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ELGAR

PLUG-IN PROGRAMMABLE OSCILLATOR

Instruction Manual

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SECTION I
GENERAL DESCRIPTION

1-1. INTRODUCTION

This manual has been prepared for use by systems engineers and by personnel responsible for the installation, operation and maintenance of the series 9010 Plug-In-Programmer.

1-2. GENERAL DESCRIPTION

The Elgar 9010 series Plug-In-Programmer (PIP) is a solid state, self contained instrument intended for use in Automatic Test Equipment (ATE) systems. In response to digitally coded command inputs from a system controller, the PIP produces output signals which are, in turn, inputs to AC Power Sources. The PIP programs the Frequency and the Amplitude of the associated power source via local control, GPIB control, or BCD parallel control.

1-3. PHYSICAL DESCRIPTION

The PIP is configured to fit the standard oscillator cavity of all Elgar AC power sources except the "C" series.

1-4. CONFIGURATION

1. All PIP oscillators have BCD Parallel programming.
2. GPIB, IEEE-488 programming is an option.
3. All PIP oscillators have local control and display.
4. Two or three phase operation, with simultaneous amplitude programming is an option.
5. Out of range, frequency sensing and shutdown with "soft" restart is standard.
6. All programming modes have "Priority Remote". When the remote controller puts the PIP in remote, the local control can not take back control.

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TABLE 1-1
PERFORMANCE SPECIFICATIONS

STANDARD

Input Power	117VAC, +42VDC and -42 VDC from associated power source
Output Signal:	0 to 2.5VAC into a 800 ohm load (per phase)
Operating Temperature Range:	0°C to 50°C
Programming:	BCD parallel or GPIB per IEEE-488-1978
Distortion (THD):	Less than 1% within power source range.

FREQUENCY PROGRAMMING

Frequency Ranges: (Jumper Range Change)	45Hz to 99.99Hz in 0.01Hz steps 45Hz to 999.9Hz in 0.1Hz steps 45Hz to 5000Hz in 1Hz steps
Frequency Accuracy:	0.001% of set value.
Frequency Temperature Coefficient:	0.0003% Per °C average 0° to 50°C
Frequency Settling Time:	50 microseconds.

AMPLITUDE PROGRAMMING

Voltage Ranges: (Range Programmable by Special Option)	0 to 130V in 0.1V steps 0 to 260V in 0.1V steps
Amplitude Accuracy:	±0.2% of Full Scale 45Hz to 2kHz from 5% of Full Scale to Full Scale. Increases ±0.02% per kHz above 2kHz.
Amplitude Temperature Coefficient:	±0.025% Per degree C average 0°C to 50°C.
Amplitude Line Regulation:	±0.01% for a 10% line change within operating line range.
Amplitude Load Regulation	±0.015% (Full Wave Average) at point of sense.
Amplitude Settling Time:	100 milliseconds when programming between 5% of F.S. and F.S.
Phase Angle Accuracy (Multiphase Units)	±1° from 45Hz to 2kHz. Add 0.2° per kHz above 2kHz.

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SECTION II
INSTALLATION

2-1 GENERAL

This section of the manual contains instructions for pre-installation inspection and electrical connections.

2-2 PREINSTALLATION INSPECTION

1. Inspect the PIP and associated power source for shipping damage such as dents, scratches or distortion.
2. Remove PIP from oscillator cavity and inspect for damage.
3. Check rear of associated power source for damage to connectors.

2-3 ELECTRICAL CONNECTIONS (see Table 2-1)

1. If a multi-unit system, connect output drives to other power sources J1 PIN 4 with J1 PIN 1 as common.
2. Connect sense leads and sense common to load.
   Note: Do not operate PIP with sense leads disconnected as output of power source will be approximately 10% above the programmed value. This may damage equipment connected to the power source output.

2-4 IEEE-488 INTERFACE CONNECTIONS

Simply connect the GPIB cable to the 24 PIN IEEE-488 connector on rear of associated power source.

2-5 BCD PARALLEL INTERFACE CONNECTIONS

Connect 24 PIN Mating Connector to 24 PIN receptacle on rear of power source. This mating connector must be wired Per Table 2-2.

2-6 90° TWO PHASE OPERATION

When the Series 9010 is connected for 90° two phase operation, the drive for the 90° phase is from the C phase output of the PIP.

When two lows of the power sources are connected together then the A phase is the reference (Zero Angle) and the second power source (driven by the C phase) is the plus 90° phase.

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2-7 60° 3 PHASE OPEN DELTA OPERATION

When the Series 9010 is connected for 60 ° open delta operation, the drive for the 60° phase is from the C phase output of the PIP.

The two lows of the power sources are connected together and the A phase is taken across the A phase power source. The C phase is taken across the C phase (second) power source and the B phase is taken from A phase High to C phase High.

TABLE 2-1

J1 CONNECTIONS ON REAR OF ASSOCIATED POWER SOURCE

PIN #	
1	Output Common
2	B Ø Output
3	C Ø Output
4	A Ø Output
5	+5V Relay 50MA Max
6	Relay Drive
7	
8	
9	Sense Common
10	C Ø Sense High
11	B Ø Sense High
12	A Ø Sense High

TABLE 2-2

BCD PARALLEL PROGRAM INPUT CONNECTIONS

Mating Connector 57-10240

1	Common	13	Common
2	NC	14	NC
3	A	15	NC
4	F	16	REM
5	100	17	.8
6	10	18	8
7	1	19	80
8	.1	20	800
9	.2	21	.4
10	2	22	4
11	20	23	40
12	200	24	400

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TABLE 2-3. IEEE-488 INTERFACE INPUT CONNECTIONS

Contact	Signal Line
1	D101
2	D102
3	D103
4	D104
5	E01
6	DAV
7	NRFD
8	NDAC
9	IFC
10	SRQ
11	ATN
12	Shield
13	D105
14	D106
15	D107
16	D108
17	REN
18	Gnd (6)
19	Gnd (7)
20	Gnd (8)
21	Gnd (9)
22	Gnd (10)
23	Gnd (11)
24	Logic Com.

Note: Gnd (n) refers to the signal com. return of the referenced contact.

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TABLE 2-4. JUMPER CONFIGURATIONS

A. Main Board

1. E34 to E35 jumper sets 130V RMS output range. Remove for 260V RMS Range.

2. E33, E30, E31, E32 jumper sets frequency range. E33 to E30 sets 5 kHz range, E33 to E31 sets 1 kHz range and E33 to E32 sets 200 Hz range. Note: Display board jumper must be set to correspond for proper decimal drive.

B. Display Board

1. E7, E8, E9, E10 jumper sets decimal position in Frequency display position. E7 to E10 sets 5 kHz range, E7 to E8 sets 1 kHz range and E7 to E9 sets 100 Hz range. Note: See Item A2 above.

C. Phase Board

1. E24, E25, E26 jumper controls phase angle of C phase. E24 to E25 is normal 120°. E24 to E26 and remove R13 sets 90° on C phase.

2. Remove R13 to set 60° on C phase.

D. GPIB (IEEE 488) Board

1. A, B, C jumpers (2 places) control entry sequence. A to B sets normal sequence, identifier last. Example: 1200A = 120V RMS amplitude. A to C sets identifier first sequence. Example: A1200CR loads 120V RMS on CR (carriage return).

2. D, E, F jumper. E to F normal operation of REM. E to D position stores REM so REM can be removed.

3. Diode CR6. Add this diode if clear when IFC signal is applied is desired.

4. Diode CR7. Add this diode if clear when going from LOCAL to REMOTE is desired.

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SECTION III
OPERATION

3-1 INTRODUCTION

This section contains information regarding the preliminary functional checkout of the Series 9010 Plug In Programmer (PIP) as well as a description of front panel controls and indicators, rear panel connections and complete remote programming information.

3-2 CONTROLS AND INDICATORS

The front panel has two control switches which are the Display Select switch and the Keyboard Switch.

1. The Display select switch controls what is being displayed on the single four digit LED display. When the switch is in the left position, the stored Frequency is being displayed. When the switch is in the right position, the stored Amplitude is being displayed. When the switch is in the center position, the information being programmed, either local or remote, is being displayed. The Display Select must be in the center, PROG, position to enable the keyboard.

2. The Keyboard switch is the means to enter information when the PIP is in local control. To operate in local control, put the Display switch in the center, PROG, position and key in four numbers. These numbers will shift in from right to left. If a mistake is made, just key in four new numbers before depressing the FREQ or AMPL load button. The Keyboard is inhibited when operating in REMOTE or when the Display Select switch is not in the center position.

3. When the PIP is under remote control the green REMOTE LED will be illuminated.

3-3 REAR PANEL INPUT/OUTPUTS

All signal inputs and outputs of the PIP are via J1 on the rear of the associated power source. These are the A, B and C phase drive outputs and the Servo feedback inputs. All Remote controls are via a 24 PIN connector on the rear panel of the associated power source. See Section II for Pin assignments of these connectors.

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3-4 IEEE-488-1978 PROGRAMMING

The Institute of Electrical and Electronic Engineers (IEEE) Standard 488-1978 specifies the method in which a central controller will control the PIP and other devices in an automatic test system. The PIP General Purpose Interface Bus (GPIB) implements the following subsets of the IEEE-488 interface functions.

SH	Function	SHØ
AH	"	AH1
T	"	TØ
L	"	L2
RL	"	RL2
PP	"	PPØ
DC	"	DC1
DT	"	DTØ
C	"	CØ

This defines the interface as a listen only device with remote and local control capability but without local lockout capability. Local lockout is not a requirement as REMOTE locks out local control.

3-4-1 LISTEN ADDRESS

The "LISTEN" address to which the PIP will respond, is determined by the positions of the 5-gang, DIP switch mounted on the GPIB Interface board. The "ON" position of each switch corresponds to the TRUE state of the address. The switch is located on the front center of the GPIB board and is accessible by loosening the thumb screws holding the PIP in the oscillator cavity and sliding the PIP about four inches out of the cavity. Simply set the desired address and return the PIP to the cavity. TABLE 3-1 contains the switch settings for various addresses.

3-4-2 DATA INPUT PROGRAMMING

A command message to the PIP consists of a string of ASCII characters for four decimal/digits having values of 0 through 9 followed by one of three capital letter characters. The most significant number is sent first followed by the next most significant, etc. The alphabetic character following the numbers identifies the function being commanded and causes it to be stored in the appropriate storage register.

The identifier letters are:

A = Amplitude	
E = Amplitude	Alternates
F = Frequency	

All messages must contain four numbers and one letter. For example, a command of 5.0V amplitude must be sent as 0050A (or E). It could also be sent as 005.0A as the PIP will not respond to the decimal point. A typical ENTRY sequence would be: 0400F1200A. This would set 400Hz at 120.0VAC. This presumes that the 45Hz to 5kHz frequency range is set. This is a jumper range change. Always program frequency first when powering up the system.

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TABLE 3-1. IEEE INTERFACE LISTEN ADDRESS

ASCII CHARACTER	IEEE Interface Board Settings SW5	SW4	SW3	SW2	SW1
Space	OFF	OFF	OFF	OFF	OFF
!	OFF	OFF	OFF	OFF	ON
"	OFF	OFF	OFF	ON	OFF
#	OFF	OFF	OFF	ON	ON
$	OFF	OFF	ON	OFF	OFF
%	OFF	OFF	ON	OFF	ON
&	OFF	OFF	ON	ON	OFF
'	OFF	OFF	ON	ON	ON
(	OFF	ON	OFF	OFF	OFF
)	OFF	ON	OFF	OFF	ON
*	OFF	ON	OFF	ON	OFF
+	OFF	ON	OFF	ON	ON
'	OFF	ON	ON	OFF	OFF
-	OFF	ON	ON	OFF	ON
.	OFF	ON	ON	ON	OFF
/	OFF	ON	ON	ON	ON
0	ON	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	ON
2	ON	OFF	OFF	ON	OFF
3	ON	OFF	OFF	ON	ON
4	ON	OFF	ON	OFF	OFF
5	ON	OFF	ON	OFF	ON
6	ON	OFF	ON	ON	OFF
7	ON	OFF	ON	ON	ON
8	ON	ON	OF	OFF	OFF
9	ON	ON	OFF	OFF	ON
:	ON	ON	OFF	ON	OFF
;	ON	ON	OFF	ON	ON
	ON	ON	ON	OFF	OFF
=	ON	ON	ON	OFF	ON
	ON	ON	ON	ON	OFF

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3-5 BCD PARALLEL PROGRAMMING

The BCD Parallel Programming is low true on all input lines. There are sixteen data lines, two strobe lines and one Remote line. Timing information is in the upper left corner of storage board schematic 6809004.

When REM is pulled to the low logic level, the local control is locked out. Thus this system has a Priority remote. To enter data, the required BCD information is placed on the sixteen BCD lines and the A or F as appropriate is pulled low and then released. The frequency should be programmed first when powering up the system.

3-6 FUNCTIONAL CHECKOUT

The functional checkout verifies that the PIP is functioning properly but does not verify specifications. The functional checkout should be performed with the PIP plugged into the power source and properly connected to the load.

3-6-1 Local Mode Check

Proceed as follows to check operation of the PIP in the local mode:

1. Connect associated power source to input power and turn on power. Display should blink 0000.
2. Switch Display Select switch to center position and key in 0400 FREQ. Display should stop blinking.
3. Switch Display Select switch to FREQ position and verify that Display reads 0400. Return switch to center (PROG) position.
4. Key in 0100AMPL. Power Source meter should read 10 VRMS. If multiphase system, check all phases.
5. Key in 1200AMPL and power source meter should indicate 120.0VRMS. If multiphase, check all phases.
6. Switch Display Select switch to AMPL position. Display should read 120.0.

The following steps (7 and 8) are for PIP with programmable 130/260 Range Special.

7. Program 0000AMPL, 4000AMPL then 6600AMPL. Power source meter should indicate 260VRMS.
8. Switch Display Select switch to AMPL position, Display should read 260.0. The redundant 4 in the major decade will cause the range to go to the 260V Range but will NOT be displayed.

3-6-2 Remote Mode Check (IEEE 488)

1. Connect a GPIB Controller to the input connector on the rear of the power source.
2. Set Address switch on PIP to proper address.
3. Turn on power source power switch.
4. Have GPIB controller send ATTN/ADDRESS with REN true and IFC false. Green Remote LED on PIP front panel should come on.
5. Have GPIB controller send 0555F0222A. Output of power source should be 22.2VRMS at 555Hz.

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6. Have GPIB controller send 0888F1300A. Output of power source should be 130.0VRMS at 888Hz.
7. Have GPIB controller send ATTN SDC. PIP Display should blink 0000 in all positions of Display Select.
8. Turn off power.

3-6-3 Remote Mode Check (BCD Parallel)

(Note: The BCD parallel may be tested with switch contacts to common as no external power is required.)

1. Connect BCD inputs to 24 PIN input connector on rear of power source.
2. Turn on power source power switch
3. Activate REM to low state, green REMOTE LED on PIP front panel should illuminate.
4. Apply 0555 to BCD Parallel, low true, inputs and activate F.
5. Apply 0222 to BCD Parallel, low true, inputs and activate A. Power source output should be 22.2VRMS at 555Hz.
6. Apply 0888 to BCD Parallel, low true, inputs and activate F.
7. Apply 1300 to BCD Parallel, low true, inputs and activate A. Output should be 130.0V RMS at 888 Hz.
8. Turn off Power.

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SECTION IV
THEORY OF OPERATION

4-1 INTRODUCTION

This section contains an overall description of the operation of the Plug-In-Programmer (PIP) series 9010 as well as the description of each major circuit. This section should be read prior to attempting troubleshooting or other maintenance of this equipment.

4-2 OVERALL THEORY OF OPERATION

When power is applied to the PIP, all registers are cleared to zero and the unit is put into local control. The local control keyboard and keyboard encoder generate a BCD byte and a strobe when a number key is depressed. The BCD byte is shifted into a set of shift registers by the strobe. After four numbers are shifted in, the * (FREQ) key or the # (AMPL) key is depressed which transfers the shift register information into storage. When operating in GPIB Remote, the GPIB board shifts the data into the same shift registers and sends the appropriate load strobe.

The stored frequency information is converted to a pulse train that is 1024 times the output frequency by a set of four Rate Multipliers. The output of the Rate Multipliers is counted down by a series of Binary counters which drive a PROM acting as a SINE look-up table. The PROM drives a Digital to Analog Converter (DAC) which produces a SINE wave output. This is filtered and becomes the output signal.

The stored Amplitude information is converted to a DC programming voltage by four DAC's which are summed to produce a programming voltage which in turn controls the servo feedback.

4-3 DETAILED CIRCUIT DESCRIPTION

In the following paragraphs, those circuits which make the PIP possible are described in detail. In preparing this text it has been assumed that the technician is familiar with analog and digital devices such as operational amplifiers, logic gates, data selectors and Digital to Analog converters. Therefore, the internal circuitry of the integrated circuits is not described in this manual. The technician is referred to the manufacturer's publications for this information.

When a logic line nomenclature has a Bar over it, it means that the signal is low when true. Example: $\overline{A}$ or $\overline{PON}$

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4-3-1 STORAGE BOARD LOGIC

When power is applied, the 3kHz clock from the Display Board will be applied to U11 PIN 9. At the same time C3 will hold U21 PIN 13 low for approximately 300 milliseconds and in turn making U11 PIN 8 high. The result is a series of clock pulses on the output of U11 PIN 10. This is the Power On Clock or PON.

The PON is inverted by U21 PIN 11 to PIN 10 and this clears shift registers U4, U5, U14 and U15. This zero information is clocked into storage latches U23, U31, U6 and U16 via U28 PIN 3 to PIN 1 and PIN 11 to PIN 13.

When the PON clock ceases after 300 milliseconds, all storage latches are set to zero. If a reset is sent by the GPIB Board through J6 PIN 16, this will also clear all storage latches to zero.

When operating in local control and a number is depressed on the keyboard, that number in Binary Coded Decimal (BCD) format will appear at J8 Pins 5,6,7 and 8 and in turn at the JK inputs of the shift registers. After the BCD information is stable, a positive pulse will appear at J8 PIN 12. This is applied to OR Gate U29 Pin 4. This in turn causes a positive going clock at U29 Pin 6 which shifts the BCD data into the shift registers U4, U5, U14 and U15.

After four BCD numbers have been shifted into the shift registers, a load will be depress on the keyboard. This will case either A or F as appropriate to go low. This will in turn cause either U28 Pin 5 (Freq) or U28 Pin 9 (AMP) to go low which will strobe the information into the appropriate latches. U23 and U31 for frequency or U6 and U16 for amplitude.

When operating in GPIB Remote, the inputs from J8 are disabled and the inputs from J6 are enabled. The BCD information now comes in on J6 Pins 5, 6, 7 and 8 and the shift on J6 Pin 12. The storage strobes come in on J6 Pin 14 (amplitude) and J6 Pin 15 (frequency). All sequences are the same as when in LOCAL except the sources of the information are different.

