rack with the Model 2718A.

### 1.2 Input Devices

The input of the amplifier is restricted to the use of capacitive devices. The maximum allowable source (shunt) capacitance, to meet all specifications, is 10,000 pF on the first two ranges and 100,000 pF on the higher ranges. The input resistance should exceed 50 megohms for all L.F. Switch positions.

### 1.3 Output Devices

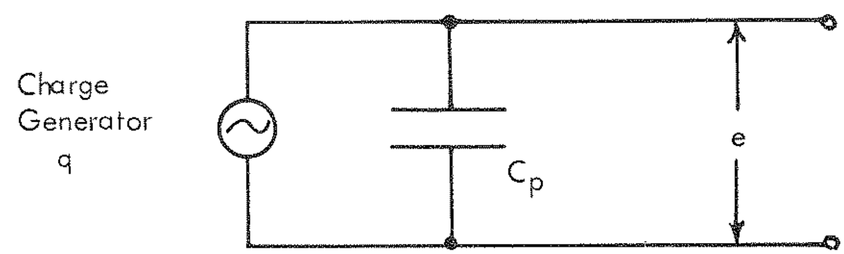
1.3.1 Signal Output - The Signal Output may be connected to any resistive load providing that the Maximum Linear Output Current is not exceeded. The maximum Signal Output current is ±1.0 mA pk.

1.3.2 Power Amplifier - The Galvanometer Output may be connected to any resistive load of 30 ohms or greater, such as galvanometers. (These include high frequency galvanometers having a maximum safe current of 100 mA).

## 2.0 THEORY

### 2.1 Charge Generators

The simplified equivalent circuit of a piezoelectric or capacitive transducer is shown in Figure 1. In an accelerometer, the charge generated is directly proportional to acceleration, and for a given acceleration the peak charge remains constant regardless of the amount of external capacitance added to the transducer. The open circuit voltage (e) is equal to the charge (q) divided by the transducer capacitance ($C_p$), or $e = q/C_p$.




Equivalent Circuit

FIGURE 1.

All new ENDEVCO® Accelerometers have the charge sensitivity provided on the calibration card, expressed in peak picocoulombs per peak g.

For other transducers the charge sensitivity may be calculated from the following formula:

$$Q = \frac{E_{cal}\,(C_p + C_{cal})}{1000}$$

Where:

| | | |
|---|---|---|
| $Q$ | = | charge sensitivity in pk pC/pk g (= pC/g) |
| $E_{cal}$ | = | factory supplied voltage sensitivity expressed in pk mV/pk g (= mV/g) |
| $C_p$ | = | internal capacitance of transducer in picofarads |
| $C_{cal}$ | = | external cable and amplifier capacitance in picofarads when calibrated |

## 2.1 Charge Generators (continued)

The values of $E_{cal}$, $C_p$, and $C_{cal}$ are usually given on the calibration card. Since the charge sensitivity is not affected by additional capacitance, such as long cables and amplifier input capacitance, no additional sensitivity calculations are required.

For example, the nominal voltage sensitivity ($E_{cal}$) of the ENDEVCO® Model 2252 Accelerometer is 5 pk mV/pk g, nominal capacitance ($C_p$) is 100 pF, and the external capacitance when calibrated ($C_{cal}$) is 300 pF. Thus, the nominal charge sensitivity:

$$Q = \frac{5\,(100 + 300)}{1000} = 2 \text{ pk pC/pk g}$$

## 2.2 Charge Conversion

The Model 2718 accepts the instantaneous charge from the transducer and converts it to a voltage directly proportional to the input charge. Although the gain of the amplifier may be expressed as millivolts output per picocoulombs input, this need not be considered in actual applications. The Model 2718 provides a sensitivity dial with which a known output voltage is obtained for transducer charge sensitivities of .1 to 10 pC/g and full scale g levels as indicated.

## 2.3 Frequency Response for Shock Measurement

Transient measurements should be made with instruments which have a flat frequency response over a wide range. Not only must the transducer response be considered, but the amplifier and all associated readout devices must be capable of passing, without distortion, all the frequency components contained in the transient. When the low cutoff frequency of an amplifier (response down 3 db or 30%) is known, then the maximum pulse width which the amplifier will pass with known accuracy may be calculated as follows:

| | $T_m$ Maximum Pulse Width | |
|---|---|---|
| | 2% Accuracy | 5% Accuracy |
| Half sine or sawtooth pulse | $\frac{.01}{f_c}$ | $\frac{.02}{f_c}$ |
| Square wave pulse | $\frac{.003}{f_c}$ | $\frac{.008}{f_c}$ |

Where: $f_c$ = low cutoff frequency

$T_m$ = maximum pulse width in seconds

2.3 Frequency Response for Shock Measurement (continued)

For example:

The Model 2718A provides three cutoff frequencies of 0.03, 0.3 and 0.7 Hz. The maximum half sine pulse width which may be measured with 5% accuracy, and at a low cutoff frequency of 0.03 Hz is

$$T_m = \frac{.02}{f_c} = \frac{.02}{.03} = 660 \text{ msec}$$

The above calculations apply to the Model 2718A or any other amplifier which has a first order rolloff.

## 3.0 EXTERNAL CONTROLS AND CONNECTORS

### 3.1 Front Panel

3.1.1 Power Switch and Light - The Power Switch is a single pole, push button switch which applies AC power to the amplifier. The pilot light, to the right of the switch, indicates when the amplifier is energized.

2.1.2 Low Frequency Cutoff - The Low Frequency Cutoff Switch, S1, is a three-position rotary switch which changes the low frequency cutoff (down 3 db at 0.03, 0.3, or 0.7 Hz).

3.1.3 High Frequency Cutoff - The High Frequency Cutoff switch is a four-position rotary switch which allows the selection of one of the three internal low pass filters.

3.1.4 Calibration - The Calibration Switch, S4, is a two-position toggle switch which is used to switch, in or out, the internal calibration signal.

3.1.5 Full Scale - The Full Scale Selector, S3, is a six-position rotary switch which selects the Full Scale g, or psi, or pound ranges. The two sets of ranges, red and black, are directly related to the two ranges of charge sensitivities, red and black, on the Sensitivity Dial below. The numerals of one color only should be used in any measurement. For example, if the transducer sensitivity is in the range of .1 to 1 pC/g (red), the full scale ranges which apply are shown in red.

3.1.6 Zero - The Zero Adjust is a screwdriver adjusted, multiturn potentiometer used to balance the output amplifier.

3.1.7 Galvanometer Adjust - The Galvanometer Adjust is a single-turn potentiometer which adjusts the gain of the Power Amplifier.

3.1.8 pC/g Sensitivity Dial - The Sensitivity Control, R59, is a ten-turn potentiometer which calibrates the Model 2718A Amplifier for specific transducer charge sensitivities expressed in picocoulombs per g or psi or pound. The number on the outer dial, in the window, represents the first significant digit; the second and third significant digits are indicated on the inner dial under the vertical line. The black and red ranges above the dial are directly related to the black and red numerals above the Full Scale Switch and only numerals of one color should be used in any measurement. A lock is also provided so that the pot may be held in any desired position. CAUTION: The counter-clockwise stop position of the dial is at 1.00. Do not attempt to turn the pot below 1.00.

3.1.9 Reset - A Reset Button, S5, is provided to reset the output signal to its steady state DC level, and enables the 2718A to be clear and ready for any incoming signals. Resetting of the output DC voltage may be necessary after changing full scale ranges, or large transients have been applied to the input of the amplifier.

## 3.2 Rear Panel

3.2.1 Input Connector - The Input Connector, J1, is a coaxial connector, Microdot S-50 Series or equivalent, with the shell insulated from the chassis, but connected to circuit and chassis ground.

3.2.2 Galvanometer Output - The Galvanometer Output Connector, J2, is a three-terminal connector. It mates with a Cannon XLR-3-11C connector. Pin 1 is the signal output, Pin 2 is the circuit ground, and Pin 3 is the chassis ground.

3.2.3 Signal Output - The Signal Output Connector, J3, is a coaxial connector with its shell insulated from the chassis, but connected to circuit and chassis ground. It mates with a Type BNC, UG-1094/U or equivalent.

3.2.4 External Filter Jack - The External Filter Jack is a microphone type jack, Switchcraft No. 13B, which allows an external filter to be substituted for the internal low pass filters. The High Frequency Cutoff switch must be in the out position. The mating plug, Switchcraft No. 267, is not supplied.

3.2.5 Fuse - A fuse, Littelfuse No. 313.750 or equivalent, 125 V, 3/4A, Slo-Blo, is connected in series with one side of the power line. For 230 V operation a Fusetron MDL or equivalent 3/8 A, is connected in series with one side of the power line.

3.2.6 Power Cord Receptacle - Connector, J6, Hubbel No. 7486, 3 pin "Twist-Lok" or equivalent, mates with Model 2910-4 Power Cord Assembly, a 5-1/2 foot, three-wire cable with standard three-prong plug. For 230 V operation, the male plug on the Power Cord Assembly is removed and the wires at the end of the cable are stripped and tinned.

3.2.7 Binding Post - The G.R. Binding Post is suitable for connection of a Banana Plug, Spade Lug or Wire. The binding post is connected to the electrostatic shield of the power transformer to reduce line transient effects.

3.2.8 Peak Meter Receptacle - This receptacle is a Cannon WK-5-32S connector which provides signal and power for the Model 2954A Peak Holding Meter. Use the Model 15438 Cable Assembly to interconnect the Models 2718A and 2954A.

## 4.0 INITIAL SETUP AND CHECKOUT

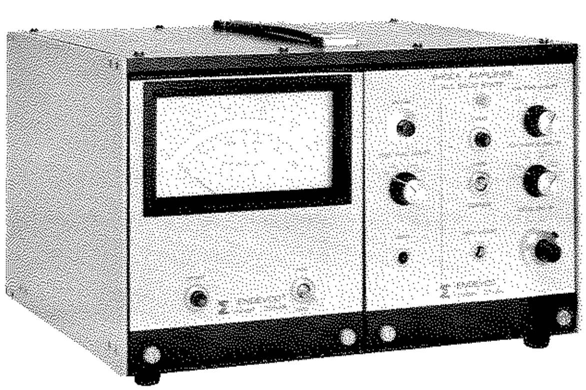
### 4.1 Unpacking and Inspection

This equipment has been thoroughly inspected and tested at the factory and should be ready for operation when received. However, the customer should make an inspection to be certain that no damage has occurred during shipment.

Carefully remove the instrument from its packing box. Inspect case and front panel for any indication of damage during shipping and handling.

### 4.2 Mounting Procedure

The Model 2718A and its associated accessories can be mounted in a rack or the 2718A can be mounted in a portable carrying case with mechanical ease. The view in Figure 2 shows the portable configuration, and in Figure 3, the rack mount configuration.



2992A

2991A

FIGURE 2.

Model 2718A in Model 2991A and 2992A Portable Carrying Cases

4.2 Mounting Procedure (continued)

The Model 2718A and Model 2954A Modules can be easily mounted in either the Model 4992A Rack, or the Model 2991A or 2992A Carrying Case, by tightening the two captive thumb screws on the front panel of the 2718A or 2954A, and inserting the two Phillips screws through the rear skirt of the 4992A, 2991A or 2992A.

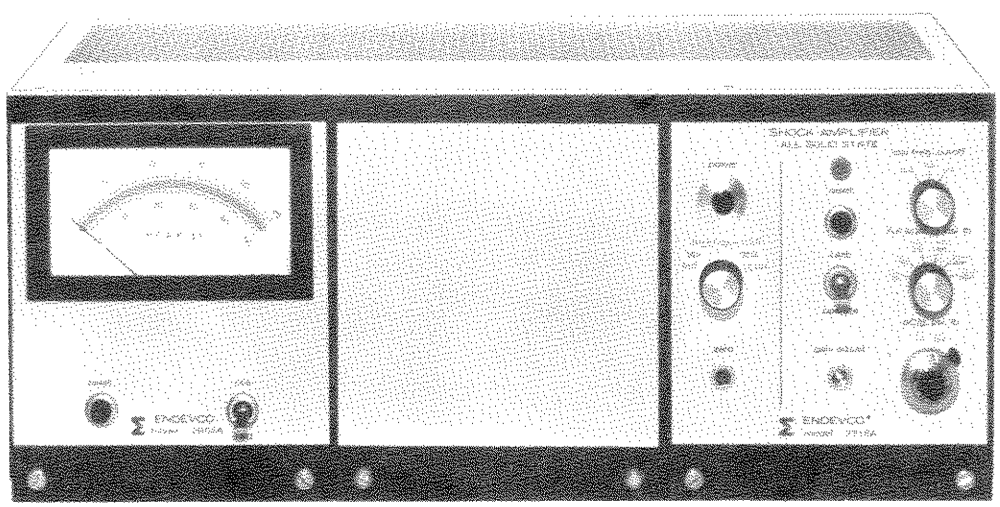


FIGURE 3.

Model 2718A Amplifier Module, Model 2954A Peak Holding Meter and Model 14718 Blank Panel in Model 4992A Rack

4.3 Initial Checkout

Before the instrument is put into operation, an initial checkout should be made to ensure that everything is operating satisfactorily. The following procedure should be followd:

4.3 Initial Checkout (continued)

| | |
|---|---|
| Equipment Needed: | Oscillator, H.P. 200CD or equivalent<br>Attenuator, 1 kΩ multi-turn potentiometer<br>Capacitor, in a shield, 1000 pF ±1%<br>Oscilloscope, Tektronix 531A or equivalent<br>AC VTVM, H.P. 400D or equivalent |

4.3.1 Initial Connections and Control Settings - Connect amplifier and associated equipment as shown in Figure 4.

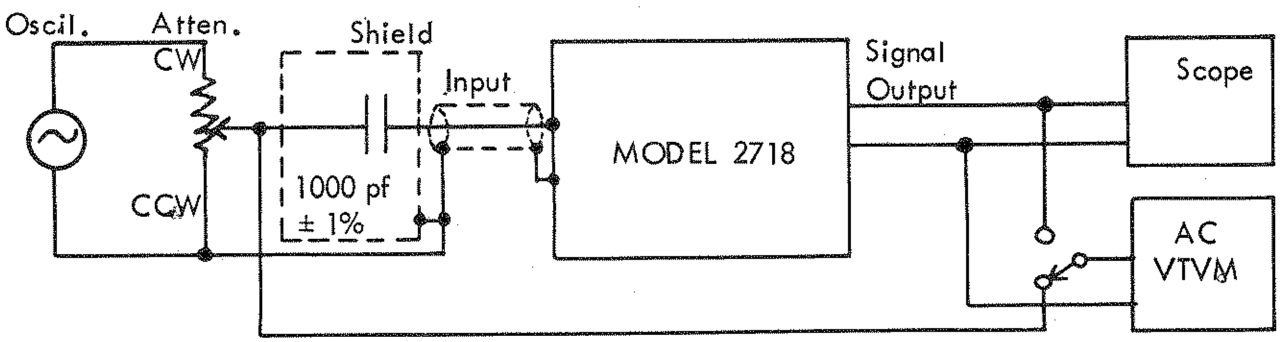



FIGURE 4.

Control Setting:

Set front panel controls as follows:

| | |
|---|---|
| L. F. Cutoff | 0.7 Hz |
| H. F. Filter | Out |
| Calib.-Operate | Operate |
| Full Scale g | 25 (Black) |
| pC/g | 1.0 (Black) |

Turn on power by pushing power switch. Pilot light should go on indicating that the instrument is on. Allow thirty minutes warmup before starting checkout.

4.3.2 Zero Check

The DC voltages at the output of the charge converter and voltage amplifier sections are not critical. These circuits are capacitance coupled and the DC voltages may vary over a relatively wide range without affecting the usefulness or accuracy of the charge amplifier. If clipping is observed, then zero adjustment is necessary. Zero adjustment procedures are given in Section 7.3.

4.3.3 Full Scale Range Check

4.3.3.1 Apply a 1000 Hz, 17.7 mV rms (25 mV pk) sinusoidal signal to the amplifier through the 1000 pF capacitor. Note the output on the scope and VTVM. The wave shape should be undistorted and the output voltage should be 3.53 V rms (5.0 V pk) ±1.5%.

CAUTION: VTVM should be accurate to within ±0.5%.

4.3.3.2 Switch the full scale g control to 50 g (black) and increase the input signal to 35.3 mV (50 mV peak). Again the output should be undistorted and 3.53 V rms (5.0 V pk) ±1.5%.

4.3.3.3 Repeat procedure for each of the ranges changing the input signal appropriately. Output voltages should always be 3.53 V rms (5.0 V pk) ±1.5%.

NOTE: The input peak millivolt signal required to achieve full scale output is equal to the product of the pC/g dial reading and the full scale g range, using numerals of one color.

4.3.4 pC/g Dial Check - With the full scale g control set to 250 g (black) adjust the input voltage until the output is 3.50 V rms. Turn the pC/g dial from 1.0 to 10.00 and change the full scale g control to 25 g (black). The output voltage should be 3.50 V rms ±1.5%.

4.3.5 Residual Noise - Again set all controls as specified in Section 4.3.1. Reduce input signal to zero by turning down the oscillator and running the attenuator to its counterclockwise end. On the meter, observe the residual noise. The signal should be less than 5 rms mV.

4.3.6 Calibration Check - Set controls as specified in Section 4.3.1. Set "Calib-Operate" Switch to Calib. Note the output on a calibrated scope. The output should be sine wave with a peak-to-peak amplitude of 5.0 V ±2%. Switch the Full Scale g control through its six positions. The calibration output should remain 5.0 V pk/pk ±2%.

4.3.7 Power Amplifier and Galvanometer Adjust Check

4.3.7.1 Change the scope and VTVM from the Signal Output to the Galvanometer Output connector.

4.3.7.2 Set front panel controls as specified in Section 4.3.1. Apply a 1000 Hz, 17.7 mV rms (25 mV pk) signal to the input through the 1000 pF capacitor. Note the output on the scope and VTVM. Vary the "Galv Adjust" control from its fully clockwise position to its fully counterclockwise position. The output voltage should vary from greater than 3.53 V rms (5 V pk) to less than 353 mV rms (500 mV pk).

4.3.7.3 Load galvanometer output with 50.0 Ω resistance. Increase "Galv Adjust" from its counterclockwise position, observing the output wave shape on the scope. The output should be undistorted to at least 3.0 V rms (4.25 V pk) and should limit at 10.0 V pk/pk or less.

# 5.0 OPERATING INSTRUCTIONS

## 5.1 Power

The Model 2718A should be operated from line source of 105 to 125 VAC, 50, 60, or 400 Hz. The line cord includes a third wire connecting the chassis to power ground.

## 5.2 Sensitivity

The nominal sensitivity of the amplifier is such that with the Full Scale Control at 25 (black) and the Sensitivity Control Dial at 1.00 (CCW), a 25 pk pC input signal will give full scale output. Full scale output is defined as 5 V pk at the Signal Output, with no load.

NOTE: There is a 180° phase shift (signal inversion) between input and output signals at the Signal Output connector.

The amplifier has a precision attenuator (Full Scale Control) which provides two sets of six full scale ranges. Full scale output is obtained for various transducer sensitivities and full scale input levels as follows:

5.2 Sensitivity (continued)

Full Scale Input to Obtain Full Scale Output

| Scale Color | Red | Black | | |
|---|---|---|---|---|
| Transducer Sensitivity | 0.1 to 1.0 pC/g | 1.0 to 10 pC/g | 10 to 100 pC/g | 100 to 1000 pC/g |
| Full Scale Input | 250 g<br>500 g<br>2500 g<br>5000 g<br>25,000 g<br>50,000 g | 25 g<br>50 g<br>250 g<br>500 g<br>2500 g<br>5000 g | 2.5 g<br>5.0 g<br>25 g<br>50 g<br>250 g<br>500 g | .25 g<br>.50 g<br>2.5 g<br>5.0 g<br>25 g<br>50 g |

The input signal, in peak picocoulombs required to achieve full scale output, 5 V pk at the Signal Output Connector, is equal to the product of the decade dial setting and the Full Scale Range, using only the numerals of one color.

The maximum charge gain of the amplifier is obtained when the Sensitivity Dial is turned to its counterclockwise stop position, at 1.00. Minimum gain is obtained in clockwise stop position.

5.3 Internal Calibration

An internal oscillator provides a calibration source in the Model 2718. This source supplies a calibration charge to the input of the amplifier such that its peak-to-peak value represents the peak full scale input as noted on the Full Scale range switch, regardless of range or sensitivity dial setting. The frequency of the calibration signal is 1000 Hz, nominal.