When operating in Parallel Remote programming, all information comes in on J10. The BCD information is presented to the parallel inputs to the shift registers U4, U5, U14 and U15.

When REM at J10 PIN 4 is low, U21 Pin 2 will be high enabling U11 Pins 2 and 5. When F at J 10 Pin 21 is pulsed low, U11 Pin 4 will go low forcing U11 Pin 11 high. This forces the Parallel Enable (PE) of the shift registers high, enabling parallel input. The circuit from U21 Pin 3 to U21 Pin 6 delays the PE pulse and then through U29 Pins 3 to 6 clocks the parallel information into the shift registers.

When the output of U11 Pin 4 went low, it caused U28 Pin 4 and in turn Pin 1 to go low. At the end of the pulse, the rising edge will clock the information into the storage latches.

The stored amplitude information is applied to Digital to Analog Converters (DAC) U7, U8, U17 and U18. The 6.9 Volt reference Diode D2 is buffered by U10 Pin 1 and fed to the analog inputs to the DACs. As these are multiplying DACs, the current output is a function of Reference input current and digital input.

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The currents from the four DACs are summed at U10 Pin 6 and converted to a voltage at Pin 7. This is the amplitude programming voltage.

The stored amplitude information is also applied to multiplexers U9 and U19. The outputs of these multiplexers will be enabled when A at J8 Pin 1 is low. Address lines a, J8 Pin 3 and b, J8 Pin 4 control which of the four BCD digits is being sent to the display at any one time.

The stored frequency information is applied to Rate Multipliers U24, U25, U32 and U33. A Rate Multiplier is a unique device which, for every ten input pulses, puts out a number of pulses determined by the BCD input program. Thus in the most significant decade, if a four is programmed, it will put out four pulses for each ten pulses in. This is cascaded down to the lesser significant decades to where the output of the four Rate Multipliers can be determined by the formula: Output equals the crystal frequency divided by the quantity 10,000 divided by the digital input.

As an example, if the digital input were 0400 then the output would be 10.24 MHz divided by the quantity 10,000 divided by 400 or 409.6kHz. This will later be divided by 1024 to produce 400Hz output.

The stored frequency information will be multiplexed to the display by multiplexers U26 and U34 when enabled by F at J8 Pin 2.

The non-stored information out of the shift registers is multiplexed to the display by multiplexers U22 and U30 when enabled by PROG at J7 Pin 3.

4-3-2 DISPLAY BOARD

The oscillator of U3 Pin 1 to 2 operates at 2.7 to 3.0 kHz and controls the multiplex digit select, the keyboard scan and is coupled to the storage board for initialization.

The output of the U3 Pin 1 to 2 oscillator is counted down by four to one by U5 and decoded into four digit enable lines U6. Integrated circuit U6 is a source driver. As an example, when U6 Pin 3 is high, U2 Pin 8 being high will connect U2 Pin 11 to the +5V RAW at Pin 9. This will enable DS1 to display whatever BCD information is at J1 Pins 13 through 16.

Keyboard S2 is a 2 of 7 code which is encoded by keyboard encoder U7. The keyboard encoder puts out BCD information on Pins 10 to 13 which is followed by a strobe at Pin 14 when the data is stable. The Freq button of the keyboard is decoded as a ten and the AMP button is decoded as an eleven. These do not generate a strobe at U7 Pin 14.

When U9 Pin 10 is high it removes the common from Pin L of the keyboard thus inhibiting any output. If MUX enable F or A is selected or if operating in remote, the keyboard is inhibited via U9 Pin 10.

When operating in remote control, REM will be high inhibiting the keyboard and also causing U8 to go into a tri-state or high impedance output mode. This allows the remote mode to have control.

If the FAULT input at E6 goes high, it will allow oscillator U3 Pins 11 to 10 to start which in turn will cause the display to blink at a 4Hz rate.

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4-3-3 MAIN BOARD

On the mainboard, everything starts at J2 Pin 11 in the upper left corner of schematic 6809001. This is the rate clock which is 1024 times the output frequency. Jumper E33 to E30 sets the 45Hz to 5kHz frequency range while E33 to E31 would set the 45 Hz to 999.9Hz range and E33 to E32 the 45Hz to 99.99Hz range. Assuming the 5kHz range as shown and the output frequency programmed at 1000Hz, the clock frequency into U11 Pin 5 would be 1.024MHz This will be counted down by 256 by U11 and U17 to where U17 Pin 12 has a frequency of 4000Hz. Thus after U11 and U17 have counted up to 256, on the next clock, all U11 and U17 outputs will go to zero. BUT the same clock will cause U15 PIN 3 to change states and the result out of the 74LS86 Exclusive OR gates U14 and U16 is that the number out remains the same except the Exclusive OR gate outputs will be counting down while U11 and U17 are counting up. This reversal of counting direction occurs every 90 degrees or four times per cycle.

The up/down count is applied to PROM U13. This PROM is a SINE look up table which in turn drives DAC U10. Digital to Analog Converter U10 will put out a current equal to the digital input and the reference current into Pin 14. This current will be changed to a voltage by current to voltage converter U7 Pins 1, 2 & 3.

The output at U7 Pin 1 will be a series of halt wave signals at twice the output frequency. Coming out of U15 PIN 2 is a square wave at the output frequency which drives the gate of enhancement mode FET Q1. When this signal is high, Q1 turns on shorting U7 Pin 5 to common. With Q1 on U7 Pins 5, 6 & 7 form an inverting operational amplifier. During the period that Q1 gate is low, the U7 Pins 5, 6 & 7 operational amplifier is non-inverting. Thus if half of the half wave signals are inverted, we will have a sine wave.

The components from U7 PIN 7 to U5 Pin 1 form a three pole active filter which further cleans up the sine wave. This sine wave is applied to variable gain amplifier U3 Pins 5, 6 & 7 whose output is the drive to the power source.

Integrated circuit U1 and associated components takes the differential sense inputs and converts them to a DC voltage. U3 Pins 1, 2 & 3 is an error integrator which compares the DC voltage from U1 to the reference. If the sense voltage is low, the error integrator will swing more negative which in turn drives more current through U4 Pin 2 to Pin 1. With more current through the photo diode of U4 the photo resistor will drop in value which will increase the gain of U3 Pins 5, 6 & 7. This comparing of the AC out of the power source with the reference voltage is a continuous operation so if the power source output tries to change due to load change, the error integrator will correct for the change.

The reference voltage is also fed to U5 Pins 5, 6 & 7 which buffers and feeds the reference through R1 to the reference input to DAC U10. In the 130 volt range E33 to E34 jumper is in so the gain of the amplifier is two. When E33 to E34 is open (on the 260V range) the gain will be one.

U18C is a glitch generator which puts out a high going pulse on each edge of the same signal that drives Q1. This occurs twice per sine wave. These pulses trigger U8. Pin 5 of U8 is the output of a retriggerable monostable multivibrator. If the frequency is in the normal range, the multivibrator will

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be retriggered before it can time out. But if the frequency drops below 44Hz, Pin 4 of U8 will time out, setting U9 PIN 1. This causes Q3 to turn on removing the Reference Raw voltage which will cause the output to drop to zero. Pin 4 is the output of another multivibrator which must time out or the frequency is above 5100Hz. If the frequency is too high, the other half of U9 will case the reference shut down. When the frequency returns to the normal range, Q3 will turn off and C13/R23 will cause the reference to rise at an exponential rate causing a "soft" start of the associated power source output.

4-3-4 PHASE BOARD

The B and C phases are generated in a similar manner to that of the A phase. The PROM U13 is driven by the same address lines as the A phase SINE PROM. But U13 is a COSINE look-up table so the signal at TP1 will be a COSINE. If we apply a COSINE to R12 and a SINE to R9 into U5 Pins 1, 2, 3 the output at U5 Pin will be -120 degrees from the A phase. Negative 120 degrees is the same as +240 degrees so this signal becomes the B phase at +240 degrees. If we further take equal parts of the A phase at zero degrees and the B phase at +240 degrees, and sum them on Pin 6 of U5, the output at U5 Pin 7 will be the C phase at +120 degrees.

The B and the C phase servos operate the same as the A phase servo.

4-3-5 GPIB BOARD

The GPIB Handshake starts when DAV goes low at U7 Pin 2. There is a 250 nanosecond delay caused by the R8/C6 RC which will screen out transients on the BUS. After the delay, U2 Pin 2 will go high causing U10 Pin 12 to go high. U10 Pin 13 is high and will remain so until the RC of R10/C7 runs out. Thus a high going DAV pulse will be developed at U10 PIN 11. Meanwhile when U2 Pin 8 went low it caused U2 Pin 10 to go high. A high on U1 Pin 5 will cause U1 Pin 6 to go high generating a DAC signal. At the same time U8 Pin 8 going low will cause U1 Pin 3 to go low inhibiting the NRFD at U1 Pin 2. When the controller removes the DAV all of the above will return to the static state in minimum time due to Diodes CR3 and CR2 shorting out the delays.

BCD to Octal decoder U8 decodes the ISO-7 Bit code column information, and U13 decides the b4, b3 and b2 portions of the row information. Decoders U8 and U13 have negative true input codes and put out positive true eight line information.

Digital comparator U14 in conjunction with U9 Pins 8, 9, 10, 5, 6 and 4 compare the listen address switches S1 to S5 with the incoming data word and issues MLA when they match.

The MLA is applied to U5 Pin 13 while ATTN & DAV is applied to Pin 12. Pin 11 of U5 will go high when column selector U8 causes either Pin 6 or Pin 15 to go high. When U5 Pin 10 goes low, nothing happens. But when Pin 10 goes high at the end of the DAV, it will clock both sections of F/F U4. If REN is set and IFC is not, both F/F of U4 will clock to the Q low condition.

The Address F/F can be cleared by PON, IFC or UNL while the REMOTE F/F can be cleared by REN, PON or GTL. When REMOTE F/F is enabled, Pin 13 will be low enabling U16 which gives the GPIB Board control of the data entry process.

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TABLE 4-1
COMPLEMENTARY OCTAL CODE U8 and U13

BCD Input	BCD 4 Pin 12	BCD 2 Pin 13	BCD 1 Pin 10	High Output PIN
0	1	1	1	4
1	1	1	0	7
2	1	0	1	6
3	1	0	0	1
4	0	1	1	15
5	0	1	0	2
6	0	0	1	14
7	0	0	0	3

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(SENT AND RECEIVED WITH ATN=1)

B_{i_s} (b7 b6 b5)	b_4	b_3	b_2	b_1	COLUMN / ROW	$0\,0\,0$	MSG (1)	$0\,0\,1$	MSG	$0\,1\,0$	MSG	$0\,1\,1$	MSG	$1\,0\,0$	MSG	$1\,0\,1$	MSG	$1\,1\,0$	MSG	$1\,1\,1$	MSG
						0		1		2		3		4		5		6		7	
	0	0	0	0	0	NUL		DLE		SP	MLA ASSIGNED TO DEVICE	0	MLA ASSIGNED TO DEVICE	@	MTA ASSIGNED TO DEVICE	P	MTA ASSIGNED TO DEVICE	`	MEANING DEFINED BY PCG CODE	p	MEANING DEFINED BY PCG CODE
	0	0	0	1	1	SOH	GTL	DC1	LLO	!		1		A		Q		a		q	
	0	0	1	0	2	STX		DC2		"		2		B		R		b		r	
	0	0	1	1	3	ETX		DC3		#		3		C		S		c		s	
	0	1	0	0	4	EOT	SDC	DC4	DCL	$		4		D		T		d		t	
	0	1	0	1	5	ENQ	PPC (3)	NAK	PPU	%		5		E		U		e		u	
	0	1	1	0	6	ACK		SYN		&		6		F		V		f		v	
	0	1	1	1	7	BEL		ETB		'		7		G		W		g		w	
	1	0	0	0	8	BS	GET	CAN	SPE	(		8		H		X		h		x	
	1	0	0	1	9	HT	TCT	EM	SPD	)		9		I		Y		i		y	
	1	0	1	0	10	LF		SUB		*		:		J		Z		j		z	
	1	0	1	1	11	VT		ESC		+		;		K		[		k		{	
	1	1	0	0	12	FF		FS		,		<		L		\		l		|	
	1	1	0	1	13	CR		GS		-		=		M		]		m		}	
	1	1	1	0	14	SO		RS		.		>		N		^		n		~	
	1	1	1	1	15	SI		US		/		?	UNL	O		_	UNT	o		DEL	

ADDRESSED COMMAND GROUP (ACG)

UNIVERSAL COMMAND GROUP (UCG)

(4)

LISTEN ADDRESS GROUP (LAG)

TALK ADDRESS GROUP (TAG)

PRIMARY COMMAND GROUP (PCG)

SECONDARY COMMAND GROUP (SCG)

NOTES: (1) MSG = INTERFACE MESSAGE
(2) b_1 = DIO1...b_7 = DIO7
(3) REQUIRES SECONDARY COMMAND
(4) DENSE SUBSET (COLUMN 2 THROUGH 5)

Table 4-2. Multiline Interface Messages: ISO-7 Bit Code Representation

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SECTION V
MAINTENANCE

5-1- GENERAL

This section of the manual contains procedures for verification of performance, disassembly, troubleshooting and calibration of the Plug-In-Programmer series 9010. The PIP is delivered with all adjustments and calibrations completed. Further adjustment should not be required unless a malfunction occurs or certain critical parts are replaced.

If the procedures of this section and the circuit description of Section IV do not provide sufficient information to locate and correct a malfunction, the assistance of the Elgar Repair Department should be requested. Equipment should not be returned to the Elgar factory without the express authorization of Elgar. Elgar cannot assume responsibility for equipment returned without authorization.

5-2 REQUIRED TEST EQUIPMENT

The equipment required to conduct the performance verification procedures and for troubleshooting is listed in Table 5.1. Substitute equipment may be employed provided that such equipment meets the accuracy specifications of the listed equipment.

5-3 DISASSEMBLY

All digital integrated circuit devices and most analog integrated circuit devices are installed in sockets for ease of removal for troubleshooting. If a spare device is not available, many times there are similar devices elsewhere in the PIP. Simply exchange similar devices to see if the trouble moves.

5-3-1 TROUBLESHOOTING ACCESS

If an extender card is not available, the boards may be accessed for troubleshooting by the following methods.

1. Remove power source top cover.
2. If trouble is on GPIB board, troubleshoot from top of GPIB board. If trouble is not on GPIB board, remove GPIB board and and operate in local control while troubleshooting.
3. If trouble is on storage board, troubleshoot from top of storage board.

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4. If trouble is on main board or phase board, remove hold down screws for storage board and lay storage board over front edge of power source. Be sure to insulate storage board from power source before reapplying power.
5. If trouble is on main board and unit has a phase board, remove phase board screws and lay phase board to left. Be sure to insulate phase board from chassis before reapplying power.

5-4 PERIODIC INSPECTION

Whenever the Plug-In-Programmer is removed for maintenance, or at six months intervals, it should be thoroughly inspected to insure that it is not returned to service in a marginal condition. The PIP should be checked for loose screws, components not properly seated in sockets or components that show evidence of overheating.

After inspection, remove any accumulation of dust or other foreign material with a soft brush and low-pressure air.

5-5 ADJUSTMENTS

There are only a comparatively few adjustments to be made in the series 9010 Plug-In-Programmer. These are made at the factory and should not require readjustment unless critical components are replaced. The function of these adjustments and the manner in which they are made is covered in the following procedures.

1. Connect a frequency counter to TP3 on the storage board with return to TP2. Program 1000Hz on PIP.
2. Adjust C6 on the storage board for a frequency on the frequency counter of 1,023,990 to 1.024,010Hz.
3. Monitor A phase output of associated power source with a distortion analyzer and program 800Hz at 30VRMS on PIP.
4. Adjust R8 and then R3 on main board for minimum distortion on the distortion analyzer.
5. Program 100VAC at 800Hz and monitor A phase output with AC differential voltmeter set for 100V.
6. Connect a test lead with 100 Kohms in series from storage board TP2 (common) to Low side of power source output. Record reading.
7. Move test lead to High side of power source output and adjust mainboard R31 (CMR) for same reading as recorded in previous step. Remove test lead.
8. Open servo leads and adjust R18 (OPEN) on main board for 110 VRMS ± 0.5VRMS reading on differential voltmeter.
9. Reclose servo loop and adjust main board R24 (F.S.) for 100 VRMS on differential voltmeter.
10. Program Amplitude to 10 VRMS out and adjust R27 (ZERO) on main board for 10.0 VRMS on differential voltmeter.
11. Repeat steps 9 and 10 at 100 VRMS and 10 VRMS respectively, to compensate for interaction of adjustments. Both adjustments should be within 100mVAC.
12. Program 90.0VAC and adjust R16 (90) on storage board for 90.0 VRMS ± 0.1VRMS on differential voltmeter.

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13. Program 99.0VAC and adjust R19 (99) on storage board for 99.0VAC±0.1VAC on DMM.
14. Program 5100Hz and turn R13 (5KADJ) on main board clockwise until display starts blinking and then adjust slowly counter clockwise until display stops blinking.
15. Program 45Hz and turn R11(45ADJ) on main board counter clockwise until display starts blinking and the adjust slowly counter clockwise until display stops blinking.

This completes the calibration for a single phase Plug-In-Programmer. For multiphase units, complete the following steps.

16. Program 800Hz at 100VAC and monitor phaseboard TP1 with distortion analyzer. Attach common to storage board TP2.
17. Adjust phase board R5(THD LO) and R8(THD HI) for minimum distortion on distortion analyzer. Remove distortion analyzer.
18. Connect a Phase Angle Meter from A phase to B phase of power source output and program 45Hz.
19. Adjust R7 for +240 degrees on Phase Angle Meter.
20. Program 5kHz and adjust C6 for +240 degrees on Phase Angle Meter.
21. Program 100VAC at 800Hz and monitor B phase output with differential voltmeter.
22. Connect a test lead with 100Kohms in series from storage board TP2 (common) to low side of B phase output. Record reading.
23. Move test lead to high side of B phase output and adjust R32 (CMR[B]) for same reading as recorded in previous step.
24. Move differential voltmeter from B phase output to C phase output and move test lead to low side of C phase output. Record reading.
25. Move test lead to high side of C phase output and adjust R33 (CMR[C]) for same reading as recorded in previous step.
26. Open servo leads for B and C phase, leave program at 100VAC and 800Hz.
27. Monitor B phase output with differential voltmeter and adjust R16 (OPEN[B]) for 110VAC ± 0.5VAC on voltmeter readout.
28. Monitor C phase output with differential voltmeter and adjust R17 (OPEN[C]) for 110VAC ± 0.5VAC on voltmeter readout.
29. Close servo leads for all phases. Monitor B phase output with differential voltmeter.
30. Adjust R24 (FS[C]) on phase board for 100VAC ± 0.1VAC on differential voltmeter.
31. Program 10.0VAC at 800Hz and adjust R28 (Zero[B]) for 10VAC ± 0.1VAC on differential voltmeter.
32. Repeat steps 30 and 31 as required to compensate for interaction of adjustments.
33. Move differential voltmeter to C phase output.
34. Program 100VAC at 800Hz and adjust R25 (FS[C]) on phase board for 100VAC ± 0.1VAC on differential voltmeter.
35. Program 10.0VAC at 800Hz and adjust R31 (Zero[C]) for 10VAC ± 0.1VAC on differential voltmeter.
36. Repeat steps 34 and 35 as required to compensate for interaction of adjustments.

END of PIP Calibration Procedure.

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5-6 PERFORMANCE VERIFICATION

The PIP Plug-In-Programmer should have its performance verified at six month intervals. The performance verification can be accomplished with the PIP connected in the system and with the necessary precision test equipment listed in Table 5-1 connected as directed in the following paragraphs.

5-6-1 Preliminary Set-Up

1. AC Power Source Power switch OFF.
2. No load connected to power source output.
3. Remote programmer disabled or disconnected.
4. AC differential voltmeter connected across A phase output.
5. Distortion Analyzer connected across A phase output.
6. Frequency meter connected across A phase output.

5-6-2 Local Mode Checks

1. Turn on Power Source Power source switch and program 400Hz 130.0VAC.
2. Frequency meter should read 399.996Hz to 400.004Hz.
3. Differential voltmeter should read 129.74VRMS to 130.26VRMS.
4. Distortion Analyzer should read 1% or less THD.
5. Program Amplitude to 6.5VRMS.
6. Differential voltmeter should read 6.24VRMS to 6.76VRMS.
7. Program 45Hz and 130VRMS.
8. Differential voltmeter should read 129.74VRMS to 130.26VRMS.
9. Distortion Analyzer should read 1% or less THD.
10. Program Frequency to 5000Hz.
11. Differential voltmeter should read 129.74VRMS to 130.26VRMS.
12. Distortion Analyzer should read 1% or less THD.
13. Program Frequency to 5200Hz. Display should blink.
14. Program Frequency to 43 Hz. Display should blink.

This is the end of Local Mode Checks. The following steps are for multiphase units only.

15. Program 130.0VAC and 45Hz. Connect differential voltmeter and Distortion Analyzer across B phase output.
16. Differential voltmeter should read 129.74VRMS to 130.26VRMS.
17. Distortion Analyzer should read 1% or less THD.
18. Move differential voltmeter and Distortion analyzer to C phase.
19. Differential voltmeter should read 129.74VRMS to 130.26VRMS.
20. Distortion Analyzer should read 1% or less THD.
21 Program Frequency to 45Hz.
22. Differential voltmeter should read 129.74VRMS to 130.26VRMS.
23. Distortion Analyzer should read 1% or less THD.
24. Move differential voltmeter and Distortion Analyzer to B phase output.
25. Differential voltmeter should read 129.74VRMS to 130.26VRMS.
26. Distortion Analyzer should read 1% or less THD.
27. Still at 45Hz, connect a Phase Angle Meter from A phase to B phase.
28. Phase Angle Meter should read +239 degrees to +241 degrees.

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29. Move Phase Angle Meter signal lead to C phase.
30. Phase Angle Meter should read +119 degrees to +121 degrees.

This is the end of Local Mode Checks.

5-6-3 Remote Mode Checks (IEEE-488 or Parallel)

1. Connect Plug-In Programmer to appropriate controller via 24 PIN connector on rear of power source.
2. Turn on power source and controller.
3. Program Frequency to 4888Hz.
4. Switch PIP Display Select switch to FREQ and verify that display reads 4888.
5. Program Frequency to 3777Hz and ensure that display reads 3777Hz.
6. Switch the Display Select Switch to AMPL.
7. Program 108.8 V and ensure that display reads 108.8.
8. Program 37.7 V and ensure that display reads 037.7.
9. Program 40.0 V and ensure that display reads 040.0.

This is the end of the Remote Mode Checks.

5-7 TROUBLESHOOTING

A thorough study of the Theory of Operation is a pre-requisite to servicing or repair of the Series 9010 Plug-In-Programmer. When the operation of the circuits is understood, the observed symptoms will suggest the procedure to use in determining which circuit is malfunctioning. The test equipment required is listed Table 5.1 It is not possible to predict all failure modes of the many devices used in the PIP and the described symptoms may be generated by failure modes that are unanticipated. Therefore, if the suggested remedy does not solve the problem, or if the problem does not have a remedy, the technician is on his own and must use good diagnostic troubleshooting to solve the problem. The troubleshooting flow chart of Table 5.2 suggests many, but not all of the problems which may be encountered.

TABLE 5-1. REQUIRED TEST EQUIPMENT

Differential AC Voltmeter	Fluke Model 931B or equal
Frequency Counter	H.P. Model 5315A or equal
Digital Multimeter	Fluke Model 8050A or equal
Oscilloscope	Tektronix Model 455 or equal
Distortion Analyzer	Krohn-Hite Model 6800 or equal
Phase Angle Meter	Dranetz Model 331 or equal

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SECTION VI
PARTS LIST

6-1. GENERAL

6-2. This section contains a listing of all parts necessary for factory-authorized repair of the Elgar Plug-In-Programmer. Location of parts and assemblies are given on an assembly drawing accompanying each board schematic. Parts are located on the assembly drawing and correlated on the parts lists by reference designators.

6-3. When ordering spare parts, specify part name, part number, manufacturer, component value and rating. Where no specific manufacturer or part number is given, the replacement part should conform to value, rating, and tolerance as listed. If complete assemblies are desired, order assemblies from Elgar, 9250 brown Deer Road, San Diego, CA 92121-2294, 1-800-733-5427. Specify assembly number, instrument series number and instrument name.

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SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
DS5		LED, green		H.P.	5082-4955	848-955-04
VR1		Regulator	+5V	Sil. Gen.	SG7805ACP	849-780-5P
VR2		Regulator	+15V	Sil. Gen.	SG7815ACP	849-781-5P
VR3		Regulator	-15V	Sil. Gen.	SG7915ACP	849-791-5P
NA		Flexstrip Jumper	18 Cond	Ansley	FSP-21B-18	895-21B-18

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5809001-01 ASSEMBLY, MAIN BOARD SERIES 9010 PIP

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
U2,6	10K	8 Res Pac	1%	Beckman	698-3-10KF	818-103-DR
R3,26	1K	Resistor	¼W, 5%	A-B	RC07GF102J	801-102-05
R7,14,20,22, 28,36	10K	Resistor	¼W, 5%	A-B	RC07GF103J	801-103-05
R23, 33	100K	Resistor	¼W, 5%	A-B	RC07GF104J	801-104-05
R5,16	1M	Resistor	¼Wm 5%	A-B	RC07GF105J	801-105-05
R19	14K	Resistor	¼W, 5%	A-B	RC07GF152J	801-153-05
R37	33K	Resistor	¼W, 5%	A-B	RC07GF333J	801-333-05
R17	3.3M	Resistor	¼W, 5%	A-B	RC07GF335J	801-355-05
R21	4.7K	Resistor	¼W, 5%	A-B	RC07GF472J	801-472-05
R9,15	510ohm	Resistor	¼W, 5%	A-B	RC07GF511J	801-511-05
R25	510K	Resistor	¼W, 5%	A-B	RC07GF514J	801-514-15
R12	1.5K	Resistor	1/8W, 1%	Dale	RN60C1501F	813-150-1F
R10	71.5K	Resistor	1/8W, 1%	Dale	RN60C7152F	813-715-2F
R32	9.76K	Resistor	1/8W, 1%	Dale	RN60C9761F	813-976-1F
R34,35	549K	Resistor	½W,1%	Dale	RN65C5493F	816-549-3F
R29,30	300ohm	Resistor	5W, 5%	Dale	CW5300R	807-301-05
R4,27	100K	1T Pot		Spectrol	63P104	819-104-63
R13	20K	Potentiometer		Spectrol	63P203	819-203-63
R8,31	500ohm	Potentiometer		Spectrol	63P501	819-501-63
R18,24	5K	20T Pot		Spectrol	64W502	819-502-64
R11	50K	1T Pot		Spectrol	63P503	819-503-63
C3	10pf	Cap Mica	5%	CDE	CD15FD100J03	820-100-05
C5	1000pf	Cap Mica	1%	CDE	CD15FD102F03	820-102-01
C7	150pf	Cap Mica	5%	CDE	CD15FD151J03	820-151-05
C6	2500Pf	Cap Mica	1%	CDE	CD19FD252F03	820-252-01
C15	510Pf	Cap Mica	5%	CDE	CD15FD511F03	820-511-05
C1,22	.001mf	Cap Disc	5%	Centralab	DDM102	821-102-00
C2,4,17,18	.1uf	Cap Disc	25V	Sprague	HY-550	821-104-05
C8,12	.002uf	Cap Disc	10%	Centralab	DDM202	821-202-10
C10	.022uf	Cap Mylar	5%	IMB	BA1B223J	822-223-53
C9	.22uf	Cap Mylar	5%	IMB	BA1B224J	822-224-53
C16	1uf	Cap Tant	35V	Sprague	196D105X035JA1	823-105-61
C11,13	2.2uf	Cap Tant	20V	Sprague	150D224X9020A2	823-224-02
C14	.47uf	Cap Tant	35V	Sprague	196D474X0035HAI	823-474-61
C20,21	100uf	Cap Elect	50V	Sprague	500D1076050DH7	824-107-71

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SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
C19	4700uf	Cap Elect	16V	Sprague	501D478F016TV	824-478-01
D7-10		Diode	15V		IN4744A	843-474-4A
D1,3,4		Diode			IN914	844-914-XX
D5,6		Diode			IN4004	845-400-4X
Q1,2		Transistor		Signetics	SD213	842-SD2-13
Q3-5		Transistor			2N3643	835-364-3X
U1,3,5,7		Dual OP-AMP		T1	TL072	849-TL0-72
U14,16,18		Quad EX OR		T1	SN74LS86N	849-LS8-6X
U4		Photo-Mod		Clairex	CLM51	849-CLM-51
U8		Dual Timer		T1	SN74LS123N	849-LS1-23
U9		Dual D F/F		T1	SN74LS74N	849-LS7-4X
U10		8 Bit DAC		Signetics	NE5008	849-N50-08
U11,15,17		Bin Ctr.		T1	SN74LS193N	849-LS1-93
U12		Dual Dec Ctr.		T1	SN74LS390N	849-LS3-90
U13		Sine Prom		Elgar		849-SA2-5D
T1		Transformer	16V	Signal	LP-16-700	850-LP1-67

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50809002 ASSEMBLY, DISPLAY BOARD, SERIES 9010 PIP

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
R2	1K	Resistor	¼W, 5%	A-B	RC07GF102J	801-102-05
R1	10K	Resistor	¼W, 5%	A-B	RC07GF103J	801-103-05
R4,5	33K	Resistor	¼W, 5%	A-B	RC07GF333J	801-333-05
R3,6,7	75K	Resistor	¼W, 5%	A-B	RC07GF753J	801-753-05
C2	.01uf	Cap Disc		Centralab	DDM103	821-103-00
C3	.1uf	Cap Disc		Sprague	HY550	821-104-CK
C4	10uf	Cap Tant	20V	Sprague	196D106X0020JA1	823-106-41
C1	4.7uf	Cap Tant	35V	Sprague	196D475X0035JA1	823-475-61
D1,2		Diode		T1	IN914	844-914-XX
DS1,2,3,4		Display		G.I.	MAN4610	848-461-0X
U1	330ohm	8 Res Pac		Beckman	316B331	818-331-DS
S2		Keyboard		Grayhill	83AA1-102	860-83A-02
S1		DPDT Sw		Alcoswitch	TT21-PG-PC-9T	860-T21-9T
U8		Hex Buf		RCA	CD4503BE	839-C45-03
U5		Dual D F/F		RCA	CD4013BE	849-C40-13
U9		Triple NAND		RCA	CD4023BE	849-C40-13
U6		Quad NAND		RCA	CD4081BE	849-C40-81
U4		Led Driver		T1	SN74LS47N	849-745-47
U3		Hex Schmidt		RCA	CD40106BE	849-401-06
U7		Keyboard Encode		Motorola	MC14419	849-144-19
U2		Source Driver		Sprague	UDN2981	849-298-1X

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5809004 ASSEMBLY, STORAGE BOARD SERIES 9010 PIP

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
R12,13,33	1K	Resistor	¼W, 5%	A-B	RC07GF102J	810-102-05
R1,3,4,6	10K	Resistor	¼W, 5%	A-B	RC07GF103J	801-103-05
R2,4,7,8,9	100K	Resistor	¼W, 5%	A-B	RC07GF104J	801-104-05
R30	1M	Resistor	¼W, 5%	A-B	RC07GF105J	801-105-05
R10,11	33K	Resistor	¼W, 5%	A-B	RC07GF333J	801-333-05
R18,21,22,23	9.1K	Resistor	¼W, 5%	A-B	RC07GF912J	801-912-05
R31	2.21K	Resistor	1/8W, 1%	Dale	RN60C2211F	813-221-1F
R25	24.3K	Resistor	1/8W, 1%	Dale	RN60C2432F	813-243-2F
R24,28	2.74K	Resistor	1/8W, 1%	Dale	RN60C2741F	813-274-1F
R14,15	3.75K	Resistor	1/8W, 1%	Dale	RN60C3651F	813-365-1F
R24,29	7.87K	Resistor	1/8W, 1%	Dale	RN60C7871F	813-787-1F
U3,13	10K	9 Res SIP	5%	Beckman	785-1-10K	818-103-SP
R32	100K	1T Pot		Spectrol	63P104	819-104-63
R16,19	500ohm	1T Pot		Spectrol	63P501	819-501-63
C15	1000pf	Cap Mica	5%	CDE	CD15FD102F03	820-102-05
C1	22pf	Cap Mica	5%	CDE	CD15FD220F03	820-220-05
C2	233pf	Cap Mica	5%	CDE	CD15FD330F03	820-330-05
C4,5,7	47pf	Cap Mica	5%	CDE	CD15FD470F03	829-470-05
C17	.001uf	Cap Disc		Centralab	DDM102	821-102-00
C8,11,14	.01uf	Cap Disc		Centralab	DDM103	821-103-00
C9,10	.1uf	Cap Disc		Sprague	HY550	821-104-05
C3,16	10uf	Cap Tant	20V	Sprague	196D106X0020JA1	823-106-41
C6	15/60pf	Cap Var		Erie	538-011F15-60	828-015-60
D1		Diode Sig		T1	IN914	844-914-XX
D2		Diode Zener	6.9V	National	LM329CZ	848-LM3-29
Y1	10.24MHz	Crystal		Monitor Prod	MC18A-32-10.24MHz	864-102-4X
U1,2,12		Hex Inv		T1	SN74LS045N	849-LS0-5X
U4,5,14,15		4 Bit Shift		RCA	CD4035BE	849-C40-35
U6,16,23,31		Octal Latch		National	MM74C374	849-7C3-74
U7,8		8 Bit DAC		Signetics	NE5009	849-N50-09
U9,19,22,26, 30,34		Dual 4 to 1 MUX		RCA	CD4539BE	849-C45-39
U10		Dual OP-AMP		T1	TL074	849-TL0-74

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5809004 ASSEMBLY, STORAGE BOARD, SERIES 9010 PIP (Continued)

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
U11		Quad Nand		RCA	CD4011BE	849-C40-11
U17,18		8 Bit DAC		Signetics	NE5008	849-N50-08
U20		Dual 4 IN NAND		T1	SN74LS20N	849-LS2-0X
U21		Hex Schmidt		RCA	CD40106BE	849-401-06
U24,25,32,33		Rate Mult		T1	SN74167N	849-741-67
U26,29		Triple OR		RCA	CD4075BE	849-C40-75
U28		Dual AND		RCA	CD4082BE	849-C41-82

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5809003 ASSEMBLY, PHASE BOARD, SERIES 9010 PIP

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
R38,39	100ohm	Resistor	¼W, 5%	A-B	RC07GF101J	801-101-05
R4,26,30	1K	Resistor	¼W, 5%	A-B	RC07GF102J	801-102-05
R22,23,40	10K	Resistor	¼W, 5%	A-B	RC07GF103J	801-103-05
R3	1M	Resistor	¼W, 5%	A-B	RC07GF105J	801-105-05
R19,21	15K	Resistor	¼W, 5%	A-B	RC07GF153J	801-153-05
R18,20	3.9K	Resistor	¼W, 5%	A-B	RC07GF392J	801-392-05
R27,29	510ohm	Resistor	¼W, 5%	A-B	RC07GF511J	801-511-05
R42	68ohm	Resistor	¼W, 5%	A-B	RC07GF680J	801-680-05
R6	4.75K	Resistor	1/8W, 1%	Dale	RN60C4751F	813-475-1F
R1,2,42,43	4.99K	Resistor	1/8W, 1%	Dale	RN60C4991F	813-499-1F
R44,45	9.76K	Resistor	1/8W, 1%	Dale	RN60C9761F	813-976-1F
R9,10	100K	Resistor	1/8W,25%	Dale	RN60C1003C	814-100-3C
R11,13,14,15	50K	Resistor	1/8W,25%	Dale	RN60C5002C	814-500-2C
R12	73.2K	Resistor	1/8W,25%	Dale	RN50C7322C	814-732-2C
R34-37	549K	Resistor	½W, 1%	Dale	RN65C5493F	816-549-3F
R5,28,31	100K	1T Pot		Spectrol	63P104	819-104-63
R7,8,32,33	500ohm	1T Pot		Spectrol	63P104	819-501-63
R24,25,16,17	5K	20T Pot		Spectrol	64W502	819-502-64
R2,7,10	10K	8 Res Pac	1%	Beckman	698-3-10KF	818-103-DR
C3	10pf	Cap Mica	5%	CDE	CD15FD100J03	820-100-05
C12	100pf	Cap Mica	5%	CDE	CD15FD101J03	820-102-01
C4	1000pf	Cap Mica	1%	CDE	CD15FD102F03	820-101-05
C2	1000pf	Cap Mica	5%	CDE	CD15FD102J03	820-102-05
C7	120pf	Cap Mica	5%	CDE	CD15FD121J03	829-121-05
C5	2500pf	Cap Mica	1%	CDE	CD19FD252F03	820-252-01
C10,11	510pf	Cap Mica	5%	CDE	CD15FD511J03	820-511-05
C1	.1uf	Cap Disc	5%	Sprague	HY550	821-104-05
C8,9	.47uf	Cap Tant	35 V	Sprague	196D474X0035HA1	823-474-61
C6	15-60pf	Cap Var		Erie	538-011F15-60	828-D15-60
D1-6		Diode		T1	IN914	844-914-XX
Q1		Transistor		Signetics	SD213	842-SD2-13
U1,3,5,6		Dual Op-Amp		T1	TL072	849-TL0-72
U4,12		Photo-Mod		Clairex	CLM51	849-CLM-51
U13		Cosine Prom		Elgar		849-CA2-5D
U14		8 Bit DAC		Signetics	NE5008	849-N50-08

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5809005 ASSEMBLY, GPIB BOARD, SERIES 9010 PIP

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
R4,6,8,10,18	510ohm	Resistor	¼W, 5%	A-B	RC07GF511J	801-511-05
R2	3K	Resistor	¼W, 5%	A-B	RC07GF302J	801-302-05
R11-17,20,21	33K	Resistor	¼W, 5%	A-B	RC07GF333J	801-333-05
R1,3,5,9	6.2K	Resistor	¼W, 5%	A-B	RC07GF622J	801-622-05
SIP1	10K	9 Res SIP		Beckman	785-1-10K	818-103-SP
C8	68pf	Cap Mica	5%	CDE	CD15FD680J03	820-680-05
C6	.001uf	Cap Disc		Centralab	DDM102	821-102-00
C4,5,9	.005uf	Cap Disc		Centralab	DDM502	821-502-00
C1-3,10-13,7	.01uf	Cap Disc		Centralab	DDM103	821-103-00
CR1-5,8		Diode		TI	1N914	844-914-XX
S1-5		5 Sect DIP SW		CTS	206-5	860-206-5X
U2		Hex Schmidt		TI	SN74LS14N	849-OS1-4X
U1,7,12		Bus Transc		TI	MC3446	849-344-6X
U18		Quad NOR		RCA	CD4001BE	849-C40-01
U3,17		Quad NAND		RCA	CD4011BE	849-C40-11
U4		Dual D F/F		RCA	CD4013BE	849-C40-13
U5,11		Triple NAND		RCA	CD4023BE	849-C40-23
U14		Digital COMP		RCA	CD4063BE	849-C40-63
U9		Quad EX OR		RCA	CD4070BE	849-C40-70
U10,20		Quad AND		RCA	CD4081BE	849-C40-81
U16		Hex Inv Buf		RCA	CD4502BE	849-C45-02
U6		Hex Schmidt		RCA	CD40106BE	849-401-06
U15,19		Triple AND		RCA	CD4073BE	849-C40-73

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SECTION VII
DIAGRAMS

7-1 GENERAL

7-2 This section contains the schematic diagrams for the Series 9010 PIP Plug-In Programmer. The schematic diagrams should be used to understand the theory of operation and as an aid in troubleshooting the unit. Reference designators shown on schematics correspond to reference designators shown in parts lists where exact component values are given.