The rated full scale output of the amplifier is 5 V pk or 10 V pk/pk. The output of the amplifier with the Calibration Switch in the "Calib" position is a 5 V pk/pk sine wave (equal to peak full scale output). An oscilloscope connected to the Signal Output, or a galvanometer connected to the Galvo Output will be deflected to plus and minus one-half peak full scale.

5.4 Low Frequency Cutoff

The setting of the Low Frequency Cutoff Switch will determine the maximum width of a pulse which will be accurately reproduced by the amplifier, as discussed in Section 2.3. However, some synthetic piezoelectric crystals

## 5.4 Low Frequency Cutoff (continued)

exhibit temperature effects which appear as low frequency drift or wander. This temperature effect may be reduced considerably by operating the Model 2718A at the higher (low) cutoff frequencies, 0.3 Hz or 0.7 Hz, since this pyroelectric effect is a low frequency phenomenon.

Many ENDEVCO® Transducers, those utilizing Piezite®P-2 crystal material, exhibit little or no temperature effects. Thus, the amplifier may be operated at a 0.03 Hz low frequency cutoff without distortion of the signal. Accelerometer Model 2242C and 2252 are recommended for long pulse shock measurements up to 1000 g and 5000 g respectively.

## 5.5 High Frequency Filters

Shock machines will often ring at high frequencies during or after shock. Also, a pulse with fast rise time may excite the natural resonant frequency of accelerometers. It may be desireable to filter out these frequencies to permit recording or observation of the pulse wave shape.

The Model 2718A includes three low pass filters, which may be selected by the switch on the front panel. The filters have the following characteristics:

| ± 5% Response | Down 3 db or greater, at |
|---|---|
| 0 to 100 Hz | 330 Hz ± 10% |
| 0 to 1000 Hz | 3300 Hz ± 10% |
| 0 to 4000 Hz | 13,200 Hz ± 10% |

An external filter may be connected into the circuit through the phone jack, J8, on the rear of the amplifier. A three-terminal phone plug, Switchcraft No. 267 or equal, will mate with this jack. The external filter must have input and output impedances which will allow it to operate correctly with the internal impedances of the amplifier as shown in Figure 5.

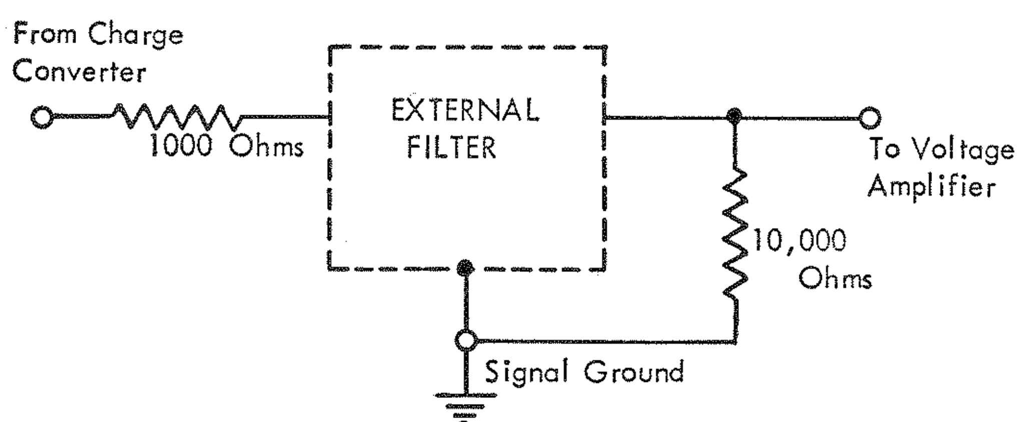



FIGURE 5.

Connections for External Filter

## 5.5 High Frequency Filters (continued)

If the transmissibility of the external filter is not unity, an appropriate correction factor must be applied to the data signal. Note that the internal sinusoidal calibration signal has a frequency of approximately 1000 Hz and will be attenuated by the internal and, possibly, the external filter.

## 5.6 Power Amplifier

Model 2718A Charge Amplifiers are capable of delivering a linear output current up to 85 pk mA for high frequency galvanometers or long output cables. The gain of the power amplifier is adjustable by means of a screwdriver adjustable pot on the front panel from less than 0.1 to greater than 1.0 without affecting the system sensitivity prior to the power amplifier.

The signal at the Galvo Output connector is in phase with the input signal.

## 5.7 Zero Adjust

The front panel zero adjust is used to adjust the signal output to zero when there is no signal applied to the input. The zero adjust is a screwdriver adjustable potentiometer. Since the Charge Converter and Voltage Amplifier are capacitanc coupled, the Charge Converter DC level should have very little effect on the Voltage Amplifier and should, under usual conditions, not be touched except wher "clipping" due to the Charge Converter operating point is experienced. For furthe information see Section 7.3.

## 5.8 Grounding

The circuit ground is grounded to the chassis at one and only one point to prevent possible ground loops. If excessive noise, particularly at power line frequency, appears at the output, it may be necessary to insulate the transducer from the structure and/or insulate the ground circuit of the readout device.

The electrostatic shield in the power transformer is connected to a binding post in the rear of the 2718A. A ground can be established at this point to reduce any line transient effects. However, a good earth ground should be used or the bindin post should not be grounded at all.

## 5.9 Using the Model 2718A to Monitor Peak G's or Other Units

To set up the 2718A to monitor peak g's, the following procedure is used:

1. Note from the calibration card supplied with the transducer the charge sensitivity as expressed in picocoulombs per g. Since the charge generated per unit remains constant regardless of the amount of external capacitance added to the transducer, no additional calculations need be made.

5.9 Using the Model 2718A to Monitor Peak G's or Other Units (continued)

2. Adjust the pC/g decade dial to the sensitivity as obtained above. (See Sections 3.1.8 and 5.2.)
3. Set the "Full Scale g" switch to the desired range.
4. Set the Low Frequency Cutoff switch to the desired frequency. (See Sections 2.3 and 5.4.)
5. Set the High Frequency Cutoff to the desired condition. (See Section 5.5.)
6. Throw the Calibrate Switch on to obrain a 5 V pk/pk output signal representing the magnitude of the peak g level set at the Full Scale control. Adjust the readout device as desired and then switch out the calibration signal.

The system is now calibrated directly in g, pounds, psi, etc.

For example: Assume a Model 2252 Accelerometer (Charge Sensitivity 2.0 pk pC/pk g) is to be used to monitor a 4000 g, 500 μsecond shock. Set into the Sensitivity Dial the value 2.0. Since the accelerometer sensitivity lies between 1.0 and 10, refer to the black numerals. Set the Full Scale control to 5000 g (black). Since the anticipated pulse width is short, the Low Frequency Cutoff Switch may be left in 0.7 Hz position.

Throw the Calibrate Switch to "Calib". The 5 V pk/pk signal represents a zero to peak 5000 g signal. Adjust the output device to a multiple of 5 division. Throw the Calibrate Switch to Operate. The system is now calibrated to read directly in peak g with 5 V pk output from the Model 2718A representing 5000 g.

For a transducer sensitivity greater than 10.0 pC/g, set the multiturn dial to 1/10 the transducer sensitivity (black) and turn the Full Scale selector to 10 times the desired full scale range (black). The full scale value shown in black must be multiplied by .1 to obtain the actual full scale value.

For a transducer sensitivity less than 0.1 pC/g, set the multiturn dial to 10 times the transducer sensitivity (red) and turn the Full Scale Selector to 1/10 the desired full scale range (red). The full scale value shown in red must be multiplied by 10 to obtain the actual full scale value.

5.10 Using Long Input Cables

The maximum allowable source capacitance to meet all specification requirements is 10,000 pF on the first two ranges and 100,000 pF on the

5.10 Using Long Input Cables (continued)

third and higher ranges. Source capacitance includes both transducer and input cable capacitance. A source capacitance greater than these values will result in increased residual noise, some loss of gain in the amplifier, and lower high frequency response.

If the Model 2718A is used with transducers utilizing P-2 crystal material, internal capacitance nominally 100 pF, over 3000 feet of cable, at 30 pF per foot, may be connected between the amplifier and the transducer.

## 6.0 CIRCUIT DESCRIPTION

The Model 2718 is made up of (1) a charge converter, (2) a capacitance coupled voltage amplifier, (3) power amplifier, (4) a calibrator, and (5) a regulated power supply. Refer to Schematic Drawing 2718A-501C.

### 6.1 Charge Converter

The function of the charge converter is to sense the charge being applied at the input of the amplifier and convert the charge into a voltage. The charge gain is either 2 or 0.2 mV/pC, depending on the full scale g range.

The charge converter consists of a high gain amplifier made up of Q1, Q2, Q3, Q4, Q5 and Q6 and a capacitance feedback circuit from the output to the input. Two different feedback capacitors are used depending on the gain setting. Capacitor C1 is in the circuit when the gain is 2.0 mV/pC, while C2 is in the circuit when the gain is 0.2 mV/pC.

The low frequency time constant of the charge converter is determined by resistors R2, R3, R14, R15 and R16. One or more of these resistors is connected in parallel with the feedback capacitor depending on the position of the low frequency cutoff switch, the low frequency time constant of the charge converter being equal to the product of the feedback capacitor and its parallel resistance. In this type of circuit the capacity of the input transducer has no effect on the time constant of the system.

The charge converter is capacitance coupled to the voltage amplifier to prevent DC drift. The bias of the F.E.T. (Q1) is adjustable through potentiometer R7 which sets the DC level of the charge converter. This adjustment screw is located inside the 2718 Module and normally should not be changed from the factory setting.

From the output of the charge converter the signal is fed through the voltage amplifier coupling capacitor, C12, to the filter receptacle and then to the attenuator. The attenuator in conjunction with the two feedback capacitors, C1 and C2, sets the range of the amplifier as required, and consists of resistors R34 through R40 and switch S3. If a spurious or unwanted signal charges the coupling capacitor, C12, the DC level can be quickly returned to zero by pressing the reset button, S5, on the 2718 front panel.

## 6.2 Voltage Amplifier

This amplifier contains most of the voltage gain of the system. It also contains a gain control potentiometer, R59, which is used to calibrate the system for specific transducer sensitivities. Q7, Q8, Q9, Q10, and Q11 make up the voltage amplifier. Q8 is a dual transistor in a single case which reduces zero drift with temperature. Negative feedback is connected from the output to one base of Q7. This negative feedback sets the gain of the voltage amplifier. A dial is attached to the potentiometer, R59, which is set to read directly in transducer sensitivity (pC/g) by the adjustment of R58 and R62.

Potentiometer R46 is the DC balance control for the amplifier and is available on the front panel for setting the zero.

## 6.3 Power Amplifier

The power amplifier has a gain adjustable from 0.1 to 1.0 and provides current for driving a high frequency galvanometer or long lines. Provision is made in the circuit to limit the output current to a predetermined value (approximately ±100 mA). Q201 provides the voltage gain for the power amplifier, while Q202, Q203, Q204, Q205 and Q208 provide current gain. Negative feedback is connected between the output and the input for stability and gain adjustment. Gain adjustment for the power amplifier is provided by potentiometer R205 located on the front panel.

Resistors R213 through R216 along with diodes CR202, CR203, CR204 and CR205 and transistors Q206 and Q207 make up the current limiting circuit. The diodes bias Q206 and Q207 on until such time as the output current causes a voltage drop across R215 and R216 to shut the transistor off. This limits the current essentially independent of the voltage output.

## 6.4 Calibrator

The calibrator circuit supplies a sine wave signal to the input of the charge converter to calibrate the system. The calibrator consists of a free running oscillator, made up of R33 through R39, L3, R50 through R54, C15, C16, C17, CR12 and CR13, and Q11 through Q14.

The oscillator is turned on by switch S4. This is the Calib-Operate Switch on the front panel.

The output of the oscillator is fed through C18 to an attenuator, R40 through R42 and R63 through R69. This attenuator is ganged to the full scale of range switch so the output from the attenuator is inversely proportional to the gain of the system. The calibration signal is fed from the attenuator through C3 to the input of the charge converter.

### 6.4 Calibrator (continued)

Ganged to S4 is an additional switch which sets the direct coupled amplifier to a fixed gain regardless of the setting of the sensitivity control. In this way, a constant voltage appears at the output regardless of range or sensitivity setting. The peak-to-peak voltage represents the full scale g's as indicated on the full scale g control.

### 6.5 Power Supply

The power supply provides regulated plus and minus 30 volts DC to the amplifier sections and the calibrator, and a plus and minus 10 volts DC to the power amplifier.

The power supply consists of a power transformer, T101, a rectifier circuit, CR117 through CR120 and plus and minus regulator circuits. The two regulator circuits are identical except for transistor type changes to substitute NPN for PNP transistors. The following circuit description applies to both regulators even though it describes the +30 volts regulator only.

A portion of the output voltage is applied to the base of Q103 through attenuators R115, R116 and R117. This voltage is compared to a reference voltage which is applied to the base of Q101. Any error signal is amplified by Q101 and Q105 and fed to the base of Q111 which is an emitter follower which drives the series regulating transistor Q109, thereby correcting the output voltage.

The plus and minus 10 volts DC for use with the power amplifier is obtained from the power transformer, T101, a rectifier circuit, CR127 through CR130 and the Zener diodes, CR125 and CR126. It is regulated by referencing to the regulated 30 volts DC supply and clamping with the Zener diodes CR125 and CR126.

## 7.0 MAINTENANCE AND TROUBLE SHOOTING

### 7.1 Maintenance

Very little routine maintenance is normally required. A little preventive maintenance directed toward keeping the equipment in proper adjustment will, however, go far toward assuring trouble-free operation when the equipment is needed.

All external connectors should be checked periodically for loose connections, shorts or grounds.

## 7.1 Maintenance (continued)

The calibration signal level and zero adjustments should be checked periodically using the procedure outlined below:

## 7.2 Power Supply Voltage Adjustment

The power supply voltages are not critical and normally do not require adjustment. If adjustment of power supply voltages is necessary, proceed as follows:

7.2.1 30 volt DC Supply - Turn on power and allow one hour for warmup. Adjust the input of the power supply to 115 VAC.

Measure the plus and minus 30 VDC at the emitters of Q109 and Q110, respectively. If these are not 30.0 V ±300 mV DC, adjust R116 and/or R119 until the voltages are within limits.

7.2.2 10 volt DC Supply - Measure the plus and minus 10 VDC at the emitters of Q119 and Q120, respectively. The supply voltages should be +10 volts, +1, -3 VDC and -10 volts, -1, +3 VDC. If these are not within specification limits, locate and replace the faulty component in the supply.

## 7.3 Zero Adjustment

There are three zero adjustments on the 2718 Charge Amplifier. One is the voltage amplifier zero control on the front panel (R46), the second is a trimpot (R7) in the charge converter circuit, and the third zero adjust (R206) is located in the power amplifier circuit.

The DC voltages at the output of the charge converter and voltage amplifier sections are not critical. These circuits are capacitance coupled and the DC voltage may vary over a wide range without affecting the usefulness or accuracy of the charge amplifier. Adjustment of zero may be required if a full scale output cannot be obtained without clipping. The Power Amplifier DC output voltage need not be adjusted unless the galvanometer connected to the Charge Amplifier cannot mechanically be set to the desired position.

To readjust the zero:

7.3.1 Voltage Amplifier

1. Turn on the amplifier and allow it to warm up for at least one hour.

7.3.1 Voltage Amplifier (continued)

2. Disconnect any input from the amplifier.
3. Set Full Scale g control to 5000 g (black) and the sensitivity control to 1.0 pC/g (black).
4. Set the Low Frequency Cutoff Control to 0.7 Hz.
5. Measure the DC voltage at the "sig out" (J3).
6. Turn the Zero Adjust potentiometer (R46) on the front panel for a DC output voltage as close to zero as possible, limited by the resolution of the potentiometer.

7.3.2 Power Amplifier

1. Adjust the DC output voltage of the voltage amplifier as described in 7.3.1 above.
2. Connect the voltmeter between Pins 1 and 2 of the Galvanometer Output connector.
3. Adjust potentiometer R206 on the Power Amplifier Module for a DC output as close to zero as possible, limited by the resolution of the potentiometer.

7.3.3 Charge Converter

1. Shield the input connector from stray electrostatic pickup or connect a piezoelectric transducer to the input with a total source capacitance of approximately 1000 pF.
2. Connect the DC voltmeter between the positive lead of C12, the 2300 μF capacitor, and signal ground.
3. Set the Full Scale switch to 25 g (black).
4. Using potentiometer R7, on the charge converter circuit board, adjust the DC voltage as close to zero as possible, limited by the resolution of the potentiometer. After each change of the potentiometer, allow time for the DC voltage to settle.

7.4 Sensitivity Adjustment

The sensitivity of the amplifier is carefully adjusted at the factory and does not normally need changing. The procedure for making the adjustment is quite complicated and, therefore, is not included in the manual. It is important that the sensitivity adjustments (R58 and R62) not be touched. If it is ever necessary to make this adjustment in the field, the procedure can be obtained from the Technical Services Department of Endevco Corporation. Write for Technical Data No. 651.

## 7.5 Calibration Signal Level

The calibration signal is adjusted by means of potentiometer R41 mounted on the calibration circuit board assembly.

Connect a calibrated and accurate oscilloscope or peak-to-peak voltmeter to the signal output connector. The deflection sensitivity of the oscilloscope or voltmeter should be known to 0.2%. Throw the Calibrate-Operate switch to calibrate. Measure the calibration output signal for each of the Full Scale g ranges. If the signal is not 5.0 volts ±2.0% peak-to-peak on all ranges, adjust R41 to bring the calibration voltage within tolerance.

## 7.6 Trouble Shooting

If a malfunction occurs, the area of trouble can be found by using the following procedure:

1. Remove the amplifier from its case and measure the ±30 volt bus from the power supply. The +30 volts is a red wire and the -30 volts is orange. If these are 30 volts ±5%, then the trouble is probably in the amplifier section. If they are not, the trouble is probably in the power supply. Checking voltage throughout the power supply should indicate the trouble.

2. If the trouble seems to be in the amplifier, measure the DC voltages in the various sections and compare them to Table 1. The trouble can be located by the area of the circuit which first deviates from the expected value.

## 7.7 Special Precaution

When using the amplifier on the 0.03 Hz low frequency cutoff and at high gain, it is very important that the leakage resistance between the signal input and ground be kept very high. If this resistance drops due to contamination or some other reason, the output zero will offset. In order to keep this offset to a minimum, the leakage resistance should be greater than 50 megohms. Therefore, if an erratic zero is noted when on the 0.03 Hz low frequency cutoff, a check of cable and connections should be made. (See Section 1.2.)

## 7.8 Factory Repairs

If serious trouble occurs, the instrument should be returned to the factory for repair. Whenever possible, it should be accompanied by supplementary information, describing in particular the fault noted.

7.8 Factory Repairs (continued)

Endevco warrants each new instrument to be free from defects in material and workmanship for one year from date of sale to the original purchaser. This warranty does not extend to vacuum tubes and transistors in the units, nor to units which have been misused or used in violation of Endevco recommendations, nor to units which have been altered or repaired outside Endevco's factory. Defects covered by this warranty will be remedied at no charge when the instrument is delivered to the factory with all transportation charges prepaid. If upon examination it is found that the defect is not within the scope of this warranty, a statement of repair charges and a request for authorization to proceed will be submitted.

## TABLE 1 - TYPICAL DC OPERATING VOLTAGES

Conditions

| | |
|---|---|
| Input: | 115 VAC |
| Sensitivity: | 1.0 |
| Full Scale g: | 25 |
| Low Frequency Cutoff: | .7 |

Equipment

Simpson 260-3 Voltmeter

CHARGE CONVERTER
(Terminal Board No. 1)

| Q | BASE | EMITTER | COLLECTOR |
|---|---|---|---|
| 1 | +17.5 V | +.4 V | 0 |
| 2 | +17.5 V | +10 V | +20 V |
| 3 | +20 V | +19 V | +30 V |
| 4 | +19 V | +20 V | 0 |
| 5 | +.09 V | 0 | +21 V |
| 6 | -.1 V | 0 | -20.5 V |

## CALIBRATOR
(Terminal Board No. 2)

| Q | BASE | EMITTER | COLLECTOR |
|---|---|---|---|
| 11 | +4.6 V | +4.5 V | +30 V |
| 12 | +1.9 V | +1.35 V | +17 V |
| 13 | +17 V | +8.3 V | +30 V |
| 14 | +17 V | +8.3 V | 0 |

## VOLTAGE AMPLIFIER
(Terminal Board No. 3)

| Q | BASE | EMITTER | COLLECTOR |
|---|---|---|---|
| 7 in | 0 | - .6 V | +16.3 V |
| 7 out | -.13 V | - .6 V | +16.5 V |
| 8 in | - .6 V | -1.2 V | +16.3 V |
| 8 out | - .6 V | -1.2 V | +16.5 V |
| 9 | +16.5 V | +17.1 V | 0 |
| 10 | +16.3 V | +16.9 V | - .6 V |
| 11 | - .6 V | +.08 V | -6.5 V |

## POWER AMPLIFIER
(Terminal Board No. 4)

| Q | BASE | EMITTER | COLLECTOR |
|---|---|---|---|
| 201 | 0 | - .6 V | +9.5 V |
| 202 | +9.5 V | +9.5 V | +30 V |
| 203 | + .8 V | + .7 V | +8.6 V |
| 204 | -.84 V | -.78 V | -8.6 V |
| 205 | + .7 V | +.23 V | +8.6 V |
| 206 | + .8 V | +.13 V | +.23 V |
| 207 | - .9 V | -.08 V | -.12 V |
| 208 | - .8 V | -.12 V | -8.6 V |

POWER SUPPLY
(Terminal Board No. 5, +30 V; Terminal Board No. 6, -30 V)

| Q | BASE | EMITTER | COLLECTOR |
|---|---|---|---|
| 101 | +8.5 V | + 8 V | +21 V |
| 102 | -8.5 V | - 8 V | -21 V |
| 103 | +8.5 V | + 8 V | +21 V |
| 104 | -8.5 V | - 8 V | -21 V |
| 105 | +21 V | +20 V | +30 V |
| 106 | -21 V | -20 V | -30 V |
| 107 | +21 V | +20 V | +30 V |
| 108 | -21 V | -20 V | -30 V |
| 109 | + 8 V | +30 V | +48 V |
| 110 | - 8 V | -30 V | -48 V |
| 111 | +30 V | + 8 V | +48 V |
| 112 | -30 V | - 8 V | -48 V |
| 113 | +45 V | +48 V | +30 V |
| 114 | -45 V | -48 V | -30 V |

| | | |
|---|---|---|
| Originated By: | ADDENDUM SHEET TO [illegible] | Dwg. No.: |
| Checked By: | INSTRUCTION MANUAL | Page |
| Approved By: | | Rev. No.: |
| | | Date: |

A 9-9-70

Electrical Parts List 3/70

R38, Resistor, Page 1, was Selected now 3k (ER158).

B-13265C, Change 9

R38 was Selected now 3k (ER158).

D-2718A-501C, Change 8

R38 was Selected now 3k (ER158).

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B 4-28-71

D-2718A-1C, Change 8

Item 22, EHW59 Washer Shoulder, fiber 3/8 was EHW104, 5/16

# ELECTRICAL PARTS LIST
# FOR
# MODEL 2718A SHOCK AMPLIFIER

## CALIBRATION BOARD ASSEMBLY

| Des. No. | Part | Value and Description | Manufacturer and No. | Endevco Part No. |
|---|---|---|---|---|
| C15 | Capacitor | 2.2 μF, ±10%, 35 V, Tantalum | Sprague 150D225X9035B2 | EC63 |
| C16 | Capacitor | .047 μF, ±5%, 50 V, Paper | San Fernando Elec. WS4J473 | EC246 |
| C17 | Capacitor | 100 μF, 12 V, Electrolytic | Sprague 30D107G012CC4 | EC220 |
| C18 | Capacitor | 6.8 μF, ±10%, 35 V, Tantalum | Sprague 150D685X9035B2 | EC276 |
| CR12 | Diode | 1N936, Zener T. C. | Motorola | ECR63 |
| CR13 | Diode | 1N456, Silicon | Hughes | ECR31 |
| L3 | Inductor | 0.5 H, ±2%, 50 mH, Toroid | | 12795 |
| Q11 | Transistor | 2N388A | Texas Instruments | EQ81 |
| Q12 | Transistor | 2N2923 | Texas Instruments | EQ94 |
| Q13 | Transistor | 2N388A | Texas Instruments | EQ81 |
| Q14 | Transistor | 2N404A | Texas Instruments | EQ82 |
| R33 | Resistor | 33 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER196 |
| R34 | Resistor | 11 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER1022 |
| R35 | Resistor | 12 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER249 |
| R36 | Resistor | 15 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER168 |
| R37 | Resistor | 15 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER168 |
| R38 | Resistor | Selected | | |
| R39 | Resistor | 10 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER182 |
| R40 | Resistor | 7.5 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER719 |
| R41 | Potentiometer | 1 kΩ, ±10%, 1/2 W, WW | Bourns 3067P-1-102 | ER829 |

ELECTRICAL PARTS LIST (continued)

| Des. No. | Part | Value and Description | Manufacturer and No. | Endevco Part No. |
|---|---|---|---|---|
| CALIBRATION BOARD ASSEMBLY (continued) | | | | |
| R42 | Resistor | 1.8 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER293 |
| R50 | Resistor | 2.2 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER169 |
| R51 | Resistor | 2.2 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER169 |
| R52 | Resistor | 1 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER23 |
| R54 | Resistor | 1 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER23 |
| MODEL 2718A PARTS (Not Including Calibration Board Assembly) | | | | |
| C1 | Capacitor | 500 pF, ±1%, 500 V, Sil. Mica | Elmenco DM-15-501F | EC232 |
| C2 | Capacitor | 5060 pF, ±1%, 300 V, Dura-Mica | Elmenco DM-19-5061F | EC360 |
| C3 | Capacitor | 1000 pF, ±1%, 500 V, Sil. Mica | Elmenco DM-19-102F | EC19 |
| C4 | Capacitor | 1.0 μF, ±20%, 50 V, Tantalum | Sprague 150D105X0050A2 | EC209A |
| C5 | Capacitor | 620 pF, ±5%, 300 V, Sil. Mica | Elmenco DM-15-621J | EC544 |
| C6 | Capacitor | 4.7 μF, ±20%, Tantalum, 10V | Sprague 150D475X0010A2 | EC150 |
| C7 | Capacitor | 2.2 μF, ±20%, 20 V, Tantalum | Sprague 150D225X0020A2 | EC204 |
| C8 | Capacitor | 5 μF, ±10%, 100 V, Mylar Metalized | Elpak Z1X505K | EC479 |
| C9 | Capacitor | 1000 pF, ±5%, 100 V, Dura-Mica | Elmenco DM-15-102J | EC359 |
| C10 | Capacitor | 0.1 μF, ±20%, Tantalum, 35V | Sprague 150D104X0035A2 | EC149 |
| C11 | Capacitor | 0.1 μF, ±20%, Tantalum, 35V | Sprague 150D104X0035A2 | EC149 |
| C12 | Capacitor | 2300 μF, $^{+75}_{-10}$%, 5 V, Electrolytic | Sprague 601D238G005FL4 | EC427 |
| C13 | Capacitor | 680 pF, ±5%, 300 V, Sil. Mica | Elmenco DM-15-681J | EC106 |
| C14 | Capacitor | 15 pF, ±5%, 500 V, Dura-Mica | Elmenco DM-15-150J | EC377 |
| C15 | Capacitor | 47 pF, ±5%, 500 V, Sil. Mica | Elmenco DM-15-470 J | EC113 |
| C16 | Capacitor | .01 μF, ±20%, 50 V, Ceramic | Sprague 19C214A6 | EC115 |
| C17 | Capacitor | 100 pF, ±5%, 500 V, Sil. Mica | Elmenco DM-15-101J | EC234 |
| C21 | Capacitor | .01 μF, ±20%, 50 V, Ceramic | Sprague 19C214A6 | EC115 |

ELECTRICAL PARTS LIST (continued)

| Des. No. | Part | Value and Description | Manufacturer and No. | Endevco Part No. |
|---|---|---|---|---|
| MODEL 2718A PARTS (Not Including Calibration Board Assembly) | | | | |
| C101 | Capacitor | 0.05 µF, ±20%, 50 V, Ceramic | Sprague 55C23A1 | EC324 |
| C102 | Capacitor | 0.05 µF, ±20%, 50 V, Ceramic | Sprague 55C23A1 | EC324 |
| C103 | Capacitor | 10 µF, $^{+75}_{-10}$%, 25 V, Electrolytic | Sprague 30D106G025BB4 | EC242 |
| C104 | Capacitor | 10 µF, $^{+75}_{-10}$%, 25 V, Electrolytic | Sprague 30D106G025BB4 | EC242 |
| C105 | Capacitor | 680 pF, ±5%, 300 V, Sil. Mica | Elmenco DM-15-681J | EC106 |
| C106 | Capacitor | 680 pF, ±5%, 300 V, Sil. Mica | Elmenco DM-15-681J | EC106 |
| C107 | Capacitor | .1 µF, ±20%, 50 V, Film | San Fernando Elec. WS4M104 | EC314 |
| C108 | Capacitor | .1 µF, ±20%, 50 V, Film | San Fernando Elec. WS4M104 | EC314 |
| C109 | Capacitor | .1 µF, ±20%, 50 V, Film | San Fernando Elec. WS4M104 | EC314 |
| C110 | Capacitor | .1 µF, ±20%, 50 V, Film | San Fernando Elec. WS4M104 | EC314 |
| C111 | Capacitor | .02 µF, $^{+80}_{-20}$%, 50 V, Ceramic | Sprague 55C21A2 or TG-S20 | EC273 |
| C112 | Capacitor | .02 µF, $^{+80}_{-20}$%, 50 V, Ceramic | Sprague 55C21A2 or TG-S20 | EC273 |
| C113 | Capacitor | 80 µF, 150 V, Electrolytic | Cornell-Dubilier BR-80-150 | EC325 |
| C114 | Capacitor | 80 µF, 150 V, Electrolytic | Cornell-Dubilier BR-80-150 | EC325 |
| C121 | Capacitor | 250 µF, 25 V, Electrolytic | Cornell-Dubilier BR-250-25 | EC456 |
| C122 | Capacitor | 250 µF, 25 V, Electrolytic | Cornell-Dubilier BR-250-25 | EC456 |
| C201 | Capacitor | 100 µF, 12 V, Electrolytic | Sprague 30D107G012CC4 | EC220 |
| C202 | Capacitor | 1000 pF, ±5%, 100 V, Dura-Mica | Elmenco DM-15-102J | EC359 |
| CR1 | Diode | 1N960, Zener | Fairchild | ECR189 |
| CR2 | Diode | 1N960, Zener | Fairchild | ECR189 |
| CR3 | Diode | Zener | | 13643 |
| CR4 | Diode | 1N961, Zener | Motorola | ECR62 |
| CR5 | Diode | 1N456, Silicon | Hughes | ECR31A |

ELECTRICAL PARTS LIST (continued)

| Des. No. | Part | Value and Description | Manufacturer and No. | Endevco Part No. |
|---|---|---|---|---|
| MODEL 2718A PARTS (Not Including Calibration Board Assembly) | | | | |
| CR6 | Diode | 1N754 | | ECR83 |
| CR11 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR101 | Diode | 1N936, Zener T. C. | Motorola | ECR63 |
| CR102 | Diode | 1N936, Zener T. C. | Motorola | ECR63 |
| CR103 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR104 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR105 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR106 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR107 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR108 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR109 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR110 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR112 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR113 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR114 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR115 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR117 | Diode | SCBR-4, Quad (CR117–CR120) | Semtech | ECR79 |
| CR118 | Diode | | | |
| CR119 | Diode | | | |
| CR120 | Diode | | | |
| CR125 | Diode | 1N961, Zener | Motorola | ECR62 |
| CR126 | Diode | 1N961, Zener | Motorola | ECR62 |
| CR127 | Diode | SCBR-4, Quad (CR127–CR128 …) | Semtech | ECR79 |
| CR128 | Diode | | | |

ELECTRICAL PARTS LIST (continued)

| Des. No. | Part | Value and Description | Manufacturer and No. | Endevco Part No. |
|---|---|---|---|---|
| MODEL 2718A PARTS | | (Not Including Calibration Board Assembly) | | |
| CR129 | Diode | | | |
| CR130 | Diode | | | |
| CR201 | Diode | 1N961, Zener | Motorola | ECR62 |
| CR202 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR203 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR204 | Diode | 1N456, Silicon | Hughes | ECR31 |
| CR205 | Diode | 1N456, Silicon | Hughes | ECR31 |
| F101 | Fuse | 3/4 Amp, Slo-Blo, 125 V | Littelfuse 313.750 | EF16 |
| F101 | Fuse | Optional, 3/8 Amp, 250 V | Fusetron MDL | EF26 |
| I101 | Indicator Light | Lamp Pilot Assembly | Eldema BG03-CCS-NE2H-033K | EX123 |
| J1 | Connector | Input | Microdot 31-33 | EJ132 |
| J1 | Connector | Input (Optional) BNC | Amphenol 31-221 | EJ15 |
| J2 | Connector | Galvanometer Output | Switchcraft B3M | EJ75 |
| J3 | Connector | BNC, Signal Output | Amphenol 31-221 | EJ15 |
| J5 | Connector | Binding Post, Transformer Shield | Raytheon 227-1214G3 | EJ42 |
| J6 | Connector | Input Power | Hubble 7486 | EJ82 |
| J7 | Connector | 5-pin, for Peak Holding Meter | Cannon WK-5-32S | EJ251 |
| J8 | Connector | Phone Jack | Switchcraft 13B | EJ254 |
| Q1 | Transistor | F.E.T. | | 14853-2 |
| Q2 | Transistor | 2N3904 | Motorola | EQ130 |
| Q3 | Transistor | 2N3904 | Motorola | EQ130 |
| Q4 | Transistor | 2N1377 | Texas Instrument | EQ100 |

ELECTRICAL PARTS LIST (continued)

| Des. No. | Part | Value and Description | Manufacturer and No. | Endevco Part No. |
|---|---|---|---|---|
| MODEL 2718A PARTS (Not Including Calibration Board Assembly) | | | | |
| Q5 | Transistor | 2N388A | Texas Instruments | EQ81 |
| Q6 | Transistor | 2N404A | Texas Instruments | EQ82 |
| Q7 | Transistor | SA2253 (Dual) | Amelco | EQ 107 |
| Q8 | Transistor | SA2253 (Dual) Selected | Amelco | EQ 150 |
| Q9 | Transistor | 2N3906 | Motorola | EQ 127 |
| Q10 | Transistor | 2N3906 | Motorola | EQ 127 |
| Q11 | Transistor | 2N3906 | Motorola | EQ 127 |
| Q101 | Transistor | 2N3904 | Motorola | EQ 130 |
| Q102 | Transistor | 2N3906 | Motorola | EQ 127 |
| Q103 | Transistor | 2N3904 | Motorola | EQ 130 |
| Q104 | Transistor | 2N3906 | Motorola | EQ 127 |
| Q105 | Transistor | 2N3904 | Motorola | EQ 130 |
| Q106 | Transistor | 2N3906 | Motorola | EQ 127 |
| Q107 | Transistor | 2N3904 | Motorola | EQ 130 |
| Q108 | Transistor | 2N3906 | Motorola | EQ 127 |
| Q109 | Transistor | 2N3766 | Motorola | EQ 131 |
| Q110 | Transistor | 2N3740 | Motorola | EQ 129 |
| Q111 | Transistor | 2N3904 | Motorola | EQ 130 |
| Q112 | Transistor | 2N5400 | Motorola | EQ216 |
| Q113 | Transistor | 2N3906 | Motorola | EQ 127 |
| Q114 | Transistor | 2N3904 | Motorola | EQ 130 |
| Q119 | Transistor | 2N3766 | Motorola | EQ 131 |
| Q120 | Transistor | 2N3740 | Motorola | EQ 129 |
| Q201 | Transistor | 2N3904 | Motorola | EQ 130 |
| Q202 | Transistor | 2N3904 | Motorola | EQ 130 |
| Q203 | Transistor | 2N3904 | Motorola | EQ 130 |

ELECTRICAL PARTS LIST (continued)

| Des. No. | Part | Value and Description | Manufacturer and No. | Endevco Part No. |
|---|---|---|---|---|
| MODEL 2718A PARTS (Not Including Calibration Board Assembly) | | | | |
| Q204 | Transistor | 2N3906 | Motorola | EQ127 |
| Q205 | Transistor | 2N696 | Fairchild | EQ83 |
| Q206 | Transistor | 2N696 | Fairchild | EQ83 |
| Q207 | Transistor | 2N1131 | Fairchild | EQ84 |
| Q208 | Transistor | 2N1131 | Fairchild | EQ84 |
| R1 | Resistor | 1 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER23 |
| R2 | Resistor | 600 MΩ, ±20%, 1/2 W, Comp. | I.R.C. GBT 1/2 | ER800 |
| R3 | Resistor | 66 MΩ, ±20%, 1/2 W, Comp. | I.R.C. GBT 1/2 | ER1172 |
| R4 | Resistor | 33 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER196 |
| R5 | Resistor | 62 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER1021 |
| R6 | Resistor | 620 k Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER1557 |
| R7 | Potentiometer | 2 kΩ, ±5%, 1-1/2 W, | Spectrol 55-2-11-202 | ER1675 |
| R8 | Resistor | 3.3 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER163 |
| R9 | Resistor | 1.5 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER94 |
| R10 | Resistor | 100 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER233 |
| R11 | Resistor | 1.3 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER60 |
| R12 | Resistor | 1.3 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER60 |
| R13 | Resistor | 10 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER182 |
| R14 | Resistor | 120 kΩ, ±5%, 1/4 W, Comp. | Allen Bradley Type CB | ER202A |
| R15 | Resistor | 22 MΩ, ±5%, 1/4 W, Comp. | Allen Bradley Type CB | ER88 |
| R16 | Resistor | 1.5 MΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER55 |
| R17 | Resistor | 100 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER233 |
| R18 | Resistor | 240 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER248 |
| R19 | Resistor | 5.6 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER126 |
| R20 | Resistor | 100 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER171 |

ELECTRICAL PARTS LIST (continued)

| Des. No. | Part | Value and Description | Manufacturer and No. | Endevco Part No. |
|---|---|---|---|---|
| MODEL 2718A PARTS (Not Including Calibration Board Assembly) | | | | |
| R21 | Resistor | 2.2 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER169 |
| R22 | Resistor | 11 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER1022 |
| R23 | Resistor | 10 kΩ,±.5%, 1/10W, Metal Film | Mepco FE10 | ER802 |
| R24 | Resistor | 5.0 kΩ,±.5%,1/10 W, Metal Film | Mepco FE10 | ER1061 |
| R25 | Resistor | 975 Ω±.5%, 1/10 W, Metal Film | Mepco FE10 | ER1579 |
| R26 | Resistor | 24 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER1507 |
| R27 | Resistor | 3.3 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER163 |
| R28 | Resistor | 10 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER182 |
| R29 | Resistor | 47 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER824 |
| R30 | Resistor | 47 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER824 |
| R31 | Resistor | 10 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER182 |
| R32 | Resistor | 3.3 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER163 |
| R33 | Resistor | 1 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER23 |
| R34 | Resistor | 9.5 kΩ,±.5%,1/10 W, Metal Film | Mepco FE10 | ER1363 |
| R35 | Resistor | 9.0 kΩ,±.5%, 1/10W, Metal Film | Mepco FE10 | ER1362 |
| R36 | Resistor | 5.0 kΩ,±.5%,1/10W, Metal Film | Mepco FE10 | ER1061 |
| R38 | Resistor | 9.5 kΩ,±.5%,1/10W, Metal Film | Mepco FE10 | ER1363 |
| R39 | Resistor | 9.0 kΩ,±.5%,1/10 W, Metal Film | Mepco FE10 | ER1362 |
| R40 | Resistor | 5.0 kΩ,±.5%,1/10W, Metal Film | Mepco FE10 | ER1061 |
| R41 | Resistor | 22 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER818 |
| R42 | Resistor | 22 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER818 |
| R43 | Resistor | 22 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER818 |
| R44 | Resistor | 56 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER1020 |
| R45 | Resistor | 180 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER1128 |
| R46 | Potentiometer | 5 kΩ, ±5%, 1-1/2 W, WW | Bourns 3052S-1-502M | ER1552 |