7-3 DIAGRAMS

7-4 Diagrams included in this section are as follows:

Interconnect Diagram, PIP Series 9010, 6809010
Assembly, Series 9010 Plug-In Programmer, 5809010
Front Panel, PIP Series 9010, 9809010
Oscillator Main Board, PIP, 6809001
Assembly Main Board, PIP Series 9010, 5809001
Display Board - PIP Schematic 6809002
Assembly Display Board, PIP Series 9010, 5809002
Oscillator Phase Board, PIP, Schematic 6809003
Oscillator Phase Board Assembly, 5809003
Storage Board Schematic, PIP, 6809004
Storage Board Assembly, PIP, 5809004
GPIB Board Schematic, 6809005
GPIB Board Assembly, 5809005

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CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 140 ASSEMBLY, ELGAR - FGI

5809010-01 OPCODE: 0 REV: G 3PHASE GPIB PIP A
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
1006026-01	TEST PROCEDURE A	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
1006027-01	COVERS ON TEST 9010 A	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
109-093-SW	WASHER,SHLDR	3	B	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
109-220-PD	INSUL,SILPAD,TO220,.007 THK	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
109-961-24	ADHSV,BONDER,SUPER STRENGTH	3	B	0	.000	1.000	EA	F	YN	.000	0	0		00/00/00	99/99/99
110AH04-03	SCREW,2-56 X .187,SBH	3		0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
110DH04-03	SCREW,6-32 X .187,SBH	3		0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
110DH04-04	SCREW,6-32 X .250,SBH	3		0	11.000	1.000	EA	F	YN	11.000	0	0		00/00/00	99/99/99
110DH04-16	SCREW,6-32 X 1.00,SBH	3		0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
1130222-99	WIRE,22AWG,300V,WHT,UL,105C	3	A	0	3.750	1.000	FT	F	YN	3.750	0	0		00/00/00	99/99/99
5809001-01	MAIN BD PIP 3PHASE A	3	M	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809002-01	DISPLAY BRD ASSY PIP A	3	C1	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809003-01	PHASE BD ASSY PIP A	3	F	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809004-01	STORAGE BRD ASSY A	3	H	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809005-01	GPIB INTERFACE ASSY A	3	D	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
604-197-90	MANUAL PIP 9010	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
6809010-01	SCHEMATIC PIP 9010	3	B	0	.000	1.000	EA	B	YN	.000	0	0		00/00/00	99/99/99
849-780-5P	IC,REG,VOLT,7805,5V,TO220	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-781-5P	IC,REG,VOLT,7815ACP,15V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-791-5P	IC,REG,VOLT,NEG,15V	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
856-FCJ-16	CONN,16P,HDR,RBN,DIP	3	C	0	6.000	1.000	EA	B	YN	6.000	0	0		00/00/00	99/99/99
895-21B-18	TERM,FLEX,STRIP,JUMPER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
896-TY2-3M	TIE WRAP,4.51 INCH LNTH	3	B	0	7.000	1.000	EA	F	YN	7.000	0	0		00/00/00	99/99/99
899-263-09	FERRUL THUMB SCREW KIT	3	A	0	2.000	1.000	PR	B	YN	2.000	0	0		00/00/00	99/99/99
9809009-01	FILTER POLARIZER	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809010-01	FRONT PNL, PIP A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 140 ASSEMBLY, ELGAR - FGI

5809010-02 OPCODE: 0 REV: F 1 PHASE PAR PIP P
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ: N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-093-SW	WASHER,SHLDR	3	B	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
109-220-PD	INSUL,SILPAD,TO220,.007 THK	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
5809001-02	MAIN BD ASSY PIP 1PH A	3	M	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809002-01	DISPLAY BRD ASSY PIP A	3	C1	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809004-01	STORAGE BRD ASSY A	3	H	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
849-780-5P	IC,REG,VOLT,7805,5V,TO220	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-781-5P	IC,REG,VOLT,7815ACP,15V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-791-5P	IC,REG,VOLT,NEG,15V	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
856-FCJ-16	CONN,16P,HDR,RBN,DIP	3	C	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
899-263-09	FERRUL THUMB SCREW KIT	3	A	0	2.000	1.000	PR	B	YN	2.000	0	0		00/00/00	99/99/99
9809009-01	FILTER POLARIZER	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809010-01	FRONT PNL, PIP A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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DISTRIBUTION: DEBBIEF -

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AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 140 ASSEMBLY, ELGAR - FGI

5809010-03 OPCODE: 3 REV: F 3 PHASE PAR PIP ASSY P
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-093-SW	WASHER,SHLDR	3	B	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
109-220-PD	INSUL,SILPAD,TO220,.007 THK	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
5809001-01	MAIN BD PIP 3PHASE A	3	M	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809002-01	DISPLAY BRD ASSY PIP A	3	C1	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809003-01	PHASE BD ASSY PIP A	3	F	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809004-01	STORAGE BRD ASSY A	3	H	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
849-780-5P	IC,REG,VOLT,7805,5V,TO220	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-781-5P	IC,REG,VOLT,7815ACP,15V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-791-5P	IC,REG,VOLT,NEG,15V	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
856-FCJ-16	CONN,16P,HDR,RBN,DIP	3	C	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
895-21B-18	TERM,FLEX,STRIP,JUMPER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
899-263-09	FERRUL THUMB SCREW KIT	3	A	0	2.000	1.000	PR	B	YN	2.000	0	0		00/00/00	99/99/99
9809009-01	FILTER POLARIZER	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809010-01	FRONT PNL, PIP A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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DISTRIBUTION: DEBBIEF -

BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 140 ASSEMBLY, ELGAR - FGI

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

5809010-04 OPCODE: 0 REV: G 1PHASE GPIB PIP ASSY A
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
1006026-01	TEST PROCEDURE A	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
1006027-01	COVERS ON TEST 9010 A	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
109-093-SW	WASHER,SHLDR	3	B	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
109-220-PD	INSUL,SILPAD,TO220,.007 THK	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
109-961-24	ADHSV,BONDER,SUPER STRENGTH	3	B	0	.000	1.000	EA	F	YN	.000	0	0		00/00/00	99/99/99
5809001-02	MAIN BD ASSY PIP 1PH A	3	M	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809002-01	DISPLAY BRD ASSY PIP A	3	C1	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809004-01	STORAGE BRD ASSY A	3	H	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809005-01	GPIB INTERFACE ASSY A	3	D	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
849-780-5P	IC,REG,VOLT,7805,5V,TO220	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-781-5P	IC,REG,VOLT,7815ACP,15V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-791-5P	IC,REG,VOLT,NEG,15V	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
856-FCJ-16	CONN,16P,HDR,RBN,DIP	3	C	0	6.000	1.000	EA	B	YN	6.000	0	0		00/00/00	99/99/99
899-263-09	FERRUL THUMB SCREW KIT	3	A	0	2.000	1.000	PR	B	YN	2.000	0	0		00/00/00	99/99/99
9809009-01	FILTER POLARIZER	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809010-01	FRONT PNL, PIP A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 140 ASSEMBLY, ELGAR - FGI

5809010-05 OPCODE: 0 REV: F 1 PH GPIB 32V RNG PIP S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ: N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-093-SW	WASHER,SHLDR	3	B	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
109-220-PD	INSUL,SILPAD,TO220,.007 THK	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
5809001-03	MAIN BD ASSY PIP 1PH S	3	M	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809002-01	DISPLAY BRD ASSY PIP A	3	C1	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809004-02	STRGE BD ASY PIP 32V S	3	H	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809005-01	GPIB INTERFACE ASSY A	3	D	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
849-780-5P	IC,REG,VOLT,7805,5V,TO220	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-781-5P	IC,REG,VOLT,7815ACP,15V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-791-5P	IC,REG,VOLT,NEG,15V	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
856-FCJ-16	CONN,16P,HDR,RBN,DIP	3	C	0	6.000	1.000	EA	B	YN	6.000	0	0		00/00/00	99/99/99
899-263-09	FERRUL THUMB SCREW KIT	3	A	0	2.000	1.000	PR	B	YN	2.000	0	0		00/00/00	99/99/99
9809009-01	FILTER POLARIZER	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809010-01	FRONT PNL, PIP A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 160 ASSEMBLY, ELGAR - MISC.

5809010-06 OPCODE: 3 REV: G 1PHASE,GPIB,DUAL RING S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
1006026-01	TEST PROCEDURE A	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
1006027-01	COVERS ON TEST 9010 A	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
109-093-SW	WASHER,SHLDR	3	B	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
109-220-PD	INSUL,SILPAD,TO220,.007 THK	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
109-961-24	ADHSV,BONDER,SUPER STRENGTH	3	B	0	.000	1.000	EA	F	YN	.000	0	0		00/00/00	99/99/99
5809001-04	MAIN BD 1PH GPIB RN S	3	M	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809002-01	DISPLAY BRD ASSY PIP A	3	C1	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809004-01	STORAGE BRD ASSY A	3	H	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809005-01	GPIB INTERFACE ASSY A	3	D	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
849-780-5P	IC,REG,VOLT,7805,5V,TO220	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-781-5P	IC,REG,VOLT,7815ACP,15V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-791-5P	IC,REG,VOLT,NEG,15V	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
856-FCJ-16	CONN,16P,HDR,RBN,DIP	3	C	0	6.000	1.000	EA	B	YN	6.000	0	0		00/00/00	99/99/99
899-263-09	FERRUL THUMB SCREW KIT	3	A	0	2.000	1.000	PR	B	YN	2.000	0	0		00/00/00	99/99/99
9809009-01	FILTER POLARIZER	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809010-01	FRONT PNL, PIP A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 140 ASSEMBLY, ELGAR - FGI

5809010-07 OPCODE: 3 REV: F 33XX-002 15HZ P
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ: N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQP	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-093-SW	WASHER,SHLDR	3	B	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
109-220-PD	INSUL,SILPAD,TO220,.007 THK	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
5809001-05	MAIN BD PIP 3PH 15HZ S	3	M	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809002-01	DISPLAY BRD ASSY PIP A	3	C1	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809003-01	PHASE BD ASSY PIP A	3	F	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809004-01	STORAGE BRD ASSY A	3	H	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809005-01	GPIB INTERFACE ASSY A	3	D	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
849-780-5P	IC,REG,VOLT,7805,5V,TO220	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-781-5P	IC,REG,VOLT,7815ACP,15V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-791-5P	IC,REG,VOLT,NEG,15V	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
856-FCJ-16	CONN,16P,HDR,RBN,DIP	3	C	0	6.000	1.000	EA	B	YN	6.000	0	0		00/00/00	99/99/99
895-21B-18	TERM,FLEX,STRIP,JUMPER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
899-263-09	FERRUL THUMB SCREW KIT	3	A	0	2.000	1.000	PR	B	YN	2.000	0	0		00/00/00	99/99/99
9809009-01	FILTER POLARIZER	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809010-01	FRONT PNL, PIP A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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LI,200,2.MDATAB01 ELGAR CORPORATION
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BILL OF MATERIAL
AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 140 ASSEMBLY, ELGAR - FGI

5809010-08 OPCODE: 0 REV: F 3PHASE GPIB FIXED FRE P
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQP	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-093-SW	WASHER,SHLDR	3	B	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
109-220-PD	INSUL,SILPAD,TO220,.007 THK	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
5809001-01	MAIN BD PIP 3PHASE A	3	M	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809002-01	DISPLAY BRD ASSY PIP A	3	C1	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809003-01	PHASE BD ASSY PIP A	3	F	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809004-03	STRGE BD ASY FIXED FR S	3	H	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809005-01	GPIB INTERFACE ASSY A	3	D	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
849-780-5P	IC,REG,VOLT,7805,5V,TO220	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-781-5P	IC,REG,VOLT,7815ACP,15V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-791-5P	IC,REG,VOLT,NEG,15V	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
856-FCJ-16	CONN,16P,HDR,RBN,DIP	3	C	0	6.000	1.000	EA	B	YN	6.000	0	0		00/00/00	99/99/99
895-21B-18	TERM,FLEX,STRIP,JUMPER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
899-263-09	FERRUL THUMB SCREW KIT	3	A	0	2.000	1.000	PR	B	YN	2.000	0	0		00/00/00	99/99/99
9809009-01	FILTER POLARIZER	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809010-01	FRONT PNL, PIP A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 180 ASSEMBLY, ELGAR - PCB

5809010-09 OPCODE: 3 REV: F 1 PHASE PAR FIXED FRE P
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQF	PREP CODE	DAYS OFFSET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-093-SW	WASHER,SHLDR	3	B	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
109-220-PD	INSUL,SILPAD,TO220,.007 THK	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
5809001-02	MAIN BD ASSY PIP 1PH A	3	M	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809002-01	DISPLAY BRD ASSY PIP A	3	C1	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809004-03	STRGE BD ASY FIXED FR S	3	H	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
849-780-5P	IC,REG,VOLT,7805,5V,TO220	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-781-5P	IC,REG,VOLT,7815ACP,15V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-791-5P	IC,REG,VOLT,NEG,15V	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
856-FCJ-16	CONN,16P,HDR,RBN,DIP	3	C	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
899-263-09	FERRUL THUMB SCREW KIT	3	A	0	2.000	1.000	PR	B	YN	2.000	0	0		00/00/00	99/99/99
9809010-01	FRONT PNL, PIP A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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DISTRIBUTION: DEBBIEF -

BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 140 ASSEMBLY, ELGAR - FGI

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

5809010-10 OPCODE: 3 REV: F 3PHASE PAR FIXED FREQ P
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQ	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-093-SW	WASHER,SHLDR	3	B	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
109-220-PD	INSUL,SILPAD,TO220,.007 THK	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
5809001-01	MAIN BD PIP 3PHASE A	3	M	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809002-01	DISPLAY BRD ASSY PIP A	3	C1	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809003-01	PHASE BD ASSY PIP A	3	F	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809004-03	STRGE BD ASY FIXED FR S	3	H	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
849-780-5P	IC,REG,VOLT,7805,5V,TO220	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-781-5P	IC,REG,VOLT,7815ACP,15V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-791-5P	IC,REG,VOLT,NEG,15V	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
856-FCJ-16	CONN,16P,HDR,RBN,DIP	3	C	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
895-21B-18	TERM,FLEX,STRIP,JUMPER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
899-263-09	FERRUL THUMB SCREW KIT	3	A	0	2.000	1.000	PR	B	YN	2.000	0	0		00/00/00	99/99/99
9809009-01	FILTER POLARIZER	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809010-01	FRONT PNL, PIP A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 180 ASSEMBLY, ELGAR - PCB

OP: ORDER POLICY CODE
REQ: N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

5809010-11 OPCODE: 3 REV: F 1 PHASE GPIB FIXED FR P
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-093-SW	WASHER,SHLDR	3	B	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
109-220-PD	INSUL,SILPAD,TO220,.007 THK	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
5809001-02	MAIN BD ASSY PIP 1PH A	3	M	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809002-01	DISPLAY BRD ASSY PIP A	3	C1	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809004-03	STRGE BD ASY FIXED FR S	3	H	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809005-01	GPIB INTERFACE ASSY A	3	D	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
849-780-5P	IC,REG,VOLT,7805,5V,TO220	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-781-5P	IC,REG,VOLT,7815ACP,15V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-791-5P	IC,REG,VOLT,NEG,15V	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
856-FCJ-16	CONN,16P,HDR,RBN,DIP	3	C	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
899-263-09	FERRUL THUMB SCREW KIT	3	A	0	2.000	1.000	PR	B	YN	2.000	0	0		00/00/00	99/99/99
9809009-01	FILTER POLARIZER	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809010-01	FRONT PNL, PIP A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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LI,200,2.MDATAB01 ELGAR CORPORATION
FRI, NOV 19, 1999, 11:01 AM

DISTRIBUTION: DEBBIEF -

BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 140 ASSEMBLY, ELGAR - FGI

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

5809010-12 OPCODE: 3 REV: F PIP 2RANG W/SNSE XFMR P
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
5809001-06	MAIN BD PIP W/20-1 IN S	3	M	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809002-01	DISPLAY BRD ASSY PIP A	3	C1	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809004-01	STORAGE BRD ASSY A	3	H	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
5809005-01	GPIB INTERFACE ASSY A	3	D	0	1.000	1.000	EA	M	YN	1.000	0	0		00/00/00	99/99/99
849-780-5P	IC,REG,VOLT,7805,5V,TO220	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-781-5P	IC,REG,VOLT,7815ACP,15V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-791-5P	IC,REG,VOLT,NEG,15V	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809010-01	FRONT PNL, PIP A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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DISTRIBUTION: DEBBIEF -

BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 180 ASSEMBLY, ELGAR - PCB

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

5809001-01 OPCODE: 3 REV: M MAIN BD PIP 3PHASE A
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-A15-30	STDF,SWG,6-32 X .625L,.25RD,AL	3	B	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
5809962-01	S/W ASSY,AC SERIES,MAIN BD	0	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
6809001-01	SCHEMATIC 9010 3PHASE A	3	G	0	.000	1.000	EA	B	YN	.000	0	0		00/00/00	99/99/99
801-101-05	RES,100,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-102-05	RES,1.0K,1/4W,2%,MF	3		0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
801-103-05	RES,10K,1/4W,2%,MF	3		0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
801-104-05	RES,100K,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-105-05	RES,1.0M,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-153-05	RES,15K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-332-05	RES,3.3K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-333-05	RES,33K,1/4W,2%,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
801-334-05	RES,330K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-335-05	RES,3.3M,1/4W,5%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-511-05	RES,510,1/4W,2%,MF	3		0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
801-514-05	RES,510K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
807-201-05	RES,200,5W,5%,WW,AXL	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-150-1F	RES,1.50K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-499-1F	RES,4.99K,1/4W,1%,70C,RN60,MF	3		0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
813-909-2F	RES,90.9K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-976-1F	RES,9.76K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
816-549-3F	RES,549K,1/2W,1%,RN65,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
818-103-DR	RESNET,10K,1%,16P,8RES,DIP	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-104-63	POT,100K,1/2W,1T,PC	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
819-203-63	POT,20K,1/2W,1T,PC	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
819-501-63	POT,500,1/2W,1T,PC	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-502-64	POT,5.0K,1/2W,16T,PCM,VERT	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-100-05	CAP,10PF,500V,5%,MICA	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-102-01	CAP,1000PF,100V,1%,MICA	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-121-05	CAP,120PF,500V,5%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-151-05	CAP,150PF,500V,5%,MICA	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-252-01	CAP,2500PF,500V,1%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-102-00	CAP,.001UF,1000V,10%,CER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-104-CK	CAP,.10UF,50V,10%,CER	3	A	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
821-202-10	CAP,.002UF,1000V,20%,CER	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
822-223-53	CAP,.022UF,200V,5%,FILM	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
822-224-53	CAP,.22UF,200V,5%,FILM	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-105-61	CAP,1UF,35V,20%,TANT	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-106-41	CAP,10UF,25V,20%,TANT	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-225-02	CAP,2.2UF,20V,10%,TANT	3	D	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
823-474-61	CAP,.47UF,35V,20%,TANT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
824-107-71	CAP,100UF,50V,20%,85C,AL,AXL	3	F	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99

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BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 180 ASSEMBLY, ELGAR - PCB

5809001-01 OPCODE: 3 REV: M MAIN BD PIP 3PHASE A
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
824-478-01	CAP,4700UF,16V,AL,AXL	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
835-364-3P	XSTR,NPN,30V,PN3643,TO-92	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
835-364-3X	XSTR,USE 835-364-3P	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
842-SD2-13	XSTR,FET,N-CH,30V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
843-474-4A	DIODE,ZENER,15V,1W,5%	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
844-914-XX	DIODE,SIGNAL,100V,SWITCH	3	D	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
845-400-4X	RECT,PWR,400V,1A,1N4004	3	C	0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
849-CLM-51	IC,OPTO,OBS USE 849-VTL-2C	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-20	SKT,IC,20P,SING BEAM,TIN,.3CNT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-23	IC,LS,74LS123,DUAL-MONO	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-93	IC,LS,74LS193,CTR-BIN	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-LS3-90	IC,LS,74LS390,DUAL,BCD CTR	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS7-4X	IC,LS,74LS74,DUAL,D F/F	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS8-6X	IC,LS,74LS86,4X2IN,XOR	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-N50-08	IC,CONV,DAC08E,8-BIT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-TL0-72	IC,LIN,TL072CP,2XFET,OP AMP	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
850-LP1-67	XFMR,PWR SP,16V,CT	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809001-01	DRILL DWG MAIN BD A	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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DISTRIBUTION: DEBBIEF -

BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 160 ASSEMBLY, ELGAR - MISC.

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

5809001-02 OPCODE: 3 REV: M MAIN BD ASSY PIP 1PH A
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQ	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-A15-30	STDF,SWG,6-32 X .625L,.25RD,AL	3	B	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
5809962-01	S/W ASSY,AC SERIES,MAIN BD	0	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-101-05	RES,100,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-102-05	RES,1.0K,1/4W,2%,MF	3		0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
801-103-05	RES,10K,1/4W,2%,MF	3		0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
801-104-05	RES,100K,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-105-05	RES,1.0M,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-153-05	RES,15K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-332-05	RES,3.3K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-333-05	RES,33K,1/4W,2%,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
801-334-05	RES,330K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-335-05	RES,3.3M,1/4W,5%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-511-05	RES,510,1/4W,2%,MF	3		0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
801-514-05	RES,510K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
807-301-05	RES,300,5W,5%,WW,AXL	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-150-1F	RES,1.50K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-499-1F	RES,4.99K,1/4W,1%,70C,RN60,MF	3		0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
813-909-2F	RES,90.9K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-976-1F	RES,9.76K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
816-549-3F	RES,549K,1/2W,1%,RN65,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
818-103-DR	RESNET,10K,1%,16P,8RES,DIP	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-104-63	POT,100K,1/2W,1T,PC	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
819-203-63	POT,20K,1/2W,1T,PC	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
819-501-63	POT,500,1/2W,1T,PC	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-502-64	POT,5.0K,1/2W,16T,PCM,VERT	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-100-05	CAP,10PF,500V,5%,MICA	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-102-01	CAP,1000PF,100V,1%,MICA	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-121-05	CAP,120PF,500V,5%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-151-05	CAP,150PF,500V,5%,MICA	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-252-01	CAP,2500PF,500V,1%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-471-05	CAP,470PF,500V,5%,2%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-102-00	CAP,.001UF,1000V,10%,CER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-104-CK	CAP,.10UF,50V,10%,CER	3	A	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
821-202-10	CAP,.002UF,1000V,20%,CER	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
822-223-53	CAP,.022UF,200V,5%,FILM	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
822-224-53	CAP,.22UF,200V,5%,FILM	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-105-61	CAP,1UF,35V,20%,TANT	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-106-41	CAP,10UF,25V,20%,TANT	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-225-02	CAP,2.2UF,20V,10%,TANT	3	D	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
823-474-61	CAP,.47UF,35V,20%,TANT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
824-107-71	CAP,100UF,50V,20%,85C,AL,AXL	3	F	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99

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5809001-02 OPCODE: 3 REV: M MAIN BD ASSY PIP 1PH A
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
824-478-01	CAP,4700UF,16V,AL,AXL	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
835-364-3P	XSTR,NPN,30V,PN3643,TO-92	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
835-364-3X	XSTR,USE 835-364-3P	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
842-SD2-13	XSTR,FET,N-CH,30V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
843-474-4A	DIODE,ZENER,15V,1W,5%	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
844-914-XX	DIODE,SIGNAL,100V,SWITCH	3	D	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
845-400-4X	RECT,PWR,400V,1A,1N4004	3	C	0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
849-CLM-51	IC,OPTO,OBS USE 849-VTL-2C	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-16	SKT,IC,16P,DIP,TIN PLT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-20	SKT,IC,20P,SING BEAM,TIN,.3CNT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-23	IC,LS,74LS123,DUAL-MONO	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-93	IC,LS,74LS193,CTR-BIN	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-LS3-90	IC,LS,74LS390,DUAL,BCD CTR	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS7-4X	IC,LS,74LS74,DUAL,D F/F	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS8-6X	IC,LS,74LS86,4X2IN,XOR	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-N50-08	IC,CONV,DAC08E,8-BIT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-TL0-72	IC,LIN,TL072CP,2XFET,OP AMP	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
850-LP1-67	XFMR,PWR SP,16V,CT	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809001-01	DRILL DWG MAIN BD A	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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5809001-03 OPCODE: 3 REV: M MAIN BD ASSY PIP 1PH S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-A15-30	STDF,SWG,6-32 X .625L,.25RD,AL	3	B	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
5809962-01	S/W ASSY,AC SERIES,MAIN BD	0	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-101-05	RES,100,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-102-05	RES,1.0K,1/4W,2%,MF	3		0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
801-103-05	RES,10K,1/4W,2%,MF	3		0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
801-104-05	RES,100K,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-105-05	RES,1.0M,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-153-05	RES,15K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-332-05	RES,3.3K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-333-05	RES,33K,1/4W,2%,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
801-334-05	RES,330K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-335-05	RES,3.3M,1/4W,5%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-511-05	RES,510,1/4W,2%,MF	3		0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
801-514-05	RES,510K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
807-301-05	RES,300,5W,5%,WW,AXL	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-150-1F	RES,1.50K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-499-1F	RES,4.99K,1/4W,1%,70C,RN60,MF	3		0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
813-681-2F	RES,68.1K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-909-2F	RES,90.9K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-976-1F	RES,9.76K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
818-103-DR	RESNET,10K,1%,16P,8RES,DIP	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-104-63	POT,100K,1/2W,1T,PC	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
819-203-63	POT,20K,1/2W,1T,PC	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
819-501-63	POT,500,1/2W,1T,PC	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-502-64	POT,5.0K,1/2W,16T,PCM,VERT	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-100-05	CAP,10PF,500V,5%,MICA	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-102-01	CAP,1000PF,100V,1%,MICA	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-121-05	CAP,120PF,500V,5%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-151-05	CAP,150PF,500V,5%,MICA	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-252-01	CAP,2500PF,500V,1%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-471-05	CAP,470PF,500V,5%,2%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-102-00	CAP,.001UF,1000V,10%,CER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-104-CK	CAP,.10UF,50V,10%,CER	3	A	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
821-202-10	CAP,.002UF,1000V,20%,CER	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
822-223-53	CAP,.022UF,200V,5%,FILM	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
822-224-53	CAP,.22UF,200V,5%,FILM	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-105-61	CAP,1UF,35V,20%,TANT	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-106-41	CAP,10UF,25V,20%,TANT	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-225-02	CAP,2.2UF,20V,10%,TANT	3	D	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
823-474-61	CAP,.47UF,35V,20%,TANT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
824-107-71	CAP,100UF,50V,20%,85C,AL,AXL	3	F	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99

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MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
824-478-01	CAP,4700UF,16V,AL,AXL	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
835-364-3P	XSTR,NPN,30V,PN3643,TO-92	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
835-364-3X	XSTR,USE 835-364-3P	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
842-SD2-13	XSTR,FET,N-CH,30V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
843-474-4A	DIODE,ZENER,15V,1W,5%	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
844-914-XX	DIODE,SIGNAL,100V,SWITCH	3	D	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
845-400-4X	RECT,PWR,400V,1A,1N4004	3	C	0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
849-CLM-51	IC,OPTO,OBS USE 849-VTL-2C	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-16	SKT,IC,16P,DIP,TIN PLT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-20	SKT,IC,20P,SING BEAM,TIN,.3CNT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-23	IC,LS,74LS123,DUAL-MONO	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-93	IC,LS,74LS193,CTR-BIN	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-LS3-90	IC,LS,74LS390,DUAL,BCD CTR	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS7-4X	IC,LS,74LS74,DUAL,D F/F	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS8-6X	IC,LS,74LS86,4X2IN,XOR	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-N50-08	IC,CONV,DAC08E,8-BIT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-TL0-72	IC,LIN,TL072CP,2XFET,OP AMP	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
850-LP1-67	XFMR,PWR SP,16V,CT	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809001-01	DRILL DWG MAIN BD A	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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DISTRIBUTION: DEBBIEF -

BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 160 ASSEMBLY, ELGAR - MISC.

OP: ORDER POLICY CODE
REQ: N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

5809001-04 OPCODE: 3 REV: M MAIN BD 1PH GPIB RN S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-A15-30	STDF,SWG,6-32 X .625L,.25RD,AL	3	B	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
5809962-01	S/W ASSY,AC SERIES,MAIN BD	0	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-101-05	RES,100,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-102-05	RES,1.0K,1/4W,2%,MF	3		0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
801-103-05	RES,10K,1/4W,2%,MF	3		0	5.000	1.000	EA	F	YN	5.000	0	0		00/00/00	99/99/99
801-104-05	RES,100K,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-105-05	RES,1.0M,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-153-05	RES,15K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-332-05	RES,3.3K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-333-05	RES,33K,1/4W,2%,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
801-334-05	RES,330K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-335-05	RES,3.3M,1/4W,5%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-511-05	RES,510,1/4W,2%,MF	3		0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
801-514-05	RES,510K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
807-301-05	RES,300,5W,5%,WW,AXL	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-150-1F	RES,1.50K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-499-1F	RES,4.99K,1/4W,1%,70C,RN60,MF	3		0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
813-909-2F	RES,90.9K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-976-1F	RES,9.76K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
816-549-3F	RES,549K,1/2W,1%,RN65,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
818-103-DR	RESNET,10K,1%,16P,8RES,DIP	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-104-63	POT,100K,1/2W,1T,PC	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
819-203-63	POT,20K,1/2W,1T,PC	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
819-501-63	POT,500,1/2W,1T,PC	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-502-64	POT,5.0K,1/2W,16T,PCM,VERT	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-100-05	CAP,10PF,500V,5%,MICA	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-102-01	CAP,1000PF,100V,1%,MICA	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-121-05	CAP,120PF,500V,5%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-151-05	CAP,150PF,500V,5%,MICA	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-252-01	CAP,2500PF,500V,1%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-471-05	CAP,470PF,500V,5%,2%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-102-00	CAP,.001UF,1000V,10%,CER	3	A	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
821-104-CK	CAP,.10UF,50V,10%,CER	3	A	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
821-202-10	CAP,.002UF,1000V,20%,CER	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
822-223-53	CAP,.022UF,200V,5%,FILM	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
822-224-53	CAP,.22UF,200V,5%,FILM	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-105-61	CAP,1UF,35V,20%,TANT	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-106-41	CAP,10UF,25V,20%,TANT	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-225-02	CAP,2.2UF,20V,10%,TANT	3	D	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
823-474-61	CAP,.47UF,35V,20%,TANT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
824-107-71	CAP,100UF,50V,20%,85C,AL,AXL	3	F	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99

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5809001-04 OPCODE: 3 REV: M MAIN BD 1PH GPIB RN S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
824-478-01	CAP,4700UF,16V,AL,AXL	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
831-222-2A	XSTR,NPN,40V,2N2222A,TO-18	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
835-364-3P	XSTR,NPN,30V,PN3643,TO-92	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
842-SD2-13	XSTR,FET,N-CH,30V	3	D	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
843-474-4A	DIODE,ZENER,15V,1W,5%	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
844-914-XX	DIODE,SIGNAL,100V,SWITCH	3	D	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
845-400-4X	RECT,PWR,400V,1A,1N4004	3	C	0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
849-CLM-51	IC,OPTO,OBS USE 849-VTL-2C	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-16	SKT,IC,16P,DIP,TIN PLT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-20	SKT,IC,20P,SING BEAM,TIN,.3CNT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-23	IC,LS,74LS123,DUAL-MONO	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-93	IC,LS,74LS193,CTR-BIN	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-LS3-90	IC,LS,74LS390,DUAL,BCD CTR	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS7-4X	IC,LS,74LS74,DUAL,D F/F	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS8-6X	IC,LS,74LS86,4X2IN,XOR	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-N50-08	IC,CONV,DAC08E,8-BIT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-TL0-72	IC,LIN,TL072CP,2XFET,OP AMP	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
850-LP1-67	XFMR,PWR SP,16V,CT	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809001-01	DRILL DWG MAIN BD A	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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DISTRIBUTION: DEBBIEF -

BILL OF MATERIAL

AS OF 11/19/99

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5809001-05 OPCODE: 3 REV: M MAIN BD PIP 3PH 15HZ S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQ	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-A15-30	STDF,SWG,6-32 X .625L,.25RD,AL	3	B	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
5809962-01	S/W ASSY,AC SERIES,MAIN BD	0	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-101-05	RES,100,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-102-05	RES,1.0K,1/4W,2%,MF	3		0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
801-103-05	RES,10K,1/4W,2%,MF	3		0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
801-104-05	RES,100K,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-105-05	RES,1.0M,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-153-05	RES,15K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-332-05	RES,3.3K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-333-05	RES,33K,1/4W,2%,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
801-334-05	RES,330K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-335-05	RES,3.3M,1/4W,5%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-511-05	RES,510,1/4W,2%,MF	3		0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
801-514-05	RES,510K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
807-201-05	RES,200,5W,5%,WW,AXL	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-150-1F	RES,1.50K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-316-3F	RES,316K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-499-1F	RES,4.99K,1/4W,1%,70C,RN60,MF	3		0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
813-976-1F	RES,9.76K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
816-549-3F	RES,549K,1/2W,1%,RN65,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
818-103-DR	RESNET,10K,1%,16P,8RES,DIP	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-104-63	POT,100K,1/2W,1T,PC	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
819-203-63	POT,20K,1/2W,1T,PC	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
819-501-63	POT,500,1/2W,1T,PC	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-502-64	POT,5.0K,1/2W,16T,PCM,VERT	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-100-05	CAP,10PF,500V,5%,MICA	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-102-01	CAP,1000PF,100V,1%,MICA	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-121-05	CAP,120PF,500V,5%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-151-05	CAP,150PF,500V,5%,MICA	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-252-01	CAP,2500PF,500V,1%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-471-05	CAP,470PF,500V,5%,2%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-102-00	CAP,.001UF,1000V,10%,CER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-104-CK	CAP,.10UF,50V,10%,CER	3	A	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
821-202-10	CAP,.002UF,1000V,20%,CER	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
822-223-53	CAP,.022UF,200V,5%,FILM	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
822-224-53	CAP,.22UF,200V,5%,FILM	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-105-61	CAP,1UF,35V,20%,TANT	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-106-41	CAP,10UF,25V,20%,TANT	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-225-02	CAP,2.2UF,20V,10%,TANT	3	D	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
823-474-61	CAP,.47UF,35V,20%,TANT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
824-107-71	CAP,100UF,50V,20%,85C,AL,AXL	3	F	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99

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5809001-05 OPCODE: 3 REV: M MAIN BD PIP 3PH 15HZ S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQ PF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
824-478-01	CAP,4700UF,16V,AL,AXL	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
835-364-3P	XSTR,NPN,30V,PN3643,TO-92	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
835-364-3X	XSTR,USE 835-364-3P	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
842-SD2-13	XSTR,FET,N-CH,30V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
843-474-4A	DIODE,ZENER,15V,1W,5%	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
844-914-XX	DIODE,SIGNAL,100V,SWITCH	3	D	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
845-400-4X	RECT,PWR,400V,1A,1N4004	3	C	0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
849-CLM-51	IC,OPTO,OBS USE 849-VTL-2C	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-16	SKT,IC,16P,DIP,TIN PLT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-20	SKT,IC,20P,SING BEAM,TIN,.3CNT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-23	IC,LS,74LS123,DUAL-MONO	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-93	IC,LS,74LS193,CTR-BIN	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-LS3-90	IC,LS,74LS390,DUAL,BCD CTR	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS7-4X	IC,LS,74LS74,DUAL,D F/F	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS8-6X	IC,LS,74LS86,4X2IN,XOR	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-N50-08	IC,CONV,DAC08E,8-BIT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-TL0-72	IC,LIN,TL072CP,2XFET,OP AMP	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
850-LP1-67	XFMR,PWR SP,16V,CT	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809001-01	DRILL DWG MAIN BD A	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 160 ASSEMBLY, ELGAR - MISC.