ELECTRICAL PARTS LIST (continued)

| Des. No. | Part | Value and Description | Manufacturer and No. | Endevco Part No. |
|---|---|---|---|---|
| MODEL 2718A PARTS (Not Including Calibration Board Assembly) | | | | |
| R47 | Resistor | 1.8 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER293 |
| R48 | Resistor | 10 kΩ, ±1%, 1/10W, Metal Film | Mepco FE10 | ER808 |
| R49 | Resistor | 680 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER159 |
| R50 | Resistor | 6.8 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER819 |
| R51 | Resistor | 82.5 kΩ, ±1%, 1/10 W, Metal Film | Mepco FE10 | ER814 |
| R52 | Resistor | 680 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER159 |
| R53 | Resistor | 27 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER820 |
| R54 | Resistor | 2.7 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER197 |
| R55 | Resistor | 4.7 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER270 |
| R56 | Resistor | 1.8 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER293 |
| R57 | Resistor | 43 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER1008 |
| R58 | Potentiometer | 200 Ω, ±10%, 1/2 W, WW | Bourns 3067P-1-201 | ER826 |
| R59 | Potentiometer | 2.0 kΩ, ±3%, 2 W, 10 Turns, WW | Bourns 3500S-714-202 | ER827 |
| R60 | Resistor | 150 Ω, ±1%, 1/10 W, Metal Film | Mepco FE10 | ER815 |
| R61 | Resistor | 5.6 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER126 |
| R62 | Potentiometer | 5 kΩ, ±10%, 1/2 W, WW | Bourns 3067P-1-502 | ER792 |
| R63 | Resistor | 2.55 kΩ, ±.5%, 1/10 W, Metal Film | Mepco FE10 | ER809 |
| R64 | Resistor | 2.05 kΩ, ±.5%, 1/10 W, Metal Film | Mepco FE10 | ER810 |
| R65 | Resistor | 255 Ω, ±.5%, 1/10W, Metal Film | Mepco FE10 | ER811 |
| R66 | Resistor | 205 Ω, ±.5%, 1/10W, Metal Film | Mepco FE10 | ER812 |
| R67 | Resistor | 25.5 Ω, ±.5%, .05 W, WW | RCL Type 7005 | ER978 |
| R68 | Resistor | 25.5 Ω, ±.5%, .05 W, WW | RCL Type 7005 | ER978 |
| R69 | Resistor | 11.5 kΩ, ±1%, 1/10 W, Metal Film | Mepco FE10 | ER838 |
| R78 | Resistor | 475 Ω, ±.5%, 1/10 W, Metal Film | Mepco FE10 | ER1492 |
| R101 | Resistor | 10 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER945 |
| R102 | Resistor | 10 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER945 |

ELECTRICAL PARTS LIST (continued)

| Des. No. | Part | Value and Description | Manufacturer and No. | Endevco Part No. |
|---|---|---|---|---|
| MODEL 2718A PARTS (Not Including Calibration Board Assembly) | | | | |
| R103 | Resistor | 4.7 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER270 |
| R104 | Resistor | 560 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER823 |
| R105 | Resistor | 560 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER823 |
| R106 | Resistor | 4.7 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER270 |
| R107 | Resistor | 4.7 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER270 |
| R108 | Resistor | 4.7 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER270 |
| R109 | Resistor | 33 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER1006 |
| R110 | Resistor | 2.4 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER295 |
| R111 | Resistor | 2.4 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER295 |
| R112 | Resistor | 33 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER1006 |
| R113 | Resistor | 4.7 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER270 |
| R114 | Resistor | 4.7 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER270 |
| R115 | Resistor | 10 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER182 |
| R116 | Potentiometer | 1 kΩ, ±10%, 1/2 W, WW | Bourns 3067P-1-102 | ER829 |
| R117 | Resistor | 3.9 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER164 |
| R118 | Resistor | 3.9 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER164 |
| R119 | Potentiometer | 1 kΩ, ±10%, 1/2 W, WW | Bourns 3067P-1-102 | ER829 |
| R120 | Resistor | 10 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER182 |
| R121 | Resistor | 680 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER159 |
| R122 | Resistor | 680 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER159 |
| R123 | Resistor | 10 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER182 |
| R124 | Resistor | 10 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER182 |
| R125 | Resistor | 680 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER159 |
| R126 | Resistor | 680 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER159 |
| R127 | Resistor | 27 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER820 |
| R128 | Resistor | 27 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER820 |

ELECTRICAL PARTS LIST (continued)

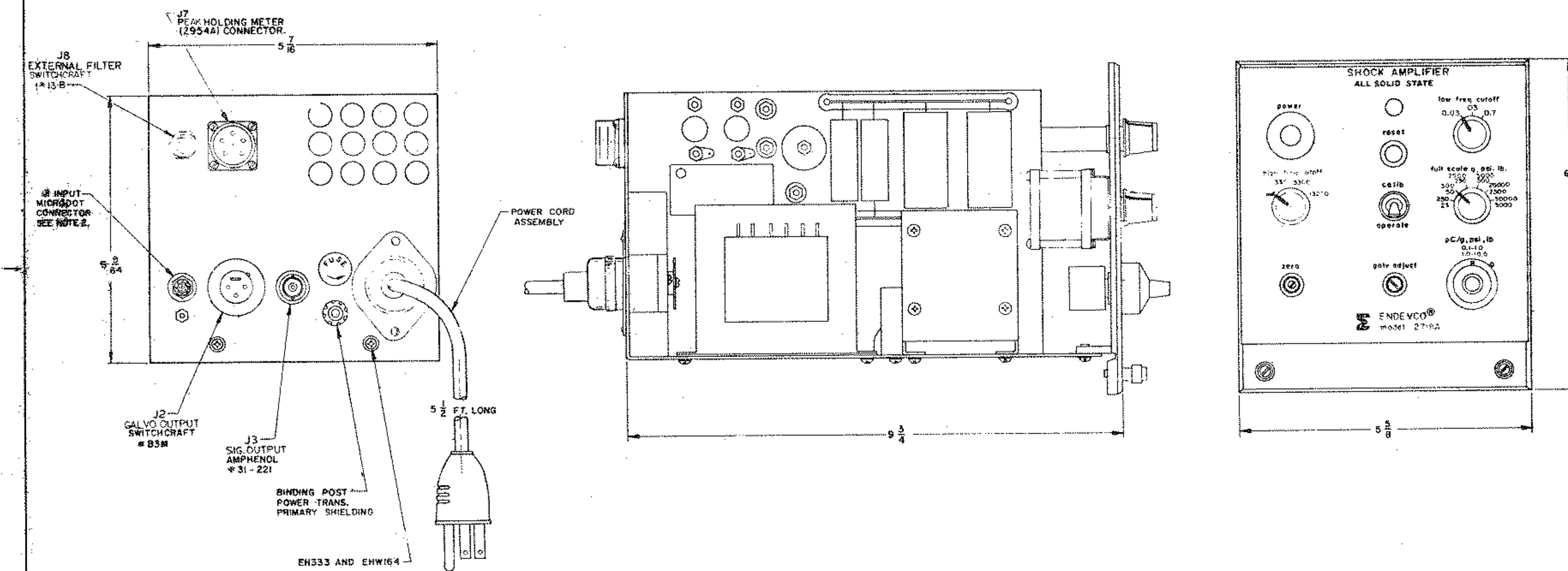
| Des. No. | Part | Value and Description | Manufacturer and No. | Endevco Part No. |
|---|---|---|---|---|
| MODEL 2718A PARTS (Not Including Calibration Board Assembly) | | | | |
| R129 | Resistor | 47 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER824 |
| R130 | Resistor | 47 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER824 |
| R131 | Resistor | 20 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER671 |
| R132 | Resistor | 20 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER671 |
| R133 | Resistor | 820 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER56 |
| R134 | Resistor | 820 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER56 |
| R135 | Resistor | 47 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER824 |
| R136 | Resistor | 47 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER824 |
| R137 | Resistor | 1.5 Ω, ±5%, 5 W, WW | Ward Leonard 5F | ER832 |
| R138 | Resistor | 1.5 Ω, ±5%, 5 W, WW | Ward Leonard 5F | ER832 |
| R140 | Resistor | 3 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER158 |
| R141 | Resistor | 3 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER158 |
| R142 | Resistor | 5 Ω, ±5%, 5 W, WW | Ward Leonard 5F | ER1493 |
| R143 | Resistor | 5 Ω, ±5%, 5 W, WW | Ward Leonard 5F | ER1493 |
| R144 | Resistor | 10 Ω, ±5%, 5 W, WW | Ward Leonard 5F | ER974 |
| R145 | Resistor | 10 Ω, ±5%, 5 W, WW | Ward Leonard 5F | ER974 |
| R201 | Resistor | 5.36 kΩ, ±1%, 1/10 W, Metal Film | Mepco FE10 | ER816 |
| R202 | Resistor | 511 Ω, ±1%, 1/10 W, Metal Film | Mepco FE10 | ER807 |
| R203 | Resistor | 33 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER196 |
| R204 | Resistor | 470 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER156 |
| R205 | Potentiometer | 6 kΩ, ±10%, 1/2 W, Carbon | Chicago Telephone 45 | 12125 |
| R206 | Potentiometer | 1 kΩ, ±10%, 1/2 W, WW | Bourns 3067P-1-102 | ER829 |
| R207 | Resistor | 10 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER182 |
| R208 | Resistor | 5.6 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER126 |
| R209 | Resistor | 33 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER196 |
| R210 | Resistor | 1.5 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER94 |

ELECTRICAL PARTS LIST (continued)

| Des. No. | Part | Value and Description | Manufacturer and No. | Endevco Part No. |
|---|---|---|---|---|
| MODEL 2718A PARTS (Not Including Calibration Board Assembly) | | | | |
| R211 | Resistor | 1.5kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER94 |
| R212 | Resistor | 33 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER196 |
| R213 | Resistor | 3 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER158 |
| R214 | Resistor | 3 kΩ, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER158 |
| R215 | Resistor | 10 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER945 |
| R216 | Resistor | 10 Ω, ±5%, 1/2 W, Comp. | Allen Bradley Type EB | ER945 |
| R217 | Resistor | Selected | Allen Bradley Type EB | |
| R218 | Resistor | Selected | Allen Bradley Type EB | |
| S1 | Switch | Three Position (One Section) | C. T. S. | 14149 |
| S2 | Switch | Four Position | C. T. S. | 15549 |
| S3 | Switch | Six Positions (Six Sections) | C. T. S. | 14148 |
| S4 | Switch | Toggle | Arrowhart 83054C | ES56 |
| S5 | Switch | DP-DT Black Button | 2PB 11 Micro Switch | ES93 |
| S101 | Switch | Push Switch | Control Corp. of Amer. J4004 | ES57 |
| T101 | Transformer | Power | | 14513 |
| LOW PASS FILTERS | | | | |
| C22 | Capacitor | .47µF, ±5%, 50V | San Fernando Elect, WS4J474 | EC245 |
| C23 | Capacitor | .047µF, ±5%, 50V | San Fernando Elect., WS4J473 | EC246 |
| C24 | Capacitor | .012µF, ±5%, 50V | San Fernando Elect., WS4J123 | EC247 |
| R79 | Resistor | 100Ω ±5%, 1/2W, Comp | A.B. Type EB | ER171 |

| PART NO. | DESCRIPTION | QTY. |
|---|---|---|
| 2718A | SHOCK AMPLIFIER | 1 |
| EP18 | PLUG, AMPHENOL #31-021 | 1 |
| EP6 | PLUG, CANNON XLR-3-11C | 1 |
| 2910-4 | PWR CORD ASSY | 1 |
| EH333 | SCREW # 4-40 x 3/8 | 2 |
| EHW164 | LOCKWASHER #4 | 2 |
| 2991 | CARRYING CASE | OPT. |
| 2991M1 | CARRYING CASE | OPT. |
| 4992A | RACK | OPT. |
| EP18 | PLUG, FOR 2718AT OPT. | OPT. |

| CHG | E.O. | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| 1 | | RELEASED | | | |
| 1A | | HIGH FREQ CUTOFF WAS 100, 1000 & 6000, J8 WAS SWITCHCRAFT #12-A | | | |
| 1B | | REVISED HVAR PICTURE | | | |
| 2 | | ADDED SIG. OUTPUT TO J2 ADDED "SIG OUTPUT" TO J3 | | | |




D-2718A-C 2

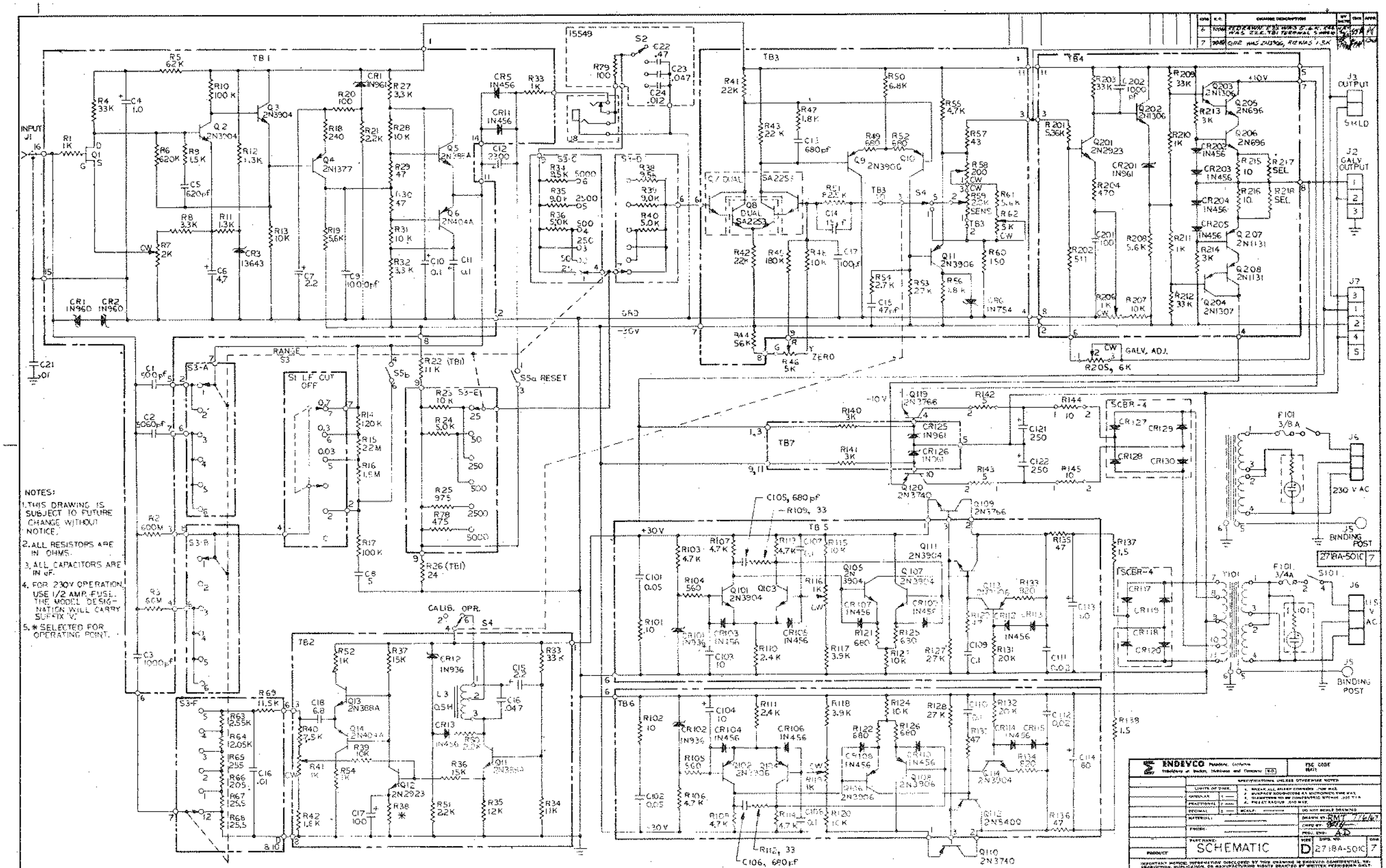
NOTES:

1. IF UNIT IS WIRED FOR 230V OPERATION MODEL SERIAL PLATE WILL CARRY MODEL DESIGNATION WITH SUFFIX "V"
2. WHEN BNC INPUT CONNECTOR INSTALLED MODEL SERIAL PLATE WILL CARRY MODEL DESIGNATION WITH SUFFIX "T".
3. THIS DRAWING IS SUBJECT TO FUTURE CHANGE WITHOUT NOTICE.

ENDEVCO Pasadena, California

PART NAME: SHOCK AMPLIFIER

SIZE: D DWG. NO. 2718A-C REV. 2




NOTES:

1. THIS DRAWING IS SUBJECT TO FUTURE CHANGE WITHOUT NOTICE.
2. ALL RESISTORS ARE IN OHMS.
3. ALL CAPACITORS ARE IN uF.
4. FOR 230V OPERATION USE 1/2 AMP FUSE. THE MODEL DESIGNATION WILL CARRY SUFFIX 'V'.
5. * SELECTED FOR OPERATING POINT.

| ISS | T.D. | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| AA | 6159 | REDRAWN (NO CHANGE) | [illegible] | [illegible] | [illegible] |
| 5 | 6213 | REVISED TYPE D/C WIRE, [illegible] ITEM 22 QTY [illegible] ADDED ITEM 35 [illegible] | [illegible] | [illegible] | [illegible] |
| 6 | 6561 | ADDED ITEMS 34 & 35. | [illegible] | [illegible] | SK |

| ITEM | PART NO | LIST OF MATERIALS — DESCRIPTION | QTY 1 | QTY 2 |
|---|---|---|---|---|
| 1 | 15445 | PRELIMINARY ASSEMBLY | 1 | 1 |
| 2 | 15388 | FRONT PANEL ASSEMBLY | 1 | 1 |
| 3 | 14144C | CIRCUIT BOARD ASSEMBLY, CHG CONVERTER | 1 | 1 |
| 4 | 13785C-1 | CIRCUIT BOARD ASSEMBLY, CALIBRATION | 1 | 1 |
| 5 | 14185C | CIRCUIT BOARD ASSEMBLY, VOLTAGE AMP | 1 | 1 |
| 6 | 35003C | POWER AMPLIFIER MODULE | 1 | 1 |
| 7 | | | | |
| 8 | 14147 | SHIELD, CHARGE CONVERTER | 1 | 1 |
| 9 | EC115 | CAPACITOR, .01uF (C21) | 1 | 1 |
| 10 | EHF38 | CLAMP, CABLE, 1/8 I.D. | 1 | 1 |
| 11 | EHF37 | CLAMP, CABLE, 1/4 I.D. | 1 | 1 |
| 12 | EHF43 | CLAMP, CABLE, 3/8 I.D. | 1 | 1 |
| 13 | EHL36 | LUG, GROUND, .315 I.D. | 1 | |
| 14 | EH318 | SCREW, 6-32 X 1/4 | 14 | 14 |
| 15 | EH324 | SCREW, 4-40 X 5/16 | 2 | 2 |
| 16 | EH326 | SCREW, 6-32 X 3/8 | 3 | 3 |
| 17 | EH333 | SCREW, 4-40 X 3/8 | 3 | 3 |
| 18 | EH369 | SCREW, 4-40 X 3/16 | 5 | 5 |
| 19 | EHW14 | WASHER, FLAT, FIBER #6 | 2 | 2 |
| 20 | EHW164 | LOCKWASHER, EXT #4 | 7 | 7 |
| 21 | EHW165 | LOCKWASHER, EXT #6 | 5 | 5 |
| 22 | EHW104 | WASHER, SHOULDER, FIBER 5/16 | 1 | 2 |
| 23 | EHN66 | NUT, HEX #6-32 | 3 | 3 |
| 24 | EHW177 | BRACKET, CIRCUIT BOARD | 2 | 2 |
| 25 | EHW105 | WASHER, FLAT | 1 | — |
| 26 | | | | |
| 27 | 15666-10 | MYLAR LABEL | 1 | 1 |
| 28 | 2970-19 | AC IDENTIFICATION LABEL | OPT | OPT |
| 29 | EHW141 | WASHER, FLAT #6 | 3 | 3 |
| 30 | — | ADHESIVE, (EASTMAN 910) | A/R | A/R |
| 31 | — | TOOL DIP, INSL-X (E/33-N) | A/R | A/R |
| 32 | EW83 | TUBING, TEFLON | A/R | A/R |
| 33 | EW99 | WIRE, BUS #22AWG | A/R | A/R |
| 34 | EW30 | WIRE, BUS #20 AWG | A/R | A/R |
| 35 | EW14 | TUBING, TEFLON | A/R | A/R |
| 36 | | | | |
| 37 | | | | |
| 38 | | | | |
| 39 | | | | |
| | | 2718T OPTION (BNC INPUT CONNECTOR) | | |
| J1 | EJ15 | BNC CONNECTOR | | 1 |
| 45 | EHL8 | LUG, SOLDER | | 1 |
| 46 | EHW169 | LOCKWASHER, INT 3/8 I.D. | | 1 |
| 47 | 13236 | BUSHING EXTENDER | | 1 |

NOTES:

(1) THIS DRAWING IS SUBJECT TO FUTURE CHANGE WITHOUT NOTICE.