5809001-06 OPCODE: 3 REV: M MAIN BD PIP W/20-1 IN S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ: N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-A15-30	STDF,SWG,6-32 X .625L,.25RD,AL	3	B	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
5809962-01	S/W ASSY,AC SERIES,MAIN BD	0	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-101-05	RES,100,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-102-05	RES,1.0K,1/4W,2%,MF	3		0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
801-103-05	RES,10K,1/4W,2%,MF	3		0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
801-104-05	RES,100K,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-105-05	RES,1.0M,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-153-05	RES,15K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-332-05	RES,3.3K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-333-05	RES,33K,1/4W,2%,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
801-334-05	RES,330K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-335-05	RES,3.3M,1/4W,5%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-511-05	RES,510,1/4W,2%,MF	3		0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
801-514-05	RES,510K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
807-301-05	RES,300,5W,5%,WW,AXL	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-150-1F	RES,1.50K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-274-2F	RES,27.4K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-499-1F	RES,4.99K,1/4W,1%,70C,RN60,MF	3		0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
813-909-2F	RES,90.9K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-976-1F	RES,9.76K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
818-103-DR	RESNET,10K,1%,16P,8RES,DIP	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-104-63	POT,100K,1/2W,1T,PC	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
819-203-63	POT,20K,1/2W,1T,PC	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
819-501-63	POT,500,1/2W,1T,PC	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-502-64	POT,5.0K,1/2W,16T,PCM,VERT	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-100-05	CAP,10PF,500V,5%,MICA	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-102-01	CAP,1000PF,100V,1%,MICA	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-121-05	CAP,120PF,500V,5%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-151-05	CAP,150PF,500V,5%,MICA	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-252-01	CAP,2500PF,500V,1%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-471-05	CAP,470PF,500V,5%,2%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-102-00	CAP,.001UF,1000V,10%,CER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-104-CK	CAP,.10UF,50V,10%,CER	3	A	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
821-202-10	CAP,.002UF,1000V,20%,CER	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
822-223-53	CAP,.022UF,200V,5%,FILM	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
822-224-53	CAP,.22UF,200V,5%,FILM	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-105-61	CAP,1UF,35V,20%,TANT	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-106-41	CAP,10UF,25V,20%,TANT	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-225-02	CAP,2.2UF,20V,10%,TANT	3	D	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
823-474-61	CAP,.47UF,35V,20%,TANT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
824-107-71	CAP,100UF,50V,20%,85C,AL,AXL	3	F	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99

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BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 160 ASSEMBLY, ELGAR - MISC.

5809001-06 OPCODE: 3 REV: M MAIN BD PIP W/20-1 IN S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
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PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQ PF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
824-478-01	CAP,4700UF,16V,AL,AXL	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
835-364-3P	XSTR,NPN,30V,PN3643,TO-92	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
835-364-3X	XSTR,USE 835-364-3P	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
842-SD2-13	XSTR,FET,N-CH,30V	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
843-474-4A	DIODE,ZENER,15V,1W,5%	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
844-914-XX	DIODE,SIGNAL,100V,SWITCH	3	D	0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
845-400-4X	RECT,PWR,400V,1A,1N4004	3	C	0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
849-CLM-51	IC,OPTO,OBS USE 849-VTL-2C	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-16	SKT,IC,16P,DIP,TIN PLT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-20	SKT,IC,20P,SING BEAM,TIN,.3CNT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-23	IC,LS,74LS123,DUAL-MONO	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-93	IC,LS,74LS193,CTR-BIN	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-LS3-90	IC,LS,74LS390,DUAL,BCD CTR	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS7-4X	IC,LS,74LS74,DUAL,D F/F	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS8-6X	IC,LS,74LS86,4X2IN,XOR	3	C	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-N50-08	IC,CONV,DAC08E,8-BIT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-TL0-72	IC,LIN,TL072CP,2XFET,OP AMP	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
850-LP1-67	XFMR,PWR SP,16V,CT	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809001-01	DRILL DWG MAIN BD A	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 180 ASSEMBLY, ELGAR - PCB

5809002-01 OPCODE: 3 REV: C1 DISPLAY BRD ASSY PIP A
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
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PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-905-38	SPACER,LED MTG,.380 LONG	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
2809002-01	A/W 9010 DISPLAY BD	3		0	.000	1.000	EA	B	YN	.000	0	0		00/00/00	99/99/99
6809002-01	SCHEMATIC 9010 DISPLAY	3	D	0	.000	1.000	EA	B	YN	.000	0	0		00/00/00	99/99/99
801-102-05	RES,1.0K,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-103-05	RES,10K,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-153-05	RES,15K,1/4W,2%,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
801-333-05	RES,33K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-753-05	RES,75K,1/4W,2%,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
818-331-DS	RESNET,330,2%,16P,8RES,DIP	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-103-00	CAP,.01UF,100V,20%,CER	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-104-CK	CAP,.10UF,50V,10%,CER	3	A	0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
823-106-41	CAP,10UF,25V,20%,TANT	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
823-475-61	CAP,4.7UF,35V,20%,TANT	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
844-914-XX	DIODE,SIGNAL,100V,SWITCH	3	D	0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
848-461-0X	LED,DISPLAY,7SEG,ORN	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
848-955-04	LED,WIDE ANGLE,GRN	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-144-19	IC,CMOS,MC14419P,KEYBD-ENC	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-298-1X	IC,DRVR,UDN2981A 8-SOURCE-D	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-401-06	IC,CMOS,HEX,SHMT,CD40106BE	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-74S-47	IC,LS,74LS47,7SEG DRI	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C40-13	IC,CMOS,CD4013BE,DUAL-D/F	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C40-23	IC,CMOS,CD4023BE,3X3IN-NA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C40-81	IC,CMOS,CD4081BE,4X2IN,AND	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C45-03	IC,CMOS,CD4503BE,HEX/BUFF	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-14	SKT,IC,14P,DIP,TIN PLT	3	E	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
849-DIP-16	SKT,IC,16P,DIP,TIN PLT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
860-83A-02	SW,10MA,24VDC,3X4,KEY BD,SPST	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
860-T21-9T	SW,DPDT,ON,OFF,ON,TOGG	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809002-01	PCB DISPLAY BRD A	3	F	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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DISTRIBUTION: DEBBIEF -

BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 160 ASSEMBLY, ELGAR - MISC.

OP: ORDER POLICY CODE
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5809004-01 OPCODE: 3 REV: H STORAGE BRD ASSY A
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQP	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-A15-30	STDF,SWG,6-32 X .625L,.25RD,AL	3	B	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
109-A15-70	SPACER,SWG,#6 X .625L,.25RD,AL	3		0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
6809004-01	SCHEMATIC 9010 STORAGE	3	C	0	.000	1.000	EA	B	YN	.000	0	0		00/00/00	99/99/99
801-102-05	RES,1.0K,1/4W,2%,MF	3		0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
801-103-05	RES,10K,1/4W,2%,MF	3		0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
801-104-05	RES,100K,1/4W,2%,MF	3		0	5.000	1.000	EA	F	YN	5.000	0	0		00/00/00	99/99/99
801-105-05	RES,1.0M,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-333-05	RES,33K,1/4W,2%,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
801-912-05	RES,9.1K,1/4W,2%,MF	3		0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
813-221-1F	RES,2.21K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-243-2F	RES,24.3K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-267-3F	RES,267K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-274-1F	RES,2.74K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-365-1F	RES,3.65K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-787-1F	RES,7.87K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-887-1F	RES,8.87K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
818-103-SP	RESNET,10K,2%,10P,9RES,SIP	3	D	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-104-63	POT,100K,1/2W,1T,PC	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
819-501-63	POT,500,1/2W,1T,PC	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-102-05	CAP,1000PF,500V,5%,MICA	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-220-05	CAP,22PF,500V,5%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-330-05	CAP,33PF,500V,5%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-470-05	CAP,47PF,500V,5%,MICA	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
821-102-00	CAP,.001UF,1000V,10%,CER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-103-00	CAP,.01UF,100V,20%,CER	3	B	0	5.000	1.000	EA	B	YN	5.000	0	0		00/00/00	99/99/99
821-104-CK	CAP,.10UF,50V,10%,CER	3	A	0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
823-106-41	CAP,10UF,25V,20%,TANT	3	F	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
828-015-60	CAP,15-60PF,VARIABLE	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
844-914-XX	DIODE,SIGNAL,100V,SWITCH	3	D	0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
848-LM3-29	DIODE,REFERENCE,6.9V	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-401-06	IC,CMOS,HEX,SHMT,CD40106BE	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-741-67	IC,TTL,74167PC,BCD,NO NEW DESN	3	C	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
849-7C3-74	IC,CMOS,74C374N,OCTAL-LA	3	D	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
849-C40-11	IC,CMOS,CD4011BE,4X2IN	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C40-35	IC,CMOS,CD4035BE,4-BIT-SHI	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
849-C40-75	IC,CMOS,CD4075BE,3X3IN,OR	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-C40-82	IC,CMOS,CD4082BE,4X2IN,AND	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C45-39	IC,CMOS,CD4539BE,2X4TO1-M	3	C	0	6.000	1.000	EA	B	YN	6.000	0	0		00/00/00	99/99/99
849-DIP-16	SKT,IC,16P,DIP,TIN PLT	3	E	0	7.000	1.000	EA	B	YN	7.000	0	0	J6,7,8,& X U24,25,32, 33	00/00/00	99/99/99

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BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 160 ASSEMBLY, ELGAR - MISC.

OP: ORDER POLICY CODE
REQ:N=PART OPTIONAL
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PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

5809004-01 OPCODE: 3 REV: H STORAGE BRD ASSY A
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQP	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
849-DIP-24	SKT,IC,24P,TIN,.600 CTR	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS2-0X	IC,LS,74LS20,2X4IN-NAN	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LSO-5X	IC,LS,74LSO5,HEX,INV	3		0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-N50-08	IC,CONV,DAC08E,8-BIT	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-N50-09	IC,CONV,DAC08H,8-BIT	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-TL0-72	IC,LIN,TL072CP,2XFET,OP AMP	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
864-102-4X	XTAL,10.24MHZ,005%	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
892-105-02	TP,105-0852-001,RED	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
9809004-01	PCB STORAGE BRD A	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
995-511-13	WIRE,22AWG,BUS,TIN COPPER	3	-	0	.200	1.000	FT	F	YN	.200	0	0		00/00/00	99/99/99

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5809004-02 OPCODE: 3 REV: H STRGE BD ASY PIP 32V S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-A15-30	STDF,SWG,6-32 X .625L,.25RD,AL	3	B	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
109-A15-70	SPACER,SWG,#6 X .625L,.25RD,AL	3		0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
801-102-05	RES,1.0K,1/4W,2%,MF	3		0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
801-103-05	RES,10K,1/4W,2%,MF	3		0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
801-104-05	RES,100K,1/4W,2%,MF	3		0	5.000	1.000	EA	F	YN	5.000	0	0		00/00/00	99/99/99
801-105-05	RES,1.0M,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-333-05	RES,33K,1/4W,2%,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
801-912-05	RES,9.1K,1/4W,2%,MF	3		0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
813-221-1F	RES,2.21K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-243-2F	RES,24.3K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-267-3F	RES,267K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-274-1F	RES,2.74K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-365-1F	RES,3.65K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-634-1F	RES,6.34K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-787-1F	RES,7.87K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-887-1F	RES,8.87K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
818-103-SP	RESNET,10K,2%,10P,9RES,SIP	3	D	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-104-63	POT,100K,1/2W,1T,PC	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
819-501-63	POT,500,1/2W,1T,PC	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-102-05	CAP,1000PF,500V,5%,MICA	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-220-05	CAP,22PF,500V,5%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-330-05	CAP,33PF,500V,5%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-470-05	CAP,47PF,500V,5%,MICA	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
821-102-00	CAP,.001UF,1000V,10%,CER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-103-00	CAP,.01UF,100V,20%,CER	3	B	0	5.000	1.000	EA	B	YN	5.000	0	0		00/00/00	99/99/99
821-104-CK	CAP,.10UF,50V,10%,CER	3	A	0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
823-106-41	CAP,10UF,25V,20%,TANT	3	F	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
828-015-60	CAP,15-60PF,VARIABLE	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
844-914-XX	DIODE,SIGNAL,100V,SWITCH	3	D	0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
848-LM3-29	DIODE,REFERENCE,6.9V	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-401-06	IC,CMOS,HEX,SHMT,CD40106BE	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-741-67	IC,TTL,74167PC,BCD,NO NEW DESN	3	C	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
849-7C3-74	IC,CMOS,74C374N,OCTAL-LA	3	D	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
849-C40-11	IC,CMOS,CD4011BE,4X2IN	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C40-35	IC,CMOS,CD4035BE,4-BIT-SHI	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
849-C40-75	IC,CMOS,CD4075BE,3X3IN,OR	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-C40-82	IC,CMOS,CD4082BE,4X2IN,AND	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C45-39	IC,CMOS,CD4539BE,2X4TO1-M	3	C	0	6.000	1.000	EA	B	YN	6.000	0	0		00/00/00	99/99/99
849-DIP-16	SKT,IC,16P,DIP,TIN PLT	3	E	0	7.000	1.000	EA	B	YN	7.000	0	0	J6,7,8 & X U24,25,32, 33	00/00/00	99/99/99

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AS OF 11/19/99

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5809004-02 OPCODE: 3 REV: H STRGE BD ASY PIP 32V S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
849-DIP-20	SKT,IC,20P,SING BEAM,TIN,.3CNT	3	C	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
849-DIP-24	SKT,IC,24P,TIN,.600 CTR	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS2-0X	IC,LS,74LS20,2X4IN-NAN	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LSO-5X	IC,LS,74LSO5,HEX,INV	3		0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-N50-08	IC,CONV,DAC08E,8-BIT	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-N50-09	IC,CONV,DAC08H,8-BIT	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-TL0-72	IC,LIN,TL072CP,2XFET,OP AMP	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
864-102-4X	XTAL,10.24MHZ,005%	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
892-105-02	TP,105-0852-001,RED	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
9809004-01	PCB STORAGE BRD A	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
995-511-13	WIRE,22AWG,BUS,TIN COPPER	3	-	0	.200	1.000	FT	F	YN	.200	0	0		00/00/00	99/99/99
849-DIP-16	SKT,IC,16P,DIP,TIN PLT	3	E	57	4.000	1.000	EA	B	YN	4.000	0	0	XU24,25,32 ,33	00/00/00	99/99/99

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BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 180 ASSEMBLY, ELGAR - PCB

5809004-03 OPCODE: 3 REV: H STRGE BD ASY FIXED FR S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ: N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
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PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
109-A15-30	STDF,SWG,6-32 X .625L,.25RD,AL	3	B	0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
109-A15-70	SPACER,SWG,#6 X .625L,.25RD,AL	3		0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
801-102-05	RES,1.0K,1/4W,2%,MF	3		0	3.000	1.000	EA	F	YN	3.000	0	0		00/00/00	99/99/99
801-103-05	RES,10K,1/4W,2%,MF	3		0	4.000	1.000	EA	F	YN	4.000	0	0		00/00/00	99/99/99
801-104-05	RES,100K,1/4W,2%,MF	3		0	5.000	1.000	EA	F	YN	5.000	0	0		00/00/00	99/99/99
801-105-05	RES,1.0M,1/4W,2%,MF	3		0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
801-333-05	RES,33K,1/4W,2%,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
801-912-05	RES,9.1K,1/4W,2%,MF	3		0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
813-221-1F	RES,2.21K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-243-2F	RES,24.3K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-267-3F	RES,267K,1/4W,1%,70C,RN60,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
813-274-1F	RES,2.74K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-365-1F	RES,3.65K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-787-1F	RES,7.87K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
813-887-1F	RES,8.87K,1/4W,1%,70C,RN60,MF	3		0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
818-103-SP	RESNET,10K,2%,10P,9RES,SIP	3	D	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
819-104-63	POT,100K,1/2W,1T,PC	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
819-501-63	POT,500,1/2W,1T,PC	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
820-102-05	CAP,1000PF,500V,5%,MICA	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-220-05	CAP,22PF,500V,5%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-330-05	CAP,33PF,500V,5%,MICA	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-470-05	CAP,47PF,500V,5%,MICA	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
821-102-00	CAP,.001UF,1000V,10%,CER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-103-00	CAP,.01UF,100V,20%,CER	3	B	0	5.000	1.000	EA	B	YN	5.000	0	0		00/00/00	99/99/99
821-104-CK	CAP,.10UF,50V,10%,CER	3	A	0	2.000	1.000	EA	F	YN	2.000	0	0		00/00/00	99/99/99
823-106-41	CAP,10UF,25V,20%,TANT	3	F	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
828-015-60	CAP,15-60PF,VARIABLE	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
844-914-XX	DIODE,SIGNAL,100V,SWITCH	3	D	0	1.000	1.000	EA	F	YN	1.000	0	0		00/00/00	99/99/99
848-LM3-29	DIODE,REFERENCE,6.9V	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-401-06	IC,CMOS,HEX,SHMT,CD40106BE	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C40-11	IC,CMOS,CD4011BE,4X2IN	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C40-35	IC,CMOS,CD4035BE,4-BIT-SHI	3	B	0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
849-C40-75	IC,CMOS,CD4075BE,3X3IN,OR	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-C40-82	IC,CMOS,CD4082BE,4X2IN,AND	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C45-39	IC,CMOS,CD4539BE,2X4TO1-M	3	C	0	6.000	1.000	EA	B	YN	6.000	0	0		00/00/00	99/99/99
849-DIP-16	SKT,IC,16P,DIP,TIN PLT	3	E	0	7.000	1.000	EA	B	YN	7.000	0	0	J6,7,8 & X U24,25,32, 33	00/00/00	99/99/99
849-DIP-24	SKT,IC,24P,TIN,.600 CTR	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS2-0X	IC,LS,74LS20,2X4IN-NAN	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LSO-5X	IC,LS,74LSO5,HEX,INV	3		0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99