(2) QUANTITY -1 FOR 2718A STANDARD; -2 FOR 2718AT (SUFFIX "T" TO BE ADDED TO MODEL DESIGNATION ON MYLAR LABEL (ITEM 27)

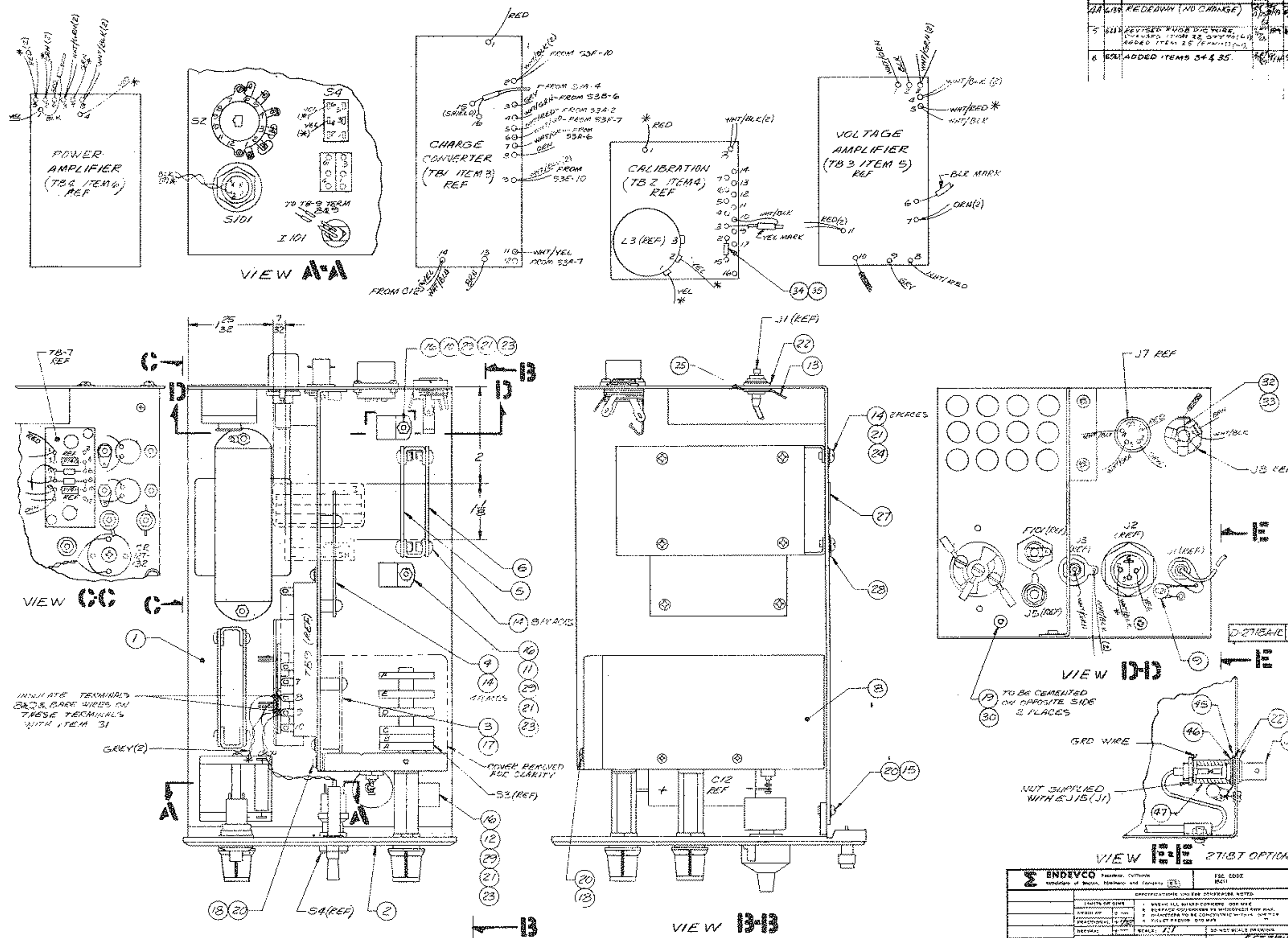
(3) ALL WIRE HOOKUP IS FROM MAIN HARNESS (15389) EXCEPT FOR THOSE WIRES MARKED * WHICH IS FROM POWER SUPPLY HARNESS 14522 OR AS NOTED

FOR 230V OPERATION:

(4) a REWORK 2910-4 - POWER CORD ASSEMBLY, LISTED ON 2718A-C PER NOTE 1 OF B-2910-4

b MODEL NUMBER WILL CARRY SUFFIX "V". SERIAL NUMBER WILL BE SUPPLIED BY PRODUCTION DEPARTMENT.

c. ITEM 28 (AC IDENTIFICATION LABEL) TO READ: 210-250 VOLTS, 50-400 Hz.



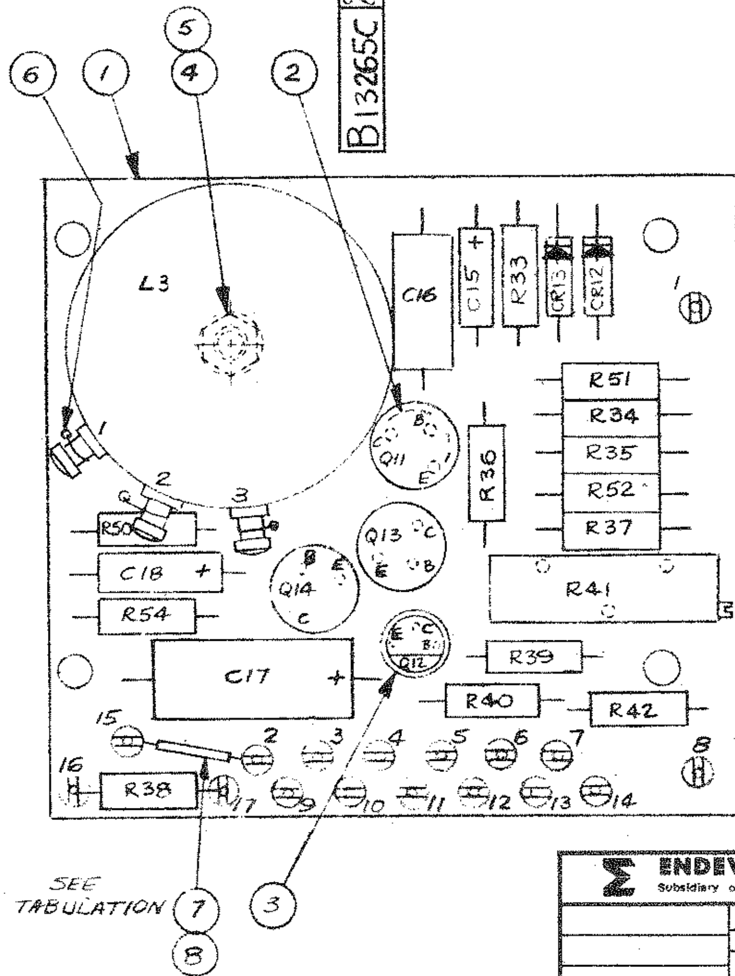

| | | |
|---|---|---|
| ENDEVCO Pasadena, California | | FSC CODE |
| MATERIAL: LISTED | SCALE: 1/1 | DRAWN BY: [illegible] |
| 2718A | PART NAME: MAIN ASSEMBLY | SIZE D · DWG NO. 2718A-1C · CHG 6 |
| PRODUCT | | |

D-2718A-1C 6

## LIST OF MATERIAL

| ITEM | PART NO. | DESCRIPTION | QTY | |
|---|---|---|---|---|
| 1 | 13264 | CIRCUIT BOARD | 1 | — |
| 2 | EHW94 | TRANSIPAD | 3 | — |
| 3 | EHW108 | TRANSIPAD | 1 | — |
| 4 | EHW2 | LOCKWASHER #6 | 1 | — |
| 5 | EHN34 | HEX NUT #6-32 | 1 | — |
| 6 | EW30 | BUS WIRE #20 AWG | AR | — |
| 7 | EW30 | BUS WIRE #20 AWG | * | — |
| 8 | EW14 | TUBING, TEFLON | * | — |
| 9 | | SOLDER, 63-37, ROSIN CORE | AR | — |
| | | | | |
| C15 | EC63 | CAPACITOR, 2.2μF | 1 | .590 |
| C16 | EC246 | , .047 | 1 | .750 |
| C17 | EC220 | , 100μF | 1 | 1.040 |
| C18 | EC276 | CAPACITOR, 6.8μF | 1 | .700 |
| | | | | |
| CR12 | ECR63 | DIODE, 1N936 | 1 | .550 |
| CR13 | ECR31 | DIODE, 1N456 | 1 | .550 |
| | | | | |
| L3 | 12795 | INDUCTOR, 0.5H | 1 | — |
| | | | | |
| Q11 | EQ81 | TRANSISTOR, 2N388A | 2 | — |
| Q12 | EQ94 | , 2N2923 | 1 | — |
| Q13 | EQ81 | , 2N388A | — | — |
| Q14 | EQ82 | TRANSISTOR, 2N404A | 1 | — |
| | | | | |
| R33 | ER196 | RESISTOR, 33K | 1 | .590 |
| R34 | ER1022 | , 11 K | 1 | .610 |
| R35 | ER249 | , 12K | 1 | .610 |
| R36 | ER168 | , 15K | 2 | .550 |
| R37 | ER168 | , 15K | — | .610 |
| R38 | * | , SELECTED | | — |
| R39 | ER187 | , 10 K | 1 | .550 |
| R40 | ER719 | RESISTOR, 7.5K | 1 | .550 |
| R41 | ER829 | POTENTIOMETER, 1K | 1 | — |
| R42 | ER293 | RESISTOR, 1.8K | 1 | .550 |
| R50 | ER169 | , 2.2K | 2 | .590 |
| R51 | ER169 | , 2.2K | — | .610 |
| R52 | ER23 | , 1K | 2 | .610 |
| R54 | ER23 | RESISTOR, 1K | — | .590 |

B13265C CHG 8A




SEE TABULATION

| DASH | DESCRIPTION |
|---|---|
| -1 | OMIT ITEMS 7&8 |
| -2 | INSTALL ITEMS 7&8 |

| CHG | E.O. | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| 5A | 5867 | REDRAWN, NO CHANGE | ET | | |
| 6 | 6333 | ER1794 WAS ER829 | | | |
| 7 | 6376 | ER829 WAS ER1794 | JAD 11-7-68 | | |
| 8 | 6483 | R33 WAS ER1021, 62 K | ET | | SK |
| 8A | 6561 | REMOVED WHERE USED COLUMN | ET | | SK |

NOTE:

1. CIRCUITRY LOCATED ON FAR SIDE.
2. ITEMS 7&8 ARE NOT INSTALLED WHEN UNIT HAS AN EXTERNAL CALIBRATION. (REF.)

**ENDEVCO** Pasadena, California
Subsidiary of Becton, Dickinson and Company [B-D]

FSC CODE 95411

SPECIFICATIONS UNLESS OTHERWISE NOTED

| LIMITS OF DIMS. | |
|---|---|
| ANGULAR | ± — |
| FRACTIONAL | ± — |
| DECIMAL | ± — |

1. BREAK ALL SHARP CORNERS .005 MAX.
2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX.
3. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R.
4. FILLET RADIUS .010 MAX.

SCALE: 2/1 — DO NOT SCALE DRAWING

| PRODUCT |
|---|
| 2718 A |
| 2629B |
| 2628A |
| 2627A |

MATERIAL: NOTED
FINISH: —
DRAWN BY: EET 8/10/64
CHKD BY: FRANZON 8/11/64
PROJ. ENG: JR WDB

PART NAME: CALIBRATION BOARD ASSEMBLY

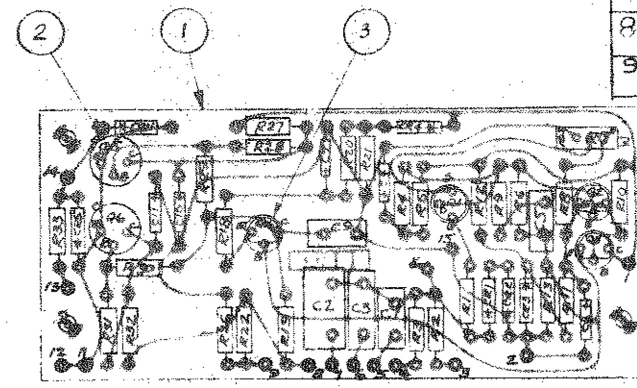
SIZE: B — DWG. NO.: 13265C — CHG: 8A

B | 14144C | CHG 11

## LIST OF MATERIAL

| ITEM | PART NO. | DESCRIPTION | QTY | |
|---|---|---|---|---|
| 1 | 14143 | CIRCUIT BOARD | 1 | — |
| 2 | EHW94 | TRANSIPAD | 2 | — |
| 3 | EHW108 | TRANSIPAD | 4 | — |
| R1 | ER23 | RESISTOR, 1K | 2 | .560 |
| R2 | ER800 | 600M | 1 | |
| R3 | ER1172 | 66M | 1 | |
| R4 | ER196 | 33K | 1 | |
| R5 | ER1021 | 62K | 1 | |
| R6 | ER1557 | RESISTOR, 620 K | 1 | .560 |
| R7 | ER1675 | POTENTIOMETER, 2K | 1 | — |
| R8 | ER163 | RESISTOR, 3.3K | 3 | .560 |
| R9 | ER94 | 1.5K | 1 | |
| R10 | ER233 | 100K | 1 | |
| R11 | ER60 | 1.3K | 1 | |
| R12 | ER60 | 1.3K | 1 | |
| R13 | ER182 | 10K | 3 | |
| R18 | ER248 | 240 Ω | 1 | |
| R19 | ER126 | 5.6K | 1 | |
| R20 | ER171 | 100 Ω | 1 | |
| R21 | ER169 | 2.2K | 1 | |
| R22 | ER1022 | 11 K | 1 | |
| R26 | ER1507 | 24 Ω | 1 | |
| R27 | ER163 | 3.3K | — | |
| R28 | ER182 | 10K | — | |
| R29 | ER824 | 47Ω | 2 | |
| R30 | ER824 | 47Ω | — | |
| R31 | ER182 | 10K | — | |
| R32 | ER163 | 3.3K | — | |
| R33 | ER23 | RESISTOR, 1K | — | .560 |
| C1 | EC232 | CAPACITOR, 300 pF | 1 | — |
| C2 | EC360 | 5060 pF | 1 | — |
| C3 | EC19 | 1000 pF | 1 | — |
| C4 | EC209A | 1.0 μF | 1 | .560 |
| C5 | EC544 | 620 pF | 1 | — |
| C6 | EC150 | 4.7 μF | 1 | .560 |
| C7 | EC204 | 2.2 μF | 1 | .560 |
| C9 | EC359 | 1000 pF | 1 | — |
| C10 | EC149 | 0.1 μF | 2 | .560 |
| C11 | EC149 | CAPACITOR, 0.1μF | — | .560 |
| CR1 | ECR189 | DIODE, 1N960 | 2 | .560 |
| CR2 | ECR189 | 1N960 | — | |
| CR3 | 13643 | | 1 | |
| CR4 | ECR62 | 1N961 | 1 | |
| CR5 | ECR31 | 1N456 | 2 | .560 |
| CR11 | ECR31 | DIODE, 1N456 | — | .560 |

| | | | | |
|---|---|---|---|---|
| Q1 | 14853-2 | TRANSISTOR, FET | 1 | — |
| Q2 | EQ130 | 2N3904 | 2 | — |
| Q3 | EQ130 | 2N3904 | — | — |
| Q4 | EQ100 | 2N1377 | 1 | — |
| Q5 | EQ81 | 2N889A | 1 | — |
| Q6 | EQ82 | TRANSISTOR, 2N4044 | 1 | — |




| CHG | E.O. | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| 5 | 5311 | REDRAWN, RERELEASED R6 WAS ER 230 R9 WAS ER 766 C5 WAS EC341 Q1 WAS 11619 | ET 5/22/67 | [illegible] | [illegible] |
| 6 | 5394 | R7 WAS ER1242 | [illegible] | [illegible] | [illegible] |
| 7 | 5906 | CR1 & CR2 WERE ECR28, IN7[illegible] | [illegible] | [illegible] | [illegible] |
| 7A | 6116 | C4 WAS 1.0 pF. NOW μF | [illegible] | [illegible] | [illegible] |
| 8 | 6372 | Q4 WAS EQ137, 2N3906 | [illegible] | [illegible] | [illegible] |
| 9 | 6587 | Q1 WAS 14853-1 | [illegible] | [illegible] | SK |
| 10 | 7006 | R22 WAS ER126, 5.6K | [illegible] | [illegible] | [illegible] |
| 11 | 7069 | R12 WAS ER214 2.0K | MS [illegible] | [illegible] | [illegible] |

THIS DRAWING IS SUBJECT TO FUTURE CHANGE WITHOUT NOTICE.

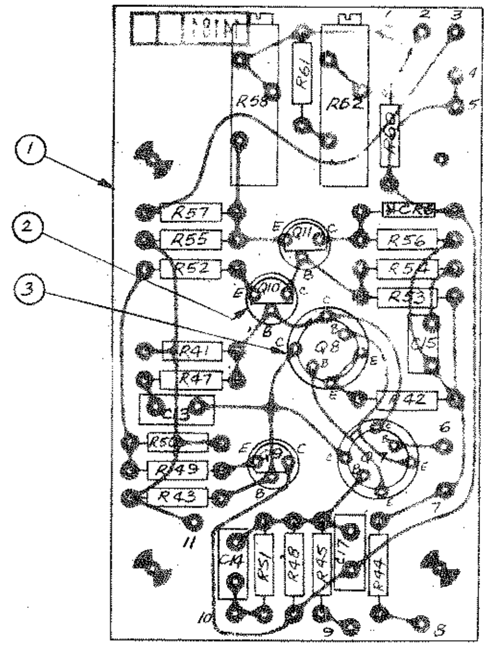
**ENDEVCO** Pasadena, California | FSC CODE 95411

SPECIFICATIONS UNLESS OTHERWISE NOTED
1. BREAK ALL SHARP CORNERS .005 MAX.
2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX.
3. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R.
4. FILLET RADIUS .010 MAX.

LIMITS OF DIMS.: ANGULAR ± — ; FRACTIONAL ± — ; DECIMAL ± —
SCALE: 1/1
DO NOT SCALE DRAWING
MATERIAL: LISTED
FINISH: ——
DRAWN BY: WN 8/30/65
CHKD BY: GH
PROJ. ENG: GM JR SK
PRODUCT: 2718A
PART NAME: CIRCUIT BOARD ASSY, CHARGE CONVERTER
SIZE: B DWG. NO. 14144C CHG. 11

| LIST OF MATERIALS | | | | |
|---|---|---|---|---|
| ITEM | PART NO. | DESCRIPTION | QTY | |
| 1 | 14184 | BOARD | 1 | |
| 2 | EHW108 | TRANSIPAD | 3 | |
| 3 | EHW102 | TRANSIPAD | 2 | |
| | | | | |
| C13 | EC106 | CAPACITOR, 680pF | 1 | |
| C14 | EC377 | CAPACITOR, 15pF | 1 | |
| C15 | EC113 | CAPACITOR, 47pF | 1 | |
| C17 | EC234 | CAPACITOR, 100pF | 1 | |
| | | | | |
| CR6 | ECR83 | DIODE, 1N754 | 1 | .562 |
| | | | | |
| Q7 | EQ107 | TRANSISTOR, SA2253 | 1 | |
| Q8 | EQ150 | TRANSISTOR, SA2253 | 1 | |
| Q9 | EQ127 | TRANSISTOR, 2N3906 | 3 | |
| Q10 | EQ127 | TRANSISTOR, 2N3906 | | |
| Q11 | EQ127 | TRANSISTOR, 2N3906 | | |
| | | | | |
| R41 | ER818 | RESISTOR, 22K | 3 | .562 |
| R42 | ER818 | 22K | | |
| R43 | ER818 | 22K | | |
| R44 | ER1020 | 56K | 1 | |
| R45 | ER1128 | 180K | 1 | |
| R47 | ER293 | 1.8K | 1 | |
| R48 | ER808 | 10K | 1 | |
| R49 | ER159 | 680Ω | 2 | |
| R50 | ER819 | 6.8K | 1 | |
| R51 | ER814 | 82.5K | 1 | |
| R52 | ER159 | 680Ω | | |
| R53 | ER820 | 27K | 1 | |
| R54 | ER197 | 2.7K | 1 | |
| R55 | ER270 | 4.7K | 1 | |
| R56 | ER293 | 1.8K | 1 | |
| R57 | ER1008 | RESISTOR, 43Ω | 1 | .562 |
| R58 | ER826 | POTENTIOMETER, 200Ω | 1 | |
| R60 | ER815 | RESISTOR, 150Ω | 1 | .562 |
| R61 | ER126 | RESISTOR, 5.6K | 1 | .562 |
| R62 | ER792 | POTENTIOMETER, 5K | 1 | |

| CHG | E.O. | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| 3A | 6150 | REDRAWN. NO CHANGE. | | | |
| 4 | 7006 | R44 WAS ER818, 22K | | | |




C 14185C 4

THIS DRAWING IS SUBJECT TO FUTURE CHANGE
WITHOUT NOTICE.

**ENDEVCO** Pasadena, California
Subsidiary of Becton, Dickinson and Company

FSC CODE 35411

SPECIFICATIONS UNLESS OTHERWISE NOTED

| LIMITS OF DIMS | | |
|---|---|---|
| ANGULAR | ± | 1. BREAK ALL SHARP CORNERS .005 MAX. |
| FRACTIONAL | ± | 2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX. |
| DECIMAL | ± | 3. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R. |
| | | 4. FILLET RADIUS .010 MAX. |

SCALE: 2/1 — DO NOT SCALE DRAWING
MATERIAL: LISTED
FINISH:
DRAWN BY: EET 9/2/65
CHKD BY: WN
PROJ. ENG.: JM JR.
2718 — PRODUCT
PART NAME: CIRCUIT BOARD ASSEMBLY, VOLTAGE AMP
SIZE: C DWG. NO.: 14185C CHG: 4

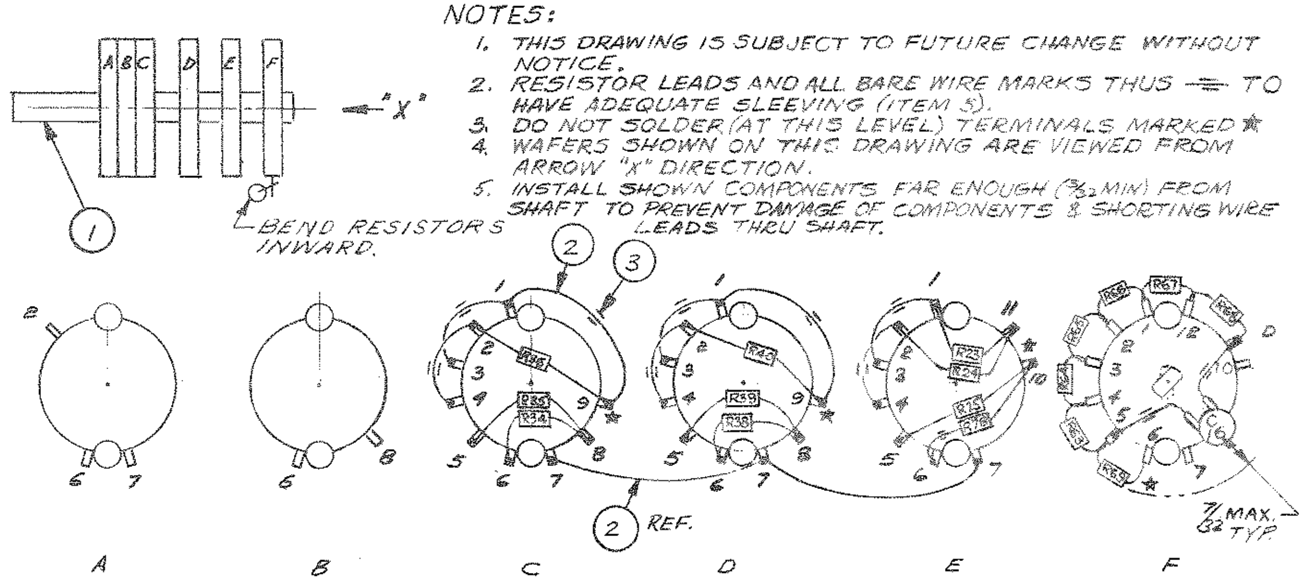
B 14188C CHG 3A

| ITEM | PART # | DESCRIPTION | QTY. |
|---|---|---|---|
| 1 | 14148 | SWITCH ROTARY | 1 |
| 2 | EW39 | #22 AWG BUS WIRE | A.R. |
| 3 | EW 14 | SLEEVING | A.R. |
| | | | |
| | | | |
| R23 | ER802 | RESISTOR 10K | 1 |
| R24 | ER1061 | " 5K | 3 |
| R25 | ER1579 | " 975Ω | 1 |
| R34 | ER1363 | " 9.5K | 2 |
| R35 | ER1362 | " 9K | 2 |
| R36 | ER1061 | " 5K | — |
| R38 | ER1363 | " 9.5K | — |
| R39 | ER1362 | " 9K | — |
| R40 | ER1061 | " 5K | — |
| R63 | ER 809 | " 2.55K | 1 |
| R64 | ER 810 | " 2.05K | 1 |
| R65 | ER811 | " 255Ω | 1 |
| R66 | ER812 | " 205Ω | 1 |
| R67 | ER978 | " 25.5Ω | 2 |
| R68 | ER 978 | " 25.5Ω | — |
| R69 | ER838 | " 11.5K | 1 |
| R70 | ER1492 | " 475Ω | 1 |
| | | | |
| C16 | EC115 | CAPACITOR .01μF | 1 |
| | | | |

| CHG | E.O. | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| 1 | 4330 | RELEASED | ET | | |
| 2 | 4521 | 7/32 DIM. WAS 3/8. ADDED RESISTOR MTG. NOTE. | FG | | |
| 3 | 4636 | ADD LUG 10 TO DECK F CHANGE R25 TO 975Ω | ET | | |
| 3A | 5098 | ADDED NOTE 5 & PICTORIAL CHG. OF DECK "E". | ET | | |

NOTES:

1. THIS DRAWING IS SUBJECT TO FUTURE CHANGE WITHOUT NOTICE.
2. RESISTOR LEADS AND ALL BARE WIRE MARKS THUS ═ TO HAVE ADEQUATE SLEEVING (ITEM 3).
3. DO NOT SOLDER (AT THIS LEVEL) TERMINALS MARKED ✱
4. WAFERS SHOWN ON THIS DRAWING ARE VIEWED FROM ARROW "X" DIRECTION.
5. INSTALL SHOWN COMPONENTS FAR ENOUGH (3/32 MIN) FROM SHAFT TO PREVENT DAMAGE OF COMPONENTS & SHORTING WIRE LEADS THRU SHAFT.




ENDEVCO CORPORATION
Pasadena, California

FSC CODE 95411

SPECIFICATIONS UNLESS OTHERWISE NOTED

| LIMITS OF DIMS. | |
|---|---|
| ANGULAR | ± — |
| FRACTIONAL | ± — |
| DECIMAL | ± — |

1. BREAK ALL SHARP CORNERS .005 MAX.
2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX.
3. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R.
4. FILLET RADIUS .010 MAX.

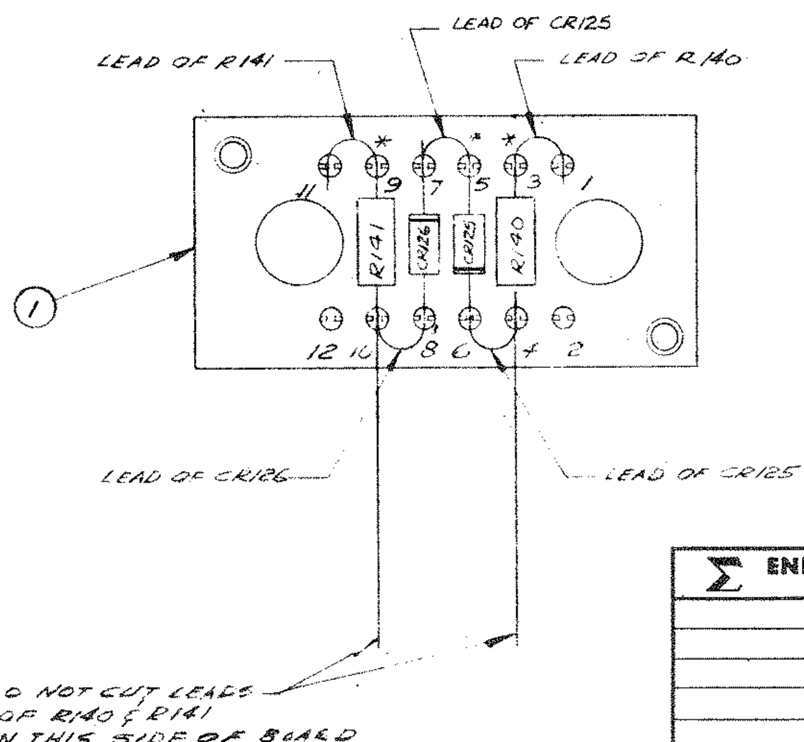
SCALE: ———
DO NOT SCALE DRAWING
MATERIAL: LISTED
DRAWN BY: EET 9/15/65
FINISH: ———
CHKD BY:
PROJ. ENG:
PRODUCT: 2718
PART NAME: SWITCH ASSY- RANGE
SIZE: B
DWG. NO.: 14188C
CHG: 3A

B-14523C 2

## BILL OF MATERIAL

| ITEM | PART NO. | DESCRIPTION | QTY |
|---|---|---|---|
| 1 | 12472 | TERMINAL BOARD ASSEMBLY | 1 |
| | | | |
| | | | |
| R140 | ER158 | RESISTOR, 3K | 2 |
| R141 | ER156 | RESISTOR, 3K | — |
| CR125 | ECR62 | DIODE, IN961 | 2 |
| CR126 | ECR62 | DIODE, IN961 | — |

| CHG | E.O. | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| 1 | 4380 | RELEASED | RLL 2-18-66 | | |
| 2 | 4478 | R140 & R141 WERE ER294 | RLL 6-14-66 | RLL | |




DO NOT SOLDER CONNECTIONS AT TERMINALS MARKED * AT THIS LEVEL

| ENDEVCO Pasadena, California | | FSC CODE 95411 |
|---|---|---|
| SPECIFICATIONS UNLESS OTHERWISE NOTED | | |
| LIMITS OF DIMS. | 1. BREAK ALL SHARP CORNERS .005 MAX. 2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX. 3. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R. 4. FILLET RADIUS .010 MAX. | |
| ANGULAR ± — | | |
| FRACTIONAL ± — | | |
| DECIMAL ± — | SCALE: 2:1 | DO NOT SCALE DRAWING |
| MATERIAL: LISTED | | DRAWN BY: RLL 2-18-66 |
| | | CHKD BY: |
| FINISH: — | | PROJ. ENG.: |
| 2718 PRODUCT | PART NAME: TERMINAL BOARD ASS'Y, AUX. REGULATOR | SIZE B DWG. NO. 14523C CHG 2 |

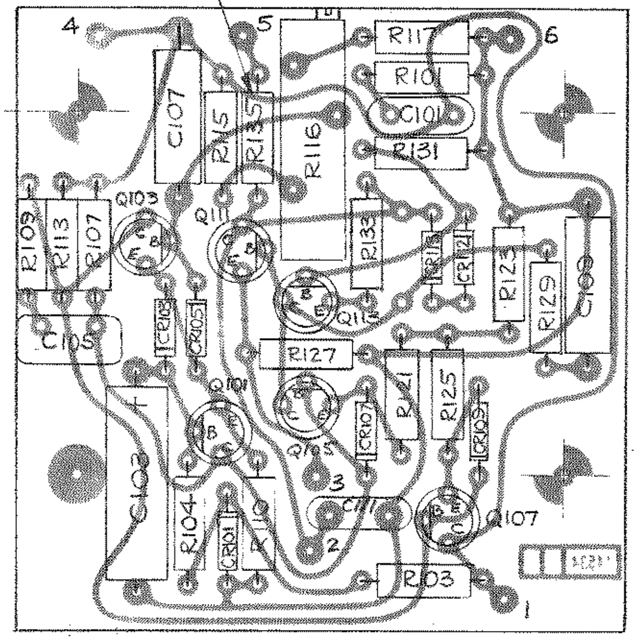
B 14535C 4A

| CHG | E.O | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| 4A | 5971 | REDRAWN, NO CHG. | ET 3/4/67 | | |

## BILL OF MATERIAL

| ITEM | PART NO. | DESCRIPTION | QTY | ℄-℄ |
|---|---|---|---|---|
| 1 | 14534 | CIRCUIT BOARD | 1 | — |
| 2 | EHW108 | TRANSIPAD | 6 | — |
| | | | | |
| R101 | ER945 | RESISTOR, 10Ω | 1 | .500 |
| R103 | ER270 | , 4.7K | 3 | |
| R104 | ER823 | , 560Ω | 1 | |
| R107 | ER270 | , 4.7K | — | |
| R109 | ER1006 | , 33Ω | 1 | |
| R110 | ER295 | , 2.4K | 1 | |
| R113 | ER270 | , 4.7K | — | |
| R115 | ER182 | RESISTOR, 10K | 2 | .500 |
| R116 | ER829 | POTENTIOMETER, 1K | 1 | — |
| R117 | ER164 | RESISTOR, 3.9K | 1 | .500 |
| R121 | ER159 | , 680Ω | 2 | |
| R123 | ER182 | , 10K | — | |
| R125 | ER159 | , 680Ω | — | |
| R127 | ER820 | , 27K | 1 | |
| R129 | ER824 | , 47Ω | 1 | |
| R131 | ER671 | , 20K | 1 | |
| R133 | ER56 | , 820Ω | 1 | |
| R135 | | RESISTOR, SEE LEGEND | — | .500 |
| | | | | |
| C101 | EC324 | CAPACITOR, .05μF | 1 | — |
| C103 | EC242 | 10μF | 1 | .900 |
| C105 | EC106 | 680pF | 1 | — |
| C107 | EC314 | .1μF | 2 | .687 |
| C109 | EC314 | .1μF | — | .687 |
| C111 | EC273 | CAPACITOR .02μF | 1 | — |
| | | | | |
| CR101 | ECR63 | DIODE, 1N936 (ZENER) | 1 | .375 |
| CR103 | ECR31 | , 1N456 | 6 | |
| CR105 | ECR31 | , 1N456 | — | |
| CR107 | ECR31 | , 1N456 | — | |
| CR109 | ECR31 | , 1N456 | — | |
| | | | | |
| CR112 | ECR31 | , 1N456 | — | |
| CR113 | ECR31 | DIODE, 1N456 | - | .375 |
| | | | | |
| Q101 | EQ130 | TRANSISTOR, 2N3904 | 5 | — |
| Q103 | EQ130 | , 2N3904 | — | — |
| Q105 | EQ130 | , 2N3904 | — | — |
| Q107 | EQ130 | , 2N3904 | — | — |
| Q111 | EQ130 | , 2N3904 | — | — |
| Q113 | EQ127 | TRANSISTOR, 2N3906 | 1 | — |

SEE LEGEND




NOTES: 1. CIRCUITRY LOCATED ON FAR SIDE.
2. THIS DRAWING SUBJECT TO FUTURE CHANGE WITHOUT NOTICE.

### LEGEND

| DASH NO. | R135 VALUE | R135 PART NO. |
|---|---|---|
| -1 | 47Ω | ER824 |
| -2 | 10Ω | ER945 |
| -3 | — | STRAP WITH EW-35 BUS WIRE. |

**ENDEVCO CORPORATION**
Pasadena, California

FSC CODE 95411

SPECIFICATIONS UNLESS OTHERWISE NOTED
1. BREAK ALL SHARP CORNERS .005 MAX.
2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX.
3. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R.
4. FILLET RADIUS .010 MAX.

| | |
|---|---|
| LIMITS OF DIMS. | |
| ANGULAR | ± — |
| FRACTIONAL | ± — |
| DECIMAL | ± — |
| SCALE | 2/1 |
| MATERIAL | LISTED |
| FINISH | — |

DO NOT SCALE DRAWING
DRAWN BY RLL 3.7.66
CHKD BY W.N.
PROJ. ENG. GWM

2622C
2718
PRODUCT

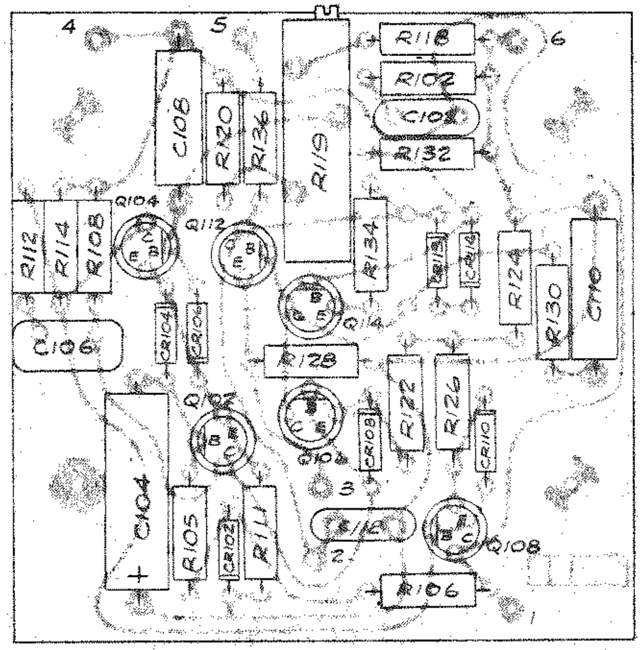
PART NAME: +30V POWER SUPPLY CIRCUIT BOARD ASSEMBLY

SIZE B | DWG. NO. 14535 C | CHG 4A

B-14536C 5

## BILL OF MATERIALS

| ITEM | PART NO | DESCRIPTION | QTY | ¢-¢ |
|---|---|---|---|---|
| 1 | 14534 | CIRCUIT BOARD | 1 | — |
| 2 | EHW108 | TRANSIPAD | 6 | — |
| R102 | ER945 | RESISTOR, 10Ω | 1 | .500 |
| R105 | ER823 | 560Ω | 1 | ↕ |
| R106 | ER270 | 4.7K | 3 | ↕ |
| R108 | ER270 | 4.7K | — | ↕ |
| R111 | ER295 | 2.4K | 1 | ↕ |
| R112 | ER1006 | 33Ω | 1 | ↕ |
| R114 | ER270 | 4.7K | — | ↕ |
| R118 | ER164 | RESISTOR, 3.9K | 1 | .500 |
| R119 | ER829 | POTENTIOMETER, 1K | 1 | |
| R120 | ER162 | RESISTOR, 10K | 2 | .500 |
| R122 | ER159 | 680Ω | 2 | ↕ |
| R124 | ER162 | 10K | — | ↕ |
| R126 | ER159 | 680Ω | — | ↕ |
| R128 | ER820 | 27K | 1 | ↕ |
| R130 | ER824 | 47Ω | 2 | ↕ |
| R132 | ER671 | 20K | 1 | ↕ |
| R134 | ER56 | 820Ω | 1 | ↕ |
| R136 | ER824 | RESISTOR, 47Ω | — | .500 |
| C102 | EC324 | CAPACITOR, .05µF | 1 | — |
| C104 | EC242 | 10µF | 1 | .900 |
| C106 | EC106 | 680pF | 1 | — |
| C108 | EC314 | .1µF | 2 | .687 |
| C110 | EC314 | .1µF | — | .687 |
| C112 | EC273 | CAPACITOR, .02µF | 1 | — |
| CR102 | ECR63 | DIODE, 1N936 (ZENER) | 1 | .375 |
| CR104 | ECR31 | 1N456 | 6 | ↕ |
| CR106 | ECR31 | 1N456 | — | ↕ |
| CR108 | ECR31 | 1N456 | — | ↕ |
| CR110 | ECR31 | 1N456 | — | ↕ |
| CR114 | ECR31 | 1N456 | — | ↕ |
| CR115 | ECR31 | DIODE, 1N456 | — | ↕ |
| Q102 | EQ127 | TRANSISTOR, 2N3906 | 4 | — |
| Q104 | EQ127 | | — | — |
| Q106 | EQ127 | | — | — |
| Q108 | EQ127 | 2N3906 | — | — |
| Q112 | EQ216 | 2N5400 | 1 | — |
| Q114 | EQ130 | TRANSISTOR, 2N3904 | 1 | — |




| CHG | E.O. | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| 4A | 547 | REDRAWN, NO CHG. | | | |
| 5 | | Q112 WAS 2N3906(EQ127) | | | |