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BILL OF MATERIAL

AS OF 11/19/99

CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 180 ASSEMBLY, ELGAR - PCB

5809004-03 OPCODE: 3 REV: H STRGE BD ASY FIXED FR S
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ: N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REQF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
849-N50-08	IC,CONV,DAC08E,8-BIT	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-N50-09	IC,CONV,DAC08H,8-BIT	3	C	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-TL0-72	IC,LIN,TL072CP,2XFET,OP AMP	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
856-600-20	CONN,20P,HDR,W/FORK PIN,TIN	3	A	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
856-650-20	CONN,20P,COVER,0.3	3	A	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
864-102-4X	XTAL,10.24MHZ,005%	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
892-105-02	TP,105-0852-001,RED	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
9809004-01	PCB STORAGE BRD A	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
995-511-13	WIRE,22AWG,BUS,TIN COPPER	3	-	0	.200	1.000	FT	F	YN	.200	0	0		00/00/00	99/99/99
849-7C3-74	IC,CMOS,74C374N,OCTAL-LA	3	D	52	2.000	1.000	EA	B	YN	2.000	0	0	U23,31	00/00/00	99/99/99
849-741-67	IC,TTL,74167PC,BCD,NO NEW DESN	3	C	53	1.000	1.000	EA	B	YN	1.000	0	0	U33	00/00/00	99/99/99

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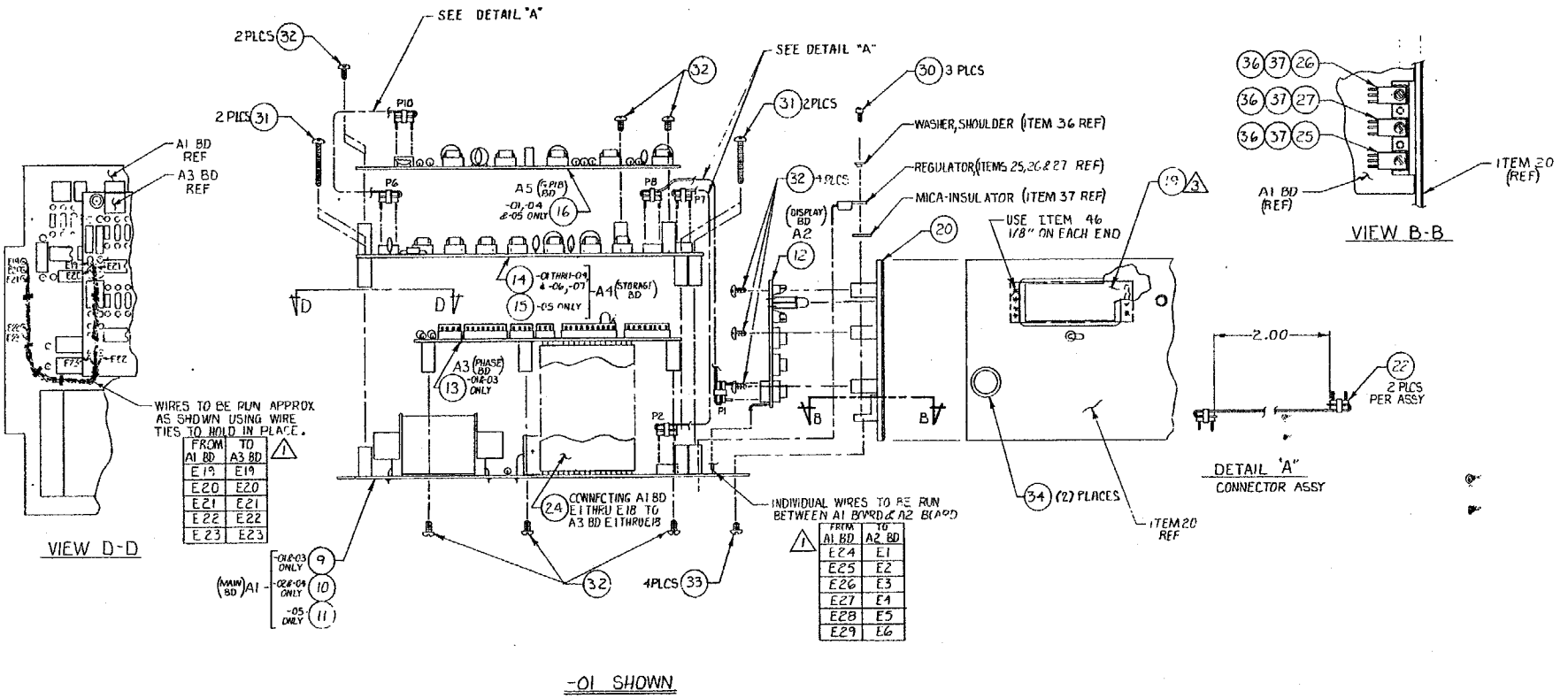
CLASS CODE GROUP: 1 COMMODITY CLASS
CLASS CODE: 160 ASSEMBLY, ELGAR - MISC.

5809005-01 OPCODE: 3 REV: D GPIB INTERFACE ASSY A
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

OP: ORDER POLICY CODE
REQ: N=PART OPTIONAL
Y=PART REQUIRED
PF: N=PART DOES NOT PRINT ON SALES ORDER
Y=PART PRINTS ON SALES ORDER W/O PRICE
P=PART PRINTS ON SALES ORDER WITH PRICE

PART NUMBER	DESCRIPTION	OP	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	REP QF	PREP CODE	DAYS OFF SET	SEQ	REFERENCE DESIGNATOR	EFFECTIV DATE	OBSOLETE DATE
6809005-01	SCHEMATIC GPIB BD	3	A	0	.000	1.000	EA	B	YN	.000	0	0		00/00/00	99/99/99
801-302-05	RES,3.0K,1/4W,2%,MF	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
801-333-05	RES,33K,1/4W,2%,MF	3		0	9.000	1.000	EA	B	YN	9.000	0	0		00/00/00	99/99/99
801-511-05	RES,510,1/4W,2%,MF	3		0	5.000	1.000	EA	F	YN	5.000	0	0		00/00/00	99/99/99
801-622-05	RES,6.2K,1/4W,2%,MF	3		0	4.000	1.000	EA	B	YN	4.000	0	0		00/00/00	99/99/99
818-103-SP	RESNET,10K,2%,10P,9RES,SIP	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
820-680-05	CAP,68PF,500V,5%,MICA	3		0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-102-00	CAP,.001UF,1000V,10%,CER	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
821-103-00	CAP,.01UF,100V,20%,CER	3	B	0	8.000	1.000	EA	B	YN	8.000	0	0		00/00/00	99/99/99
821-502-00	CAP,.005UF,150V,+60/-40%,CER	3	A	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
844-914-XX	DIODE,SIGNAL,100V,SWITCH	3	D	0	6.000	1.000	EA	F	YN	6.000	0	0		00/00/00	99/99/99
849-344-6X	IC,TTL,QUAD,MC3446AP	3	B	0	3.000	1.000	EA	B	YN	3.000	0	0		00/00/00	99/99/99
849-401-06	IC,CMOS,HEX,SHMT,CD40106BE	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C40-01	IC,CMOS,CD4001BE,4X2IN	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C40-11	IC,CMOS,CD4011BE,4X2IN	3	D	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-C40-13	IC,CMOS,CD4013BE,DUAL-D/F	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C40-23	IC,CMOS,CD4023BE,3X3IN-NA	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-C40-28	IC,CMOS,CD4028BE,BCD/10LI	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-C40-63	IC,CMOS,CD4063BE,4-BIT/DIGCO	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C40-70	IC,CMOS,CD4070BE,4X2IN,XOR	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-C40-73	IC,CMOS,CD4073BE,3X3IN,AN	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-C40-81	IC,CMOS,CD4081BE,4X2IN,AND	3	B	0	2.000	1.000	EA	B	YN	2.000	0	0		00/00/00	99/99/99
849-C45-02	IC,CMOS,CD4502BE,HEX/INV/TS	3	B	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-16	SKT,IC,16P,DIP,TIN PLT	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-DIP-24	SKT,IC,24P,TIN,.600 CTR	3	D	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
849-LS1-4X	IC,LS,74LS14,HEX SCHMIT	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
860-206-5X	SW,50MA,24VDC,5P,SPST,DIP	3	C	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809005-01	PCB GPIB INTERFACE A	3	E	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99
9809008-02	CABLE INTERCONNECT C	3	A	0	1.000	1.000	EA	B	YN	1.000	0	0		00/00/00	99/99/99

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-01 SHOWN

3 INSTALL ITEM 19 (FILTER) BEFORE INSTALLING ITEM 12 (A2 BOARD).
2. FOR INTERCONNECT DWG SEE DWG # 5809010-01.
1 ALL WIRE TO BE # 22 AWG 600V, EXCEPT E22 & E23.

NOTES: UNLESS OTHERWISE SPECIFIED.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
		SEE SHT 1 ('A' SIZE)		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS FRACTIONS ANGLES
XX ± .03 ± 1/32 ± 1/2°
XXX ± .010
DO NOT SCALE THIS DRAWING
MATERIAL
FINISH
NEXT ASSY | USED ON
APPLICATION

CONTRACT NO
FIRST MADE FOR END #05

	APPROVAL	DATE
DRAWN	JAY DEVEREUX	4-26-82
CHECKED	[illegible]	4-26-82
PROJ ENG	[illegible]	5-3-82
QA-REL		

ELGAR
an Applied power systems company

ASSY, SERIES 9010, PLUG-IN-PROGRAMER

SIZE	CODE IDENT NO	DRAWING NO	REV
D	25965	5809010	G

SCALE 1X | SHEET 6 OF 6

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ELGAR 990 313 90A

Figure 7-2. Assembly, Series 9010 Plug-In Programmer, 5809010

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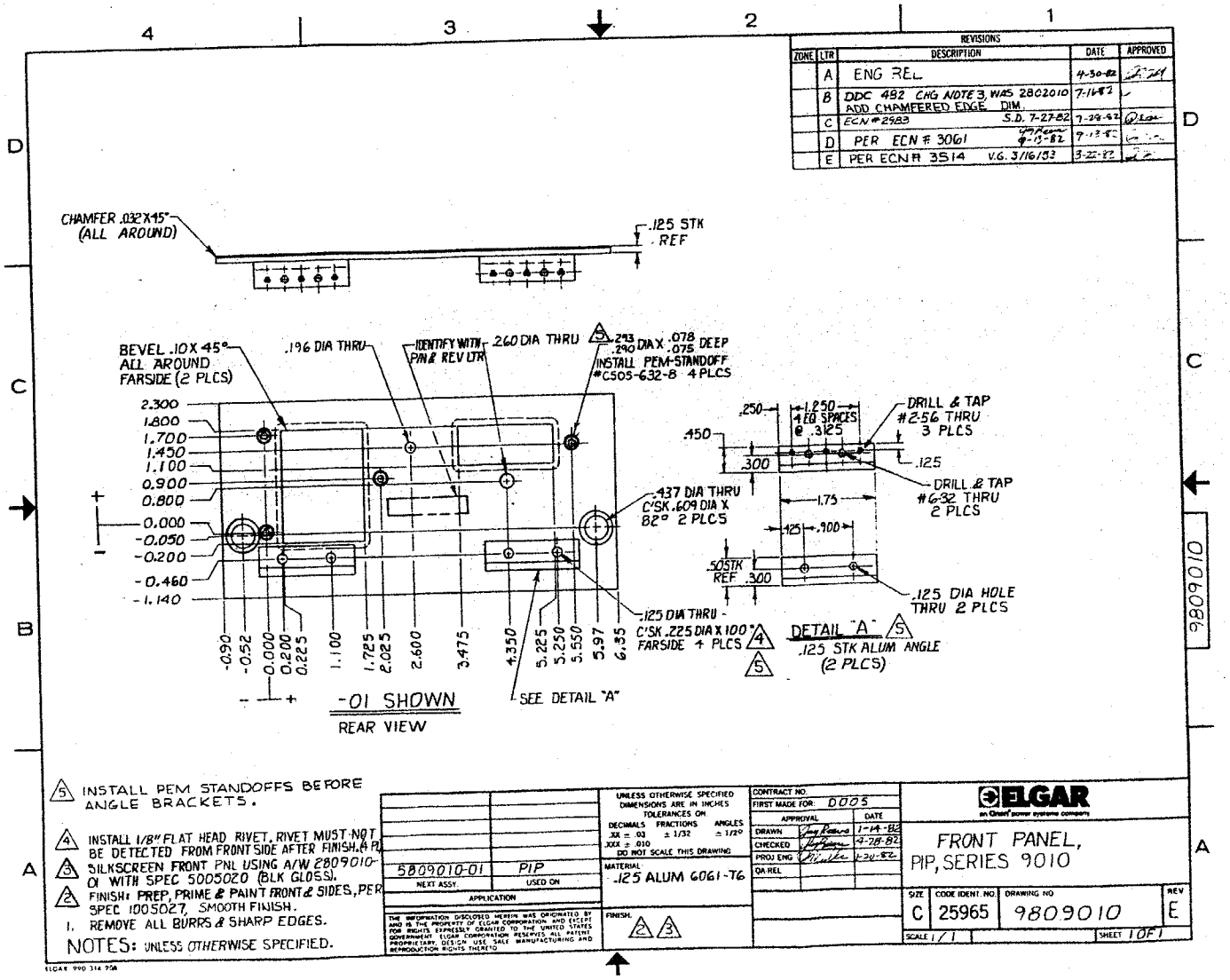


Figure 7-3. Front Panel, PIP Series 9010, 9809010

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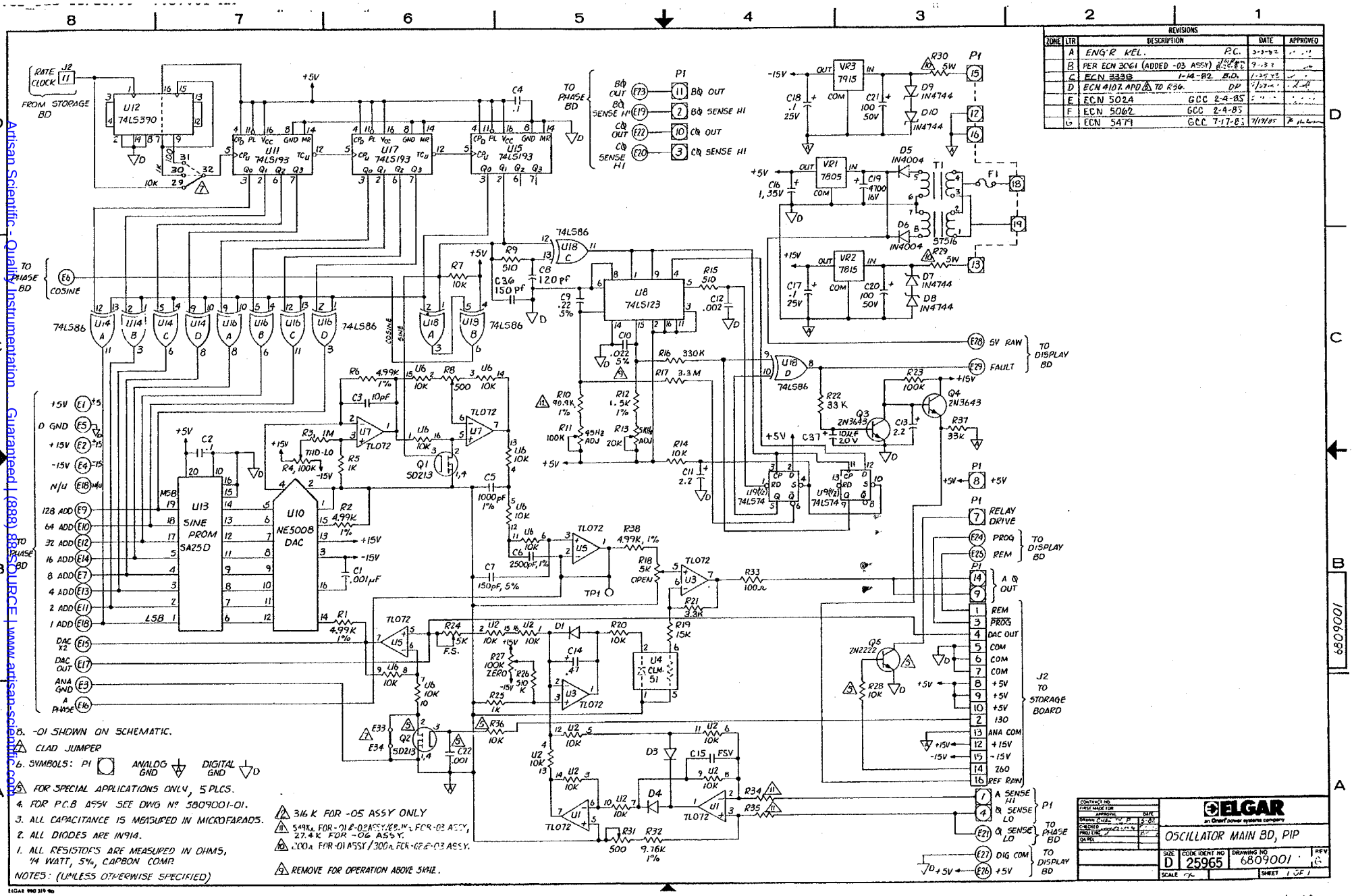