NOTES:
1. CIRCUITRY LOCATED ON FARSIDE
2. THIS DRAWING SUBJECT TO FUTURE CHANGE WITHOUT NOTICE

**ENDEVCO** Pasadena, California — FSC CODE 95411

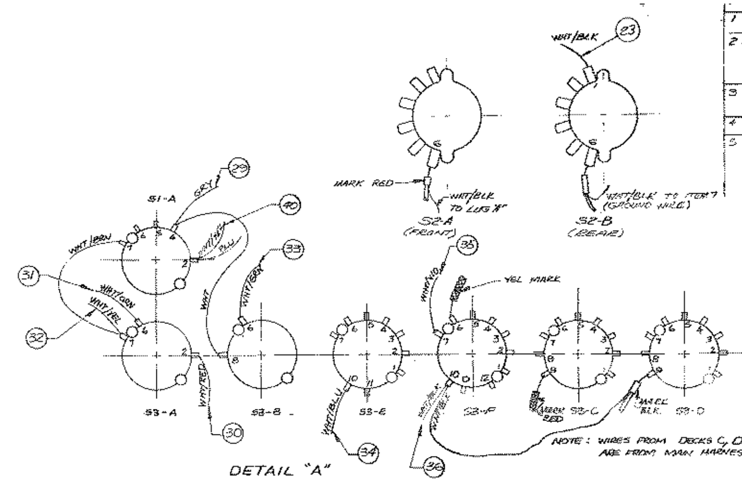
SCALE 2X — MATERIAL LISTED — DRAWN BY RLL 3-8-66 — CHKD BY WN — PROJ ENG GWM

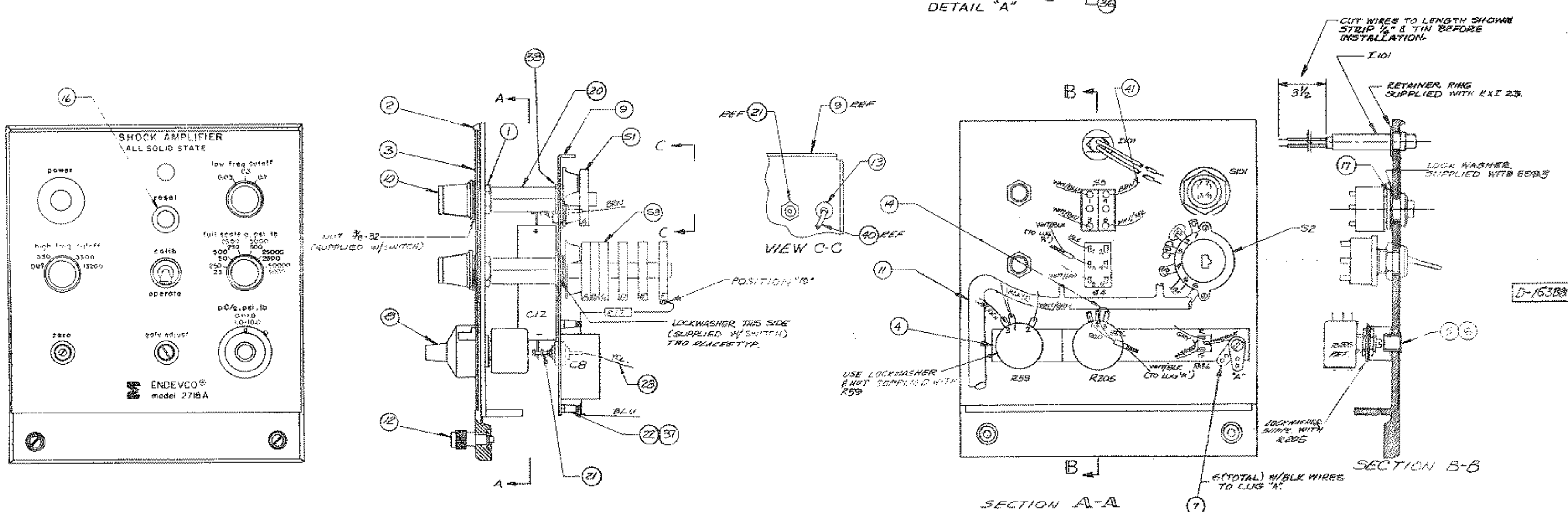
.2718 PRODUCT — PART NAME -30V POWER SUPPLY CIRCUIT BOARD ASSEMBLY — SIZE B — DWG NO 14536C — CHG 5

| LIST OF MATERIAL | | | QUANTITY | |
|---|---|---|---|---|
| ITEM | PART NO. | DESCRIPTION | -1 | -2 |
| I101 | EXI 723 | INDICATOR LIGHT | 1 | 1 |
| R46 | ER1552 | POTENTIOMETER, 5K | 1 | 1 |
| R59 | ER827 | POTENTIOMETER, 2K | 1 | 1 |
| R205 | 12125 | POTENTIOMETER, 6K | 1 | 1 |
| S2 | 15549 | SWITCH ASSY | | |
| S4 | E556 | SWITCH | 1 | 1 |
| S5 | E593 | SWITCH | 1 | 1 |
| S101 | E557 | SWITCH, PUSH | 1 | 1 |
| R17 | ER 233 | RESISTOR, 100K | 1 | 1 |
| 1 | EHM 70 | NUT, HEX 3/8-32 | 2 | 2 |
| 2 | 15386 | FACE PLATE | 1 | 1 |
| 3 | 15387 | METAL CAL | 1 | 1 |
| 4 | 14867 | POT BRACKET | 1 | 1 |
| 5 | 10574 | PANEL BEARING | 2 | 2 |
| 6 | EHW61 | RING, RETAINING, EXT 3/8 | 2 | 2 |
| 7 | EHL15 | LUG, SOLDER | 2 | 2 |
| 8 | EHM364 | DIAL | 1 | 1 |
| 9 | 14146 | BRACKET, CHARGE CONVERTER | 1 | 1 |
| 10 | 14344 | KNOB, INDICATOR | 3 | 3 |
| 11 | 15389-1 | MAIN HARNESS | 1 | |
| 12 | EHM358 | FASTENER, TURN-LOC | 2 | 2 |
| 13 | EHR28 | GROMMET | 1 | 1 |
| 14 | EW39 | BUS WIRE | 1" | 1" |
| 15 | EH324 | SCREW, 4-40 X 5/16 | 5 | 5 |
| 16 | 14775 | DRESS NUT, MODIFIED | 1 | 1 |
| 11 | 15389-2 | MAIN HARNESS | | 1 |

| ITEM | PART NO. | DESCRIPTION | -1 | -2 | FROM | TO |
|---|---|---|---|---|---|---|
| 17 | EHW187 | WASHER FLAT 1/2 OD. | 1 | 1 | | |
| 18 | | | 1 | 1 | | |
| 19 | EHW164 | LOCKWASHER, EXT #4 | 2 | 2 | | |
| 20 | EHM323 | BUSHING EXTENDER | 2 | 2 | | |
| 21 | EE115 | FEED-THRU | 2 | 2 | | |
| 22 | EE134 | TERMINAL, INSULATED | 2 | 2 | FROM | TO |
| 23 | EW125 | WIRE, 22 AWG, WHT/BLK | 5" | 5" | S2B-1 | LUG "A" |
| 24 | EW33 | BRN | 3¼" | 3½" | S1A-7 | C12(+) |
| 25 | EW40 | BLU | 6½" | 6½" | S1A-2 | C8 |
| 26 | EW35 | WHT | 4½" | 4½" | S1A-4 | S3B-8 |
| 27 | EW127 | WHT/BRN | 3" | 3" | S1A-7 | S3A-7 |
| 28 | EW122 | YEL. | 3" | 3" | | |
| 29 | EW36 | GRAY | 4" | 4" | | |
| 30 | EW124 | WHT/RED | 4" | 4" | | |
| 31 | EW128 | WHT/ORN | 5" | 5" | | |
| 32 | EW234 | WHT/YEL | 5⅝" | 5⅝" | | |
| 33 | EW160 | WHT/GRN | 5" | 5" | | |
| 34 | EW133 | WHT/BLU | 6" | 6" | | |
| 35 | EW244 | WHT/VIO. | 6" | 6" | | |
| 36 | EW125 | WIRE, WHT/BLK | 6½" | 6½" | | |
| 37 | EH368 | SCREW, 4-40 X 1/8 | 2 | 2 | | |
| 38 | EHW185 | LOCK WASHER, 3/8 | 2 | 2 | | |
| C8 | EC479 | CAPACITOR, 5 µF | 1 | 1 | | |
| C12 | EC427 | CAPACITOR, 2300 µF | 1 | 1 | | |
| S1 | 14189C | SWITCH, ASSY L.F. CUTOFF | 1 | 1 | | |
| S3 | 14188C | SWITCH, ASSY RANGE | 1 | 1 | FROM | TO |
| 40 | EW234 | WIRE, WHT/YEL | 2½" | 2½" | S5-6 | S1A-2 |
| 41 | EW33 | WIRE, BRN | 1½" | 1½" | S5-4 | C12(+) |

| | | | | |
|---|---|---|---|---|
| 1 | 5313 | RELEASED | | |
| 2 | 5601 | ITEM 22; EE134 WAS EEM ... ITEM 37: EH368 WAS EH328 ... CORRECTED LENGTH OF ITEMS 24, 26, 27, 30, 31, 33; ITEM 10 - 14344 WAS 12449; ADDED NOTE 3. | | |
| 3 | 5832 | HIGH FREQ CUTOUT WAS 100, 1000 & 9000 ITEM 8 WAS EHM 189 | | |
| 4 | 5954 | ITEM 38 OF L/M WAS EHW165 | | |
| 5 | | CHG. WHT/BRN. WIRE AT S2-B (6) TO SHIELDED CABLE; QTY 6 WAS 5 AT ITEM 7 HOOKUP | | |




NOTES:
1. ALL WIRE HOOKUP FROM HARNESS 15389 UNLESS AS NOTED.
2. USE {-1 QTY FOR 2718A STD. / -2 QTY FOR 2718AT.
3. DISTANCE OF THE BOTTOM EDGE OF THE KNOB (ITEM 10) FROM METAL CAL (ITEM 3), SILKSCREENED SIDE MAY BE UP TO 1/16"

| | |
|---|---|
| ENDEVCO CORPORATION, Pasadena, California | FSC CODE |
| SCALE: 1:1 | DO NOT SCALE DRAWING |
| MATERIAL: LISTED | DRAWN BY: FET 7/22/67 |
| PRODUCT: 2718A | PART NAME: FRONT PANEL ASSEM |
| SIZE: D | DWG. NO. 15388C |
| REV: 5 | |

| CHG | E.O. | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| 2 | 5965 | REDRAWN, ITEMS 31 & 32 (EW34 & EW121) DELETED | | | |

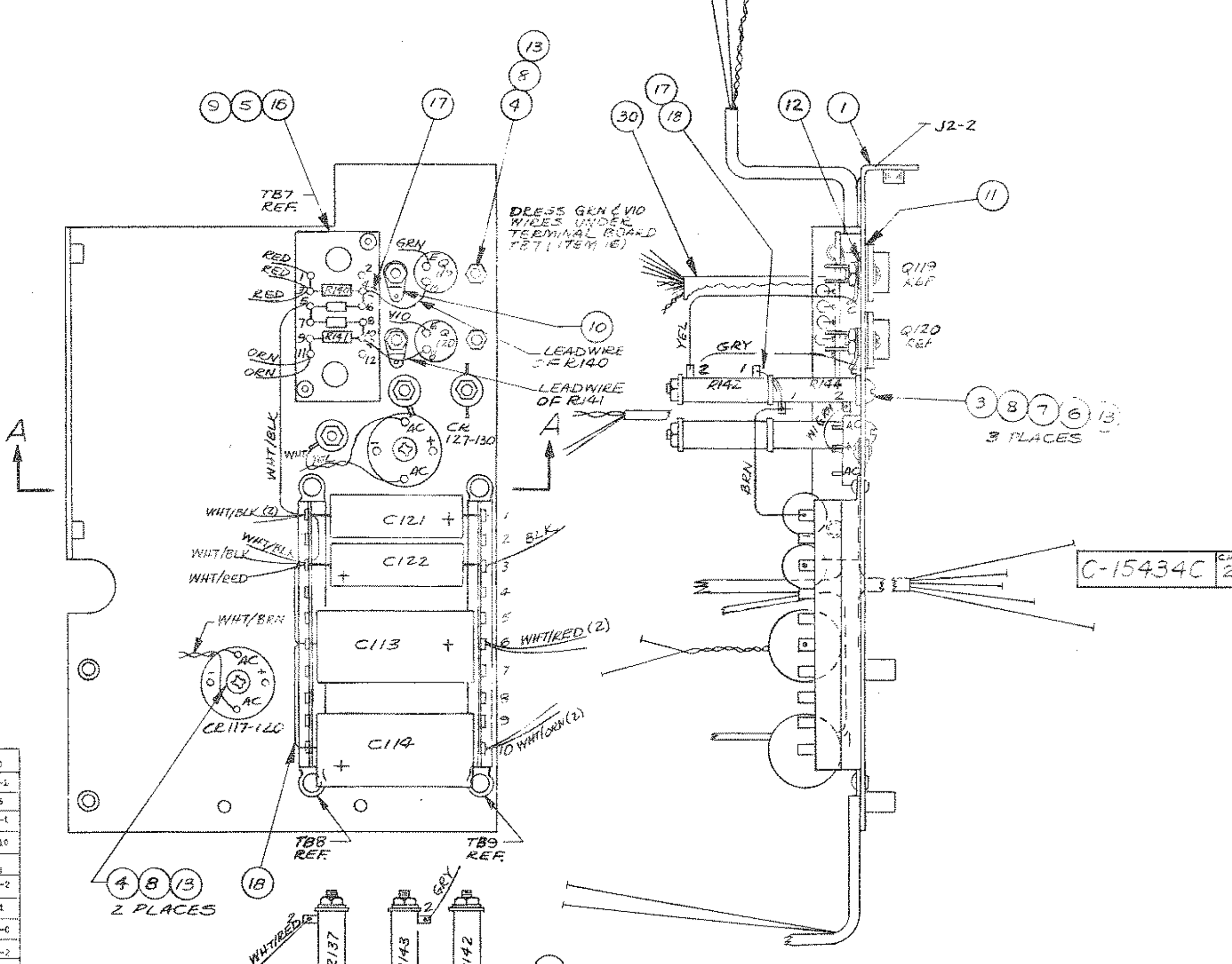
## LIST OF MATERIALS

| ITEM | PART NO | DESCRIPTION | QTY | FROM | TO |
|---|---|---|---|---|---|
| C113 | EC325 | CAPACITOR, 80uF | 2 | | |
| C114 | EC325 | CAPACITOR, 80uF | — | | |
| C121 | EC456 | CAPACITOR, 250uF | 2 | | |
| C122 | EC456 | CAPACITOR, 250uF | — | | |
| CR117-120 | ECR79 | DIODE, QUAD | 2 | | |
| CR127-130 | ECR79 | DIODE, QUAD | — | | |
| Q119 | EQ131 | TRANSISTOR, 2N3766 | 1 | | |
| Q120 | EQ129 | TRANSISTOR, 2N3740 | 1 | | |
| R137 | ER832 | RESISTOR, 1.5Ω | 2 | | |
| R138 | ER832 | 1.5Ω | — | | |
| R142 | ER1493 | 5Ω | 2 | | |
| R143 | ER1493 | 5Ω | — | | |
| R144 | ER974 | 10Ω | 2 | | |
| R145 | ER974 | RESISTOR, 10Ω | — | | |
| 1 | 15432 | SHIELD, POWER SUPPLY | 1 | | |
| 2 | | | | | |
| 3 | EH385 | SCREW, 6-32 X 2-1/2 | 3 | | |
| 4 | EH326 | SCREW, 6-32 X 3/8 | 6 | | |
| 5 | EH317 | SCREW, 4-40 X 1/4 | 2 | | |
| 6 | EHW161 | WASHER, FLAT #6 | 3 | | |
| 7 | EHW14 | SPACER, FIBER | 9 | | |
| 8 | EHW165 | LOCKWASHER, EXT #6 | 7 | | |
| 9 | EHW164 | LOCKWASHER, EXT #4 | 2 | | |
| 10 | EHL5 | LUG, SOLDER #6 | 2 | | |
| 11 | EHW176 | WASHER, MICA | 4 | | |
| 12 | EHB27 | SHOULDER WASHER | 4 | | |
| 13 | EHN66 | NUT, HEX 6-32 | 9 | | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | 14523C | TERMINAL BOARD ASSEMBLY | 1 | | |
| 17 | EW83 | TUBING, TEFLON (BLU) | 2-1/2" | | |
| 18 | EW39 | #22 AWG, BUS WIRE | 6-1/2 | | |
| 19 | EW124 | WIRE, VINYL, WHT/RED | 5-3/4 | CR117-120 (+) | R137-1 |
| 20 | EW124 | WHT/RED | 6-3/4 | R137-2 | TB9-6 |
| 21 | EW128 | WHT/ORN | 6-1/2 | CR117-120 (−) | R138-1 |
| 22 | EW128 | WHT/ORN | 6-1/2 | R138-2 | TB9-10 |
| 23 | EW125 | WHT/BLK | 4 | TB7-5 | TB8-1 |
| 24 | EW180 | WHT/GRN | 2-5/8 | CR127-130 | R144-2 |
| 25 | EW33 | BRN | 3 | R144-1 | TB9-1 |
| 26 | EW122 | YEL | 3-7/8 | R142-2 | Q119-C |
| 27 | EW244 | WHT/VIO | 2-1/2 | CR127-130 (−) | R145-2 |
| 28 | EW32 | BLK | 4-1/2 | R145-1 | TB9-3 |
| 29 | EW36 | #22 AWG, WIRE, VINYL, GRY | 3 | R143-2 | Q120-C |
| — | — | LEAD OF R140 (SLEEVED) | — | TB7-4 | Q119-B |
| — | — | LEAD OF R141 (SLEEVED) | | TB7-10 | Q120-B |
| 30 | 14622 | POWER SUPPLY HARNESS (HARNESS #3) | 1 | | |

NOTES:

(1) WIRES OR COMPONENTS LEADS SHOWN THUS ═ TO HAVE ADEQUATE SLEEVING (ITEM 17)

(2) THIS DRAWING IS SUBJECT TO FUTURE CHANGE WITHOUT NOTICE.




| | |
|---|---|
| **ENDEVCO CORPORATION** Pasadena, California | FSC CODE 95411 |

SPECIFICATIONS UNLESS OTHERWISE NOTED

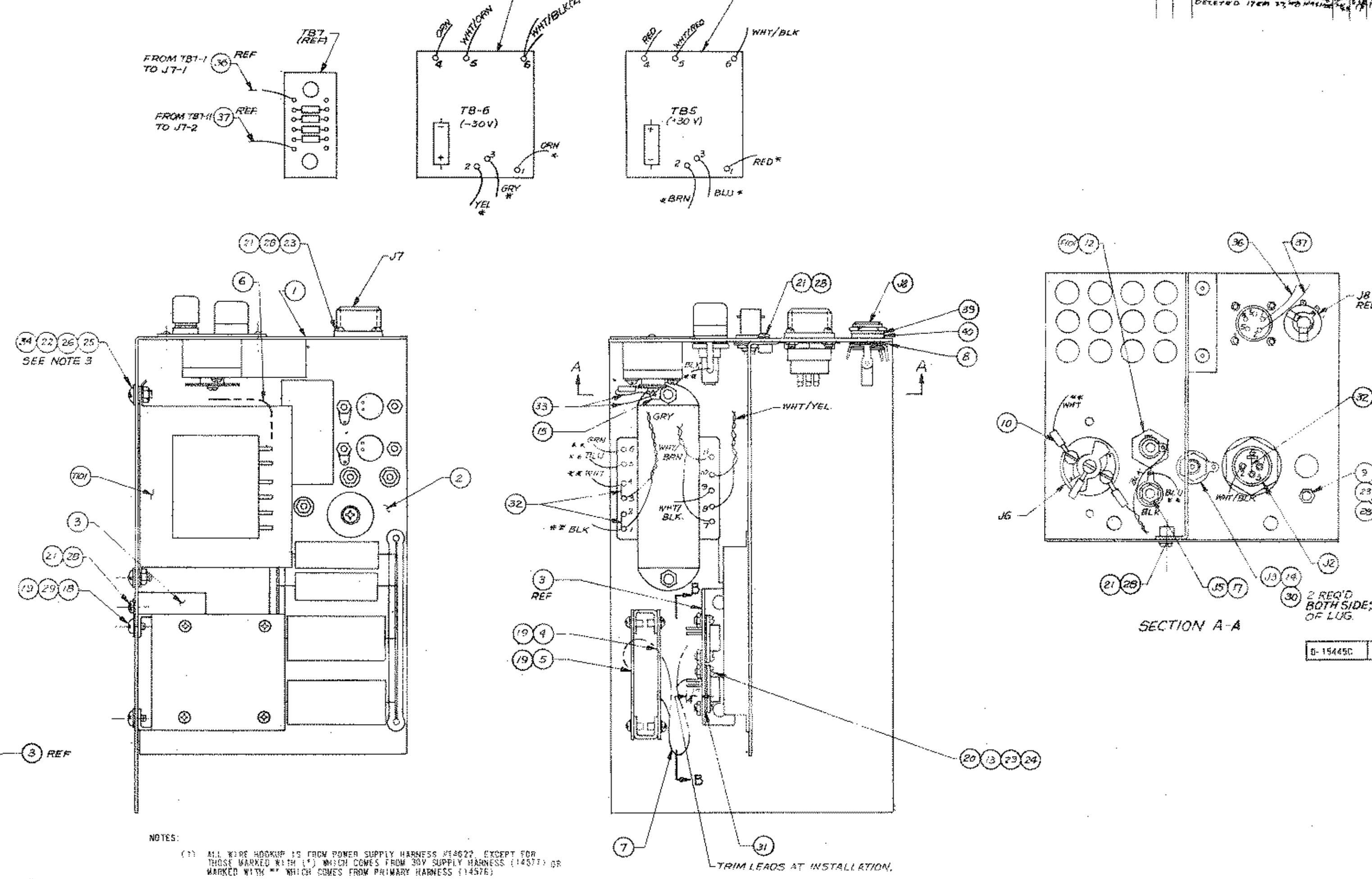
| LIMITS OF DIMS. | |
|---|---|
| ANGULAR | ± — |
| FRACTIONAL | ± — |
| DECIMAL | ± — |

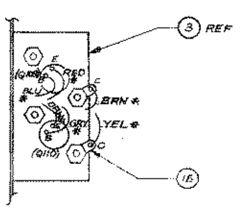
1. BREAK ALL SHARP CORNERS .005 MAX.
2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX.
3. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R.
4. FILLET RADIUS .010 MAX.

SCALE: 1/1 — DO NOT SCALE DRAWING
MATERIAL: LISTED — DRAWN BY: EET 7/21/67
FINISH: — — CHKD BY: WN
PROJ. ENG: AD

PRODUCT: 2718A
PART NAME: POWER SUPPLY ASSY. — SIZE: C — DWG. NO. 15434C — CHG 2

| CHG | E.O. | CHANGE DESCRIPTION |
|---|---|---|
| 6A | | REDRAWN, NO CHANGE |
| 7 | | ITEM 33 WAS EH389, ... DELETED ITEM 37 ... |




VIEW B-B

| LIST OF MATERIALS | | | |
|---|---|---|---|
| ITEM | PART NO. | DESCRIPTION | QTY |
| J2 | EJ75 | CONNECTOR | 1 |
| J3 | EJ15 | BNC CONNECTOR | 1 |
| J5 | EJ42 | BINDING POST | 1 |
| J7 | EJ251 | RECEPTACLE | 1 |
| J8 | EJ254 | JACK | 1 |
| | | | |
| F101 | EF16 | FUSE | 1 |
| | | | |
| Q109 | EQ131 | TRANSISTOR, 2N3766 | 1 |
| Q110 | EQ129 | TRANSISTOR, 2N3740 | 1 |
| | | | |
| T101 | 14513 | POWER TRANSFORMER | 1 |
| | | | |
| | | | |
| 1 | 15433 | BASE | 1 |
| 2 | 15434 | POWER SUPPLY ASSEMBLY | 1 |
| 3 | 14771 | HEAT SINK | 1 |
| 4 | 14535C | CIRCUIT BOARD ASSY +30V(TB5) | 1 |
| 5 | 14536C | CIRCUIT BOARD ASSY -30V(TB6) | 1 |
| 6 | 14576 | PRIMARY HARNESS (#1) | 1 |
| 7 | 14577 | 30V SUPPLY HARNESS (#2) | 1 |
| 8 | EHW59 | WASHER, SHOULDER, FIBER | 1 |
| 9 | EE120 | TERMINAL, THREADED | 1 |
| 10 | EE69 | TERMINAL, SOLDERLESS | 3 |
| 11 | | | |
| 12 | EXF2 | FUSE HOLDER | 1 |
| 13 | EH827 | WASHER, SHOULDER | 4 |
| 14 | EHL8 | LUG, GROUND | 1 |
| 15 | EHL13 | LUG, GROUND | 1 |
| 16 | EHL5 | LUG, SOLDER | 2 |
| 17 | EHL31 | LUG, SOLDER | 1 |
| 18 | EHM116 | BRACKET, CIRCUIT BOARD | 2 |
| 19 | EH318 | SCREW, 6-32 X 1/4 | 10 |
| 20 | EH328 | 6-32 X 3/8 | 4 |
| 21 | EH333 | 4-40 X 3/8 | 10 |
| 22 | EH358 | SCREW, 6-32 X 1/2 | 2 |
| 23 | EHN65 | NUT, HEX 4-40 | 5 |
| 24 | EHN66 | NUT, HEX 6-32 | 4 |
| 25 | EHN67 | NUT, HEX 8-32 | 2 |
| 26 | EHW156 | LOCKWASHER, EXT #8 | 2 |
| 27 | | | |
| 28 | EHW164 | LOCKWASHER, EXT #4 | 11 |
| 29 | EHW165 | LOCKWASHER, EXT #6 | 4 |
| 30 | EHW169 | LOCKWASHER, INT 3/8 ID | 2 |
| 31 | EHW176 | WASHER, MICA | 2 |
| 32 | EW39 | WIRE, BUS, 22 AWG 3/4 LG | 3 |
| 33 | EW37 | WIRE, 22 AWG, VINYL GRN | 2-1/2" |
| 34 | 15449 | WASHER, SPECIAL (3) | 4 |
| 35 | EF26 | FUSE | OPT. |
| 36 | EW34 | WIRE, VINYL, RED #22 AWG | 4" |
| 37 | EW121 | WIRE, VINYL, ORN #22 AWG | 5" |
| 38 | | | |
| 39 | EHW54 | WASHER, FLAT | 1 |
| 40 | EHW60 | WASHER, FLAT, NYLON | 1 |

NOTES:

(1) ALL WIRE HOOKUP IS FROM POWER SUPPLY HARNESS #14622, EXCEPT FOR THOSE MARKED WITH (*) WHICH COMES FROM 30V SUPPLY HARNESS (14577) OR MARKED WITH ** WHICH COMES FROM PRIMARY HARNESS (14576)

(2) FOR 230V REMOVE ITEM 37 JUMPER BETWEEN TERMINALS 3 AND 4 AND 1 AND 2 ON T101. PLACE JUMPER BETWEEN 2 AND 3. REPLACE F101 WITH ITEM 35.

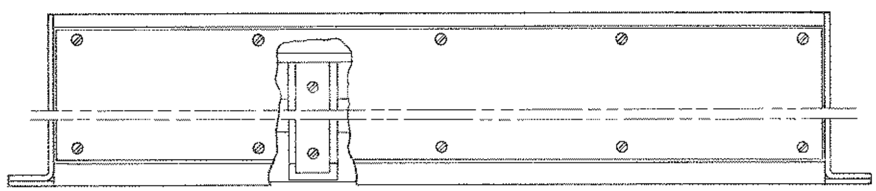
(3) TORQUE ITEM 25 TO 20 IN LBS - TWO PLACES. SMOOTH MOUNTING SURFACE OF TRANSFORMER T101 BY REMOVING THE BLOBS AND TEARS. IF BARE METAL IS EXPOSED, SPRAY WITH CLEAR ACRYLIC LACQUER. SANDWICH FEET OF T101 BETWEEN TWO SPECIAL WASHERS, ITEM 34

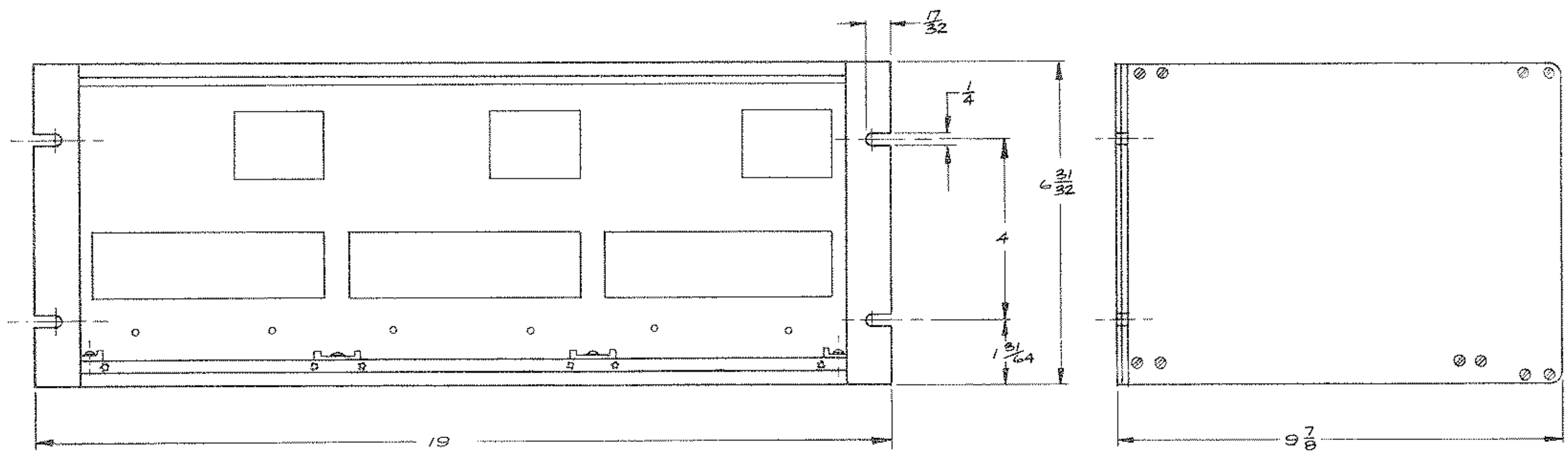
D-15445C 7

ENDEVCO
SCALE 1/1
MATERIAL SEE L/M
DRAWN BY GET 7/21/67
CHKD BY WN
PROJ. ENGR. AD
2718A
PRODUCT
PART NAME: PRELIMINARY ASSEMBLY
SIZE D DWG. NO. 15445C REV 7

| ITEM | PART NO. | DESCRIPTION | QTY |
|---|---|---|---|
| 1 | 4992A | RACK | 1 |
| 2 | EH127 | SCREW, OVAL HEAD 10-32 x 1/2 | 4 |
| 3 | EHW175 | WASHER, CUP | 4 |
| 4 | EHW144 | CUP WASHER FILLER | 4 |
| 5 | 14786 | POWER CORD (TRIPLE CONNECTOR) | OPT |
| 6 | 14718 | BLANK FACE PLATE ASSEMBLY | OPT. |

| CHG | E.O. | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| 1 | 5484 | RELEASED | ET | | |






C-4992A-C 1

THIS DRAWING IS SUBJECT TO FUTURE CHANGE WITHOUT NOTICE.

**ENDEVCO CORPORATION**
Pasadena, California

FSC CODE 95411

SPECIFICATIONS UNLESS OTHERWISE NOTED

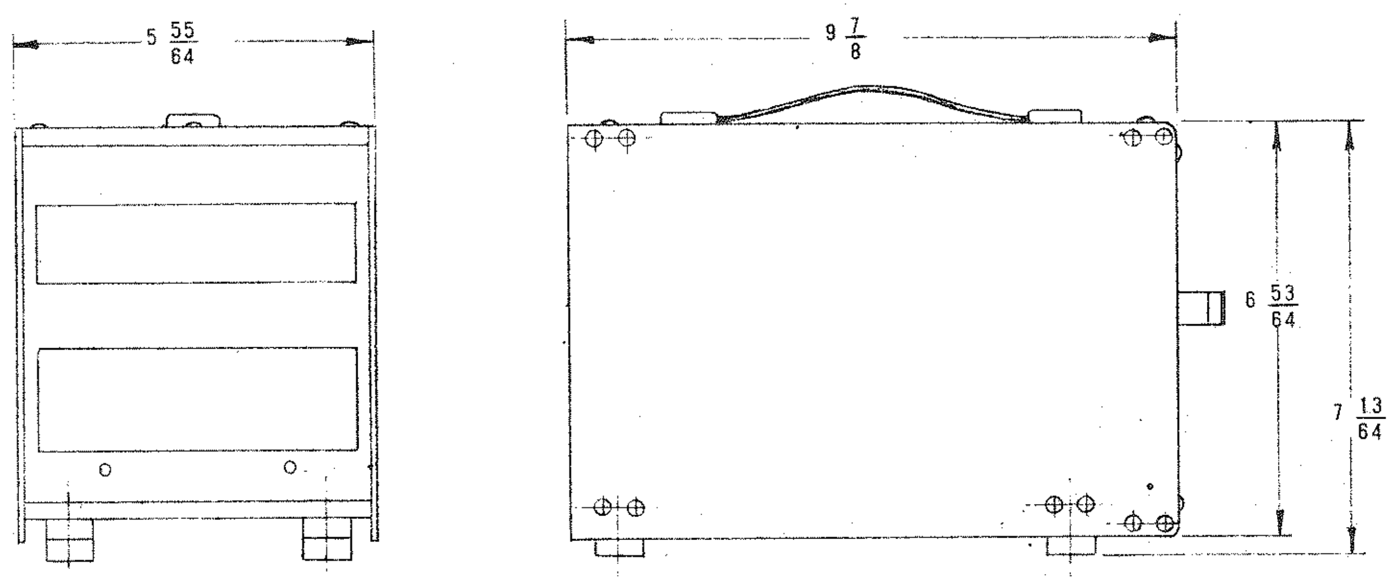
| LIMITS OF DIMS. | | |
|---|---|---|
| ANGULAR | ± — | 1. BREAK ALL SHARP CORNERS .005 MAX. |
| FRACTIONAL | ± 1/32 | 2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX. |
| DECIMAL | ± — | 3. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.P. |
| | | 4. FILLET RADIUS .010 MAX. |

SCALE: 1/2 SIZE
DO NOT SCALE DRAWING
MATERIAL:
DRAWN BY: EET 8/21/67
FINISH: GREY ENAMEL
CHKD BY:
PROJ. ENG.:
PART NAME: RACK
PRODUCT
SIZE C DWG. NO. 4992A-C CHG 1

12/64 DIETERICH-POST CLEARPRINT 1000H

| CHG | E.O. | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| 1 | 6953 | RELEASED | 11/4/64 | | PS |
| 1A | 7019 | ADDED NOTE 2 | | | PS |

B-2991A-C 1A




NOTES:

(1) THIS DRAWING SUBJECT TO FUTURE CHANGE WITHOUT NOTICE.

(2) THIS CARRYING CASE IS USED WITH ONE 2718A.

**ENDEVCO** Pasadena, California
Subsidiary of Becton, Dickinson and Company B-D

FSC 95411

DO NOT SCALE DRAWING

SPECIFICATIONS UNLESS OTHERWISE NOTED

| LIMITS OF DIMS. | |
|---|---|
| ANGULAR | ± |
| FRACTIONAL | ± 1/16 |
| DECIMAL | ± |

1. BREAK ALL SHARP EDGES .005 MAX.
2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX.
3. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R.
4. HOLE TOLERANCE PER AND10387
5. ALL DIMENSIONS IN INCHES
6. FILLET RADIUS .010 MAX.

SCALE: 1/2

MATERIAL: ALUMINUM

FINISH: BLACK ANODIZE

DRAWN BY: CEH 10-3-64
CHKD BY: 11-4-64
PROJ. ENG.: PS

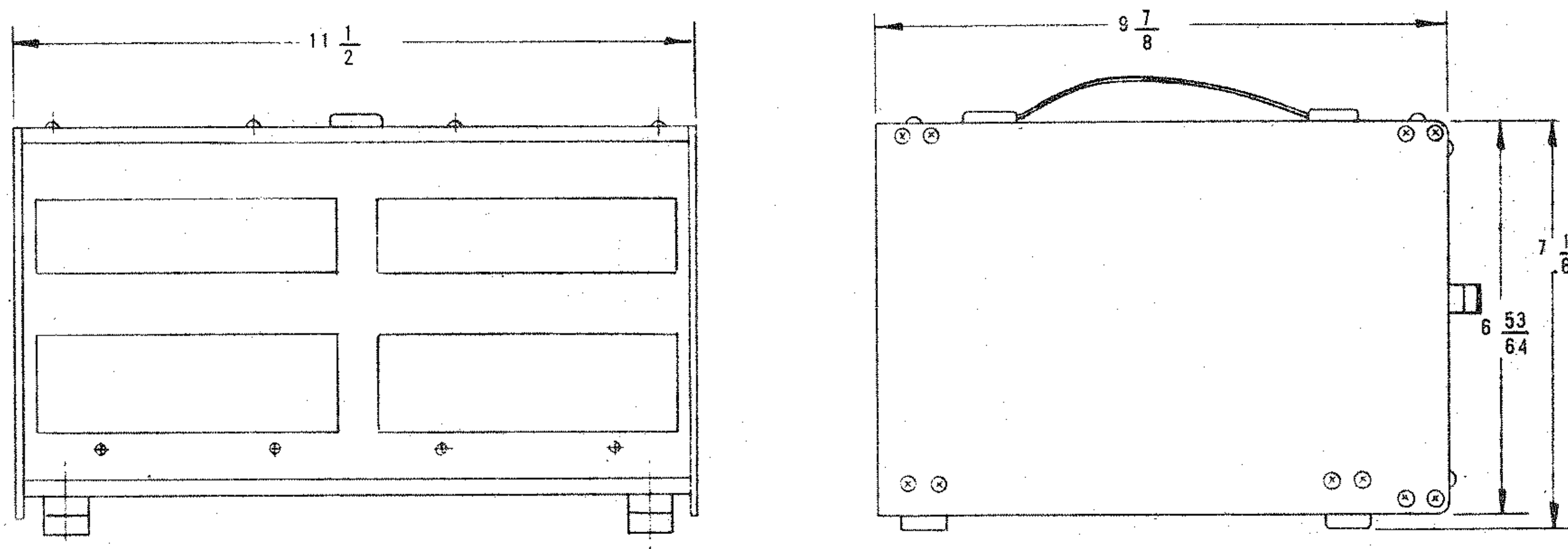
PART NAME: SINGLE CARRYING CASE

SIZE: B DWG. NO. 2991A-C CHG 1A

PRODUCT

| CHG | E.O. | CHANGE DESCRIPTION | BY DATE | CHK | APPR |
|---|---|---|---|---|---|
| 1 | 4953 | RELEASED | | | |
| 1A | 7019 | ADDED NOTE 2 | | | |

B-2992A-C 1A




NOTES:

(1) THIS DRAWING SUBJECT TO FUTURE CHANGE WITHOUT NOTICE.

(2) THIS DUAL CARRYING CASE IS USED WITH (1) 2718A AND (1) 2954A OR TWO OF EITHER UNITS.

**ENDEVCO** Pasadena, California
Subsidiary of Becton, Dickinson and Company B-D

FSC 95411

DO NOT SCALE DRAWING

SPECIFICATIONS UNLESS OTHERWISE NOTED

| LIMITS OF DIMS. | | |
|---|---|---|
| ANGULAR | ± | |
| FRACTIONAL | ±1/16 | |
| DECIMAL | ± | |

1. BREAK ALL SHARP EDGES .005 MAX.
2. SURFACE ROUGHNESS 63 MICROINCH RMS MAX.
3. DIAMETERS TO BE CONCENTRIC WITHIN .005 T.I.R.
4. HOLE TOLERANCE PER AND10387
5. ALL DIMENSIONS IN INCHES
6. FILLET RADIUS .010 MAX.

SCALE: 1/2

MATERIAL: ALUMINUM

FINISH: BLACK ANODIZE

PART NAME: DUAL CARRYING CASE

DRAWN BY: CEH 10-3-67

CHKD BY: 11-9-69

PROJ. ENG: PT

SIZE: B | DWG. NO. 2992A-C | CHG 1A

PRODUCT

# ENDEVCO FIELD ENGINEERING OFFICES

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(617) 969-8063

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Len Leopold
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Haddonfield, New Jersey 08033
(609) 428-5285

Tom Macaluso
19 East 21st Street
Baltimore, Maryland 21218
(301) 752-0688

## SOUTHERN REGION

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783 Northlake Blvd.
North Palm Beach, Florida 33403
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## MIDWEST REGION

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Akron, Ohio 44313
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Palo Alto, California 94303
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Frank Benedict
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Al Green

4/70