Figure 7-4. Oscillator Main Board, PIP, 6809001

7-9/7-10

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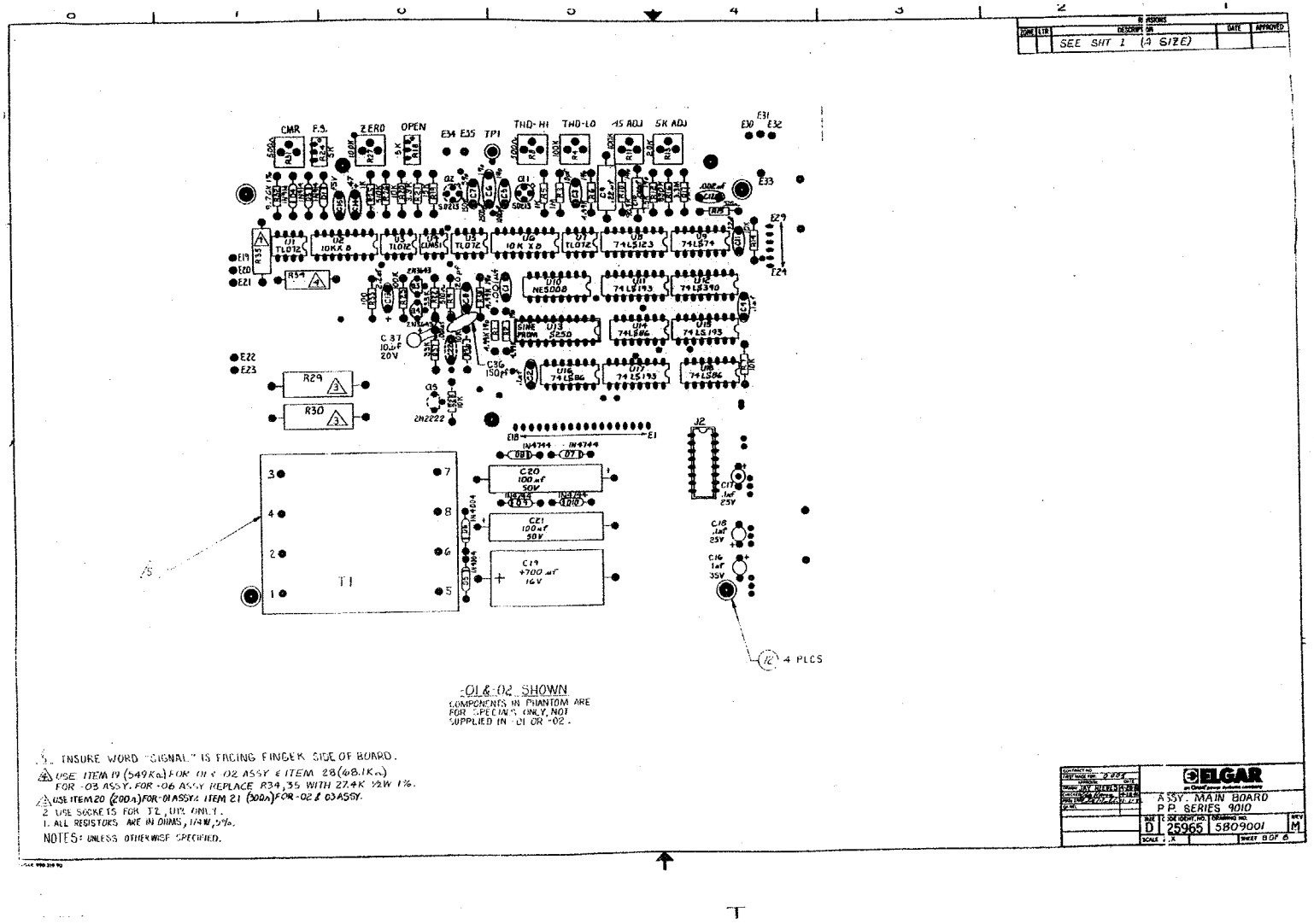


Figure 7-5. Assembly Main Board, PIP Series 9010, 5809001

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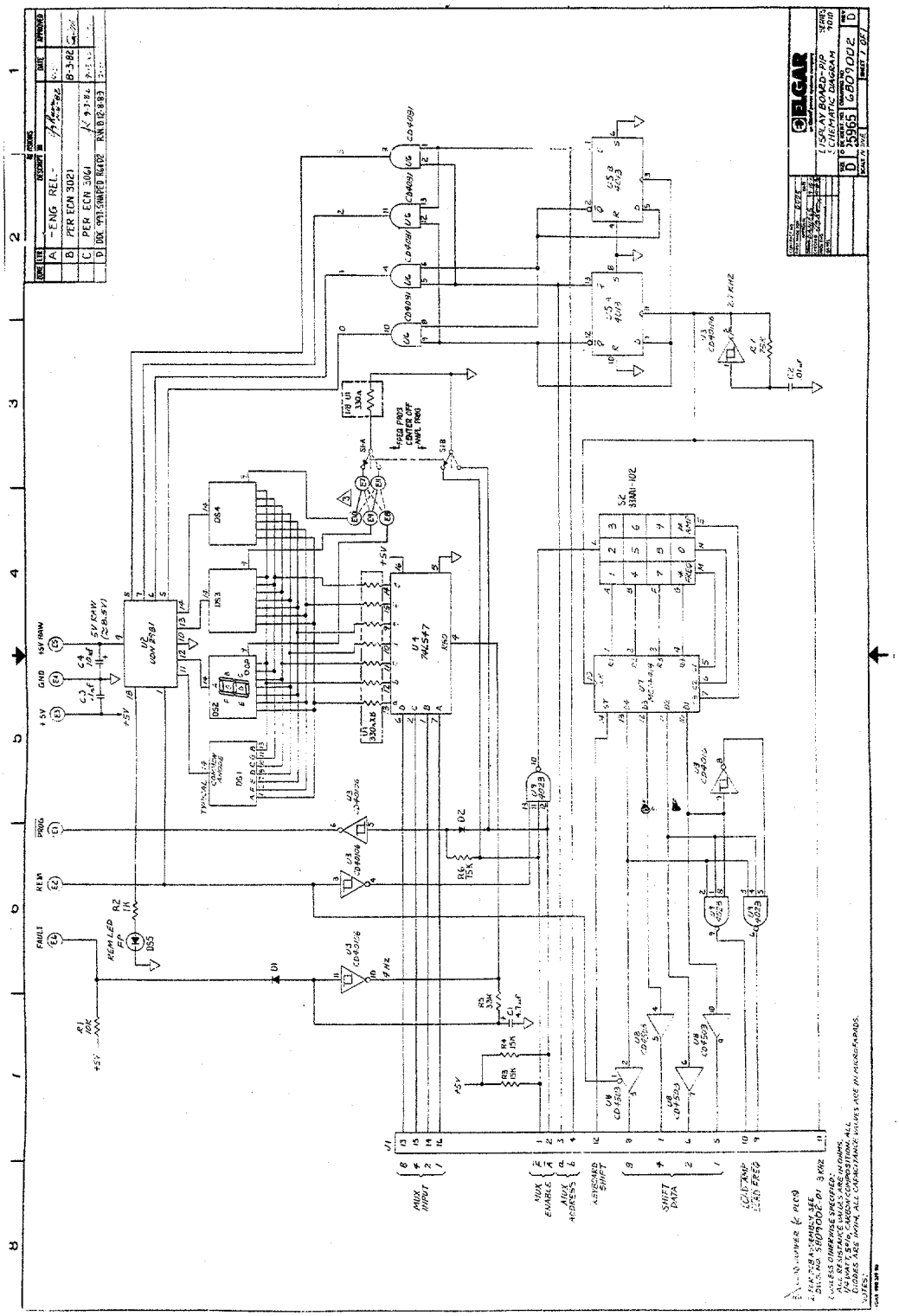
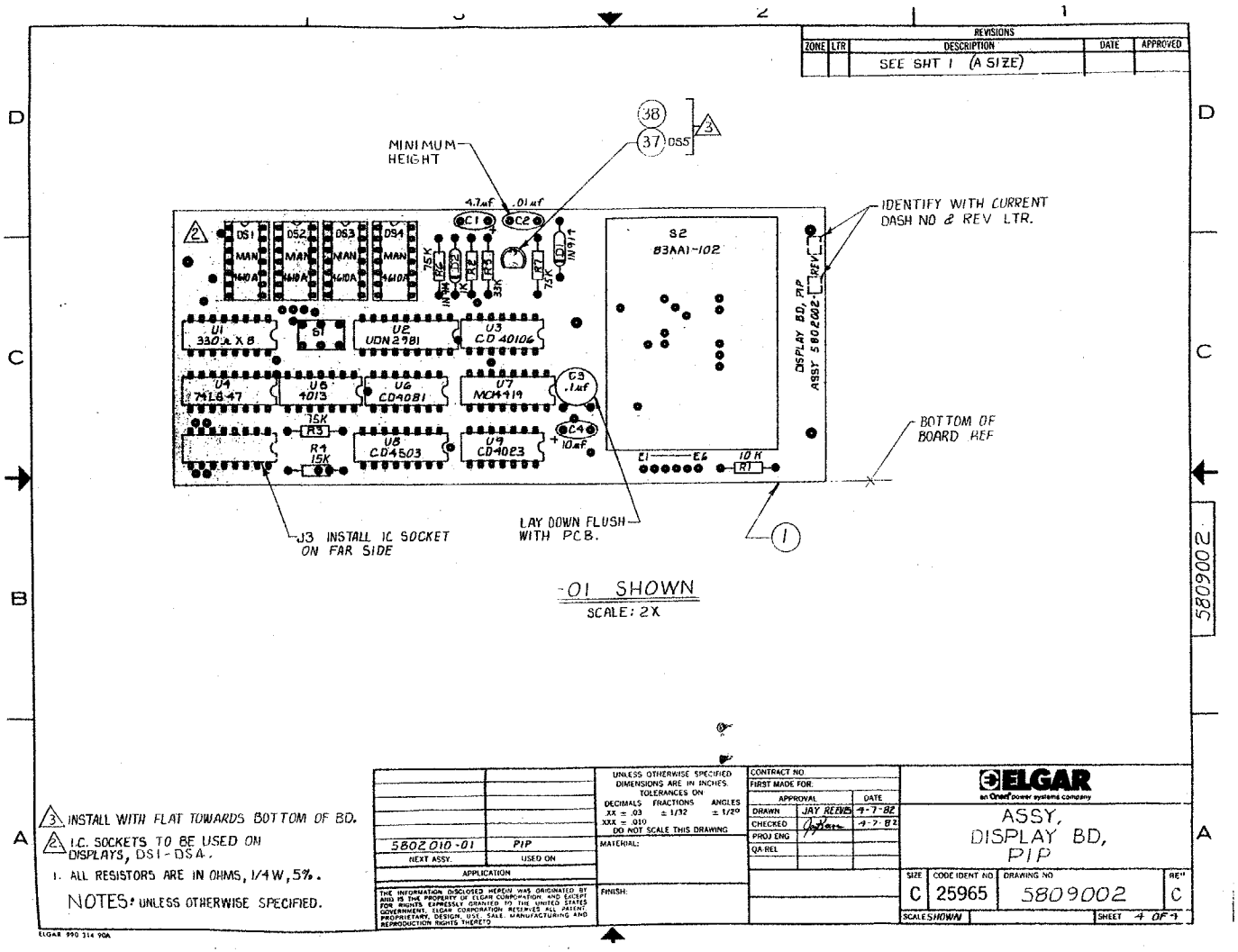


Figure 7-6. Display Board - PIP Schematic 6809002

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3 INSTALL WITH FLAT TOWARDS BOTTOM OF BD.

2 I.C. SOCKETS TO BE USED ON DISPLAYS, DS1-DS4.

1. ALL RESISTORS ARE IN OHMS, 1/4W, 5%.

NOTES: UNLESS OTHERWISE SPECIFIED.

5802010-01	PIP
NEXT ASSY	USED ON

APPLICATION

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MATERIAL:

FINISH:

CONTRACT NO.
FIRST MADE FOR

APPROVAL		DATE
DRAWN	JAY REEVES	4-7-82
CHECKED		4-7-82
PROJ ENG		
QA REL		

ELGAR an Ametek power systems company

ASSY, DISPLAY BD, PIP

SIZE	CODE IDENT NO	DRAWING NO	REV
C	25965	5809002	C

SCALE SHOWN SHEET 4 OF 4

ELGAR 990 314 90A

Figure 7-7. Assembly Display Board, PIP, 5809002

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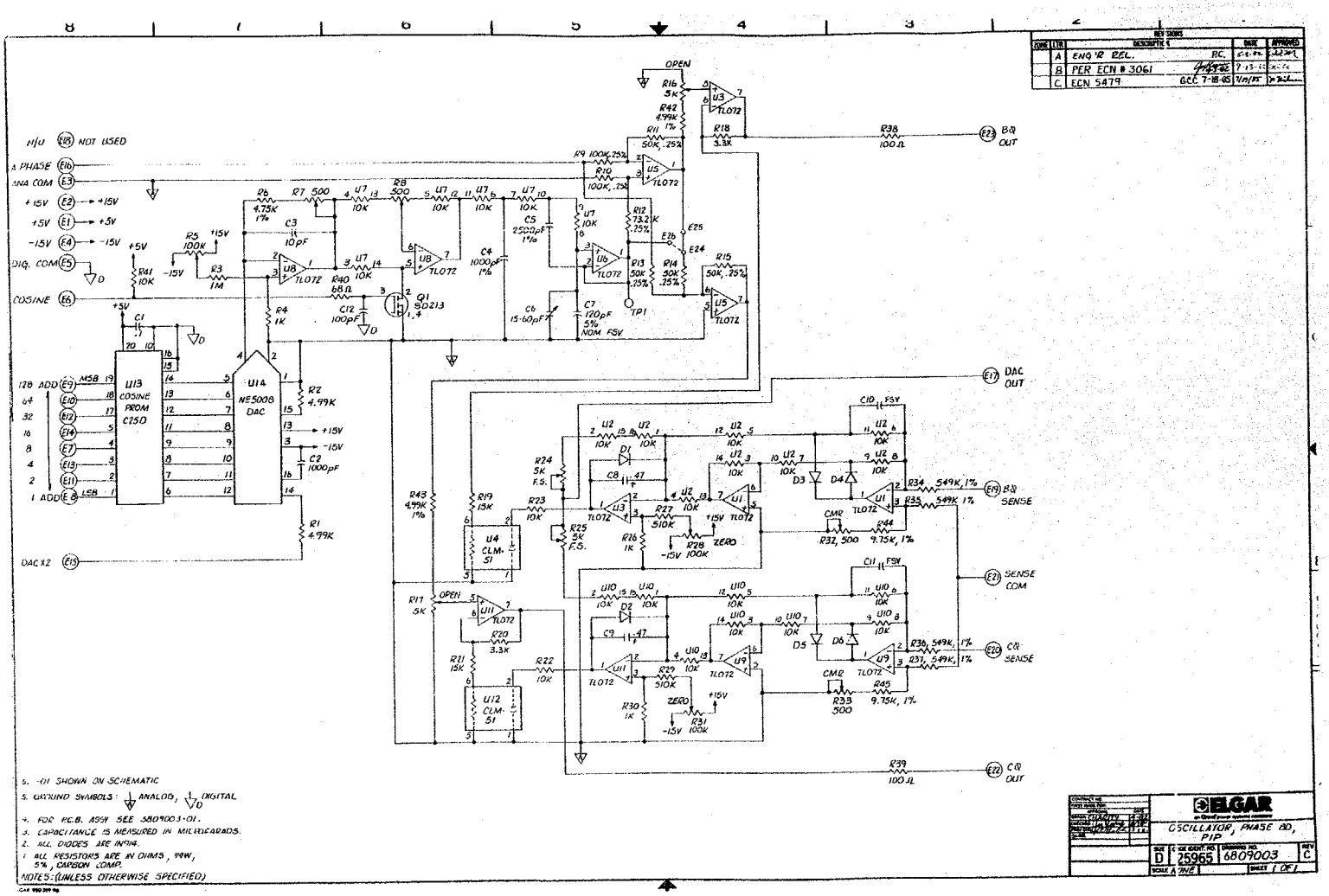


Figure 7-8. Oscillator Phase Board, PIP, Schematic 6809003

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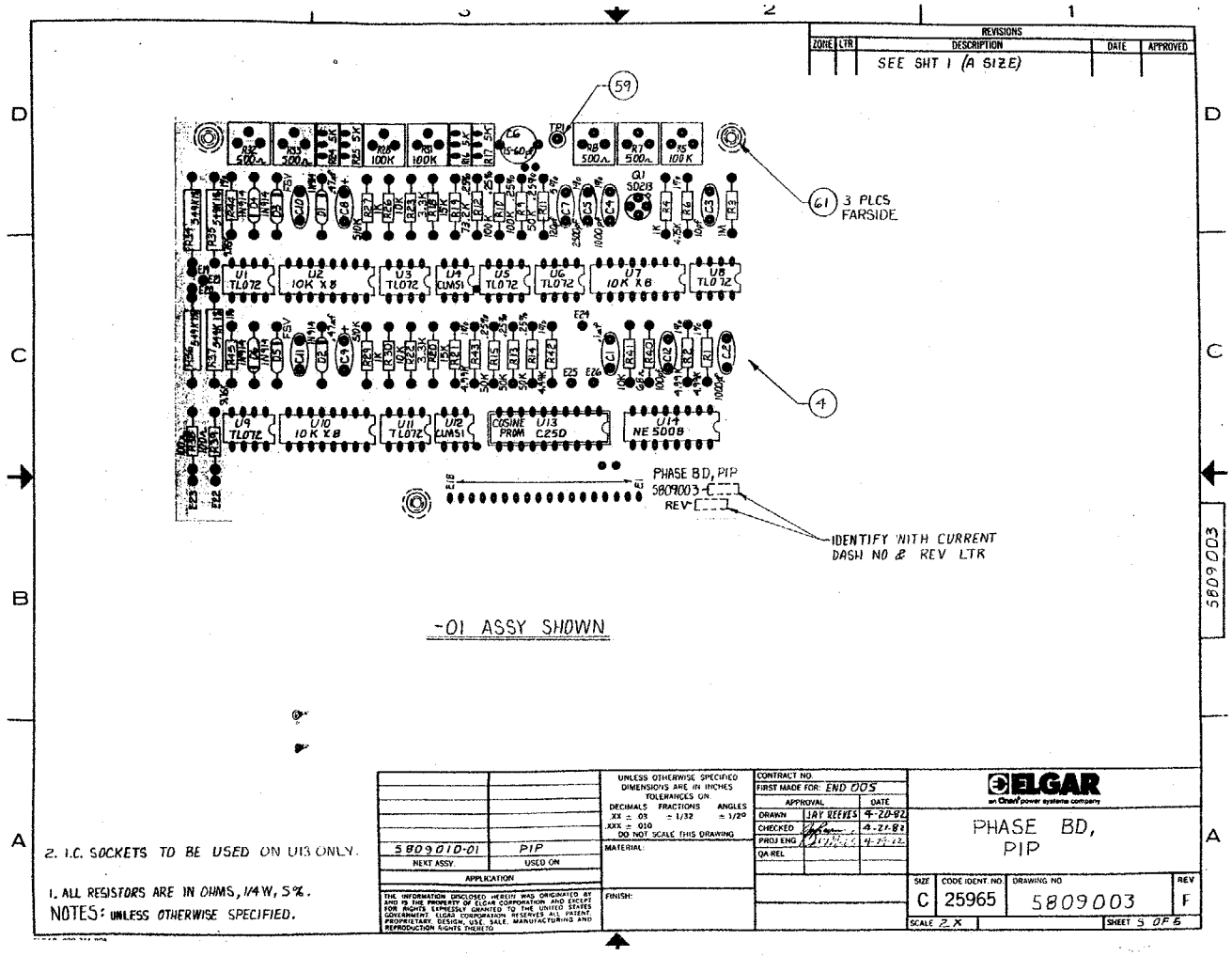


Figure 7-9. Oscillator Phase Board Assembly, 5809003

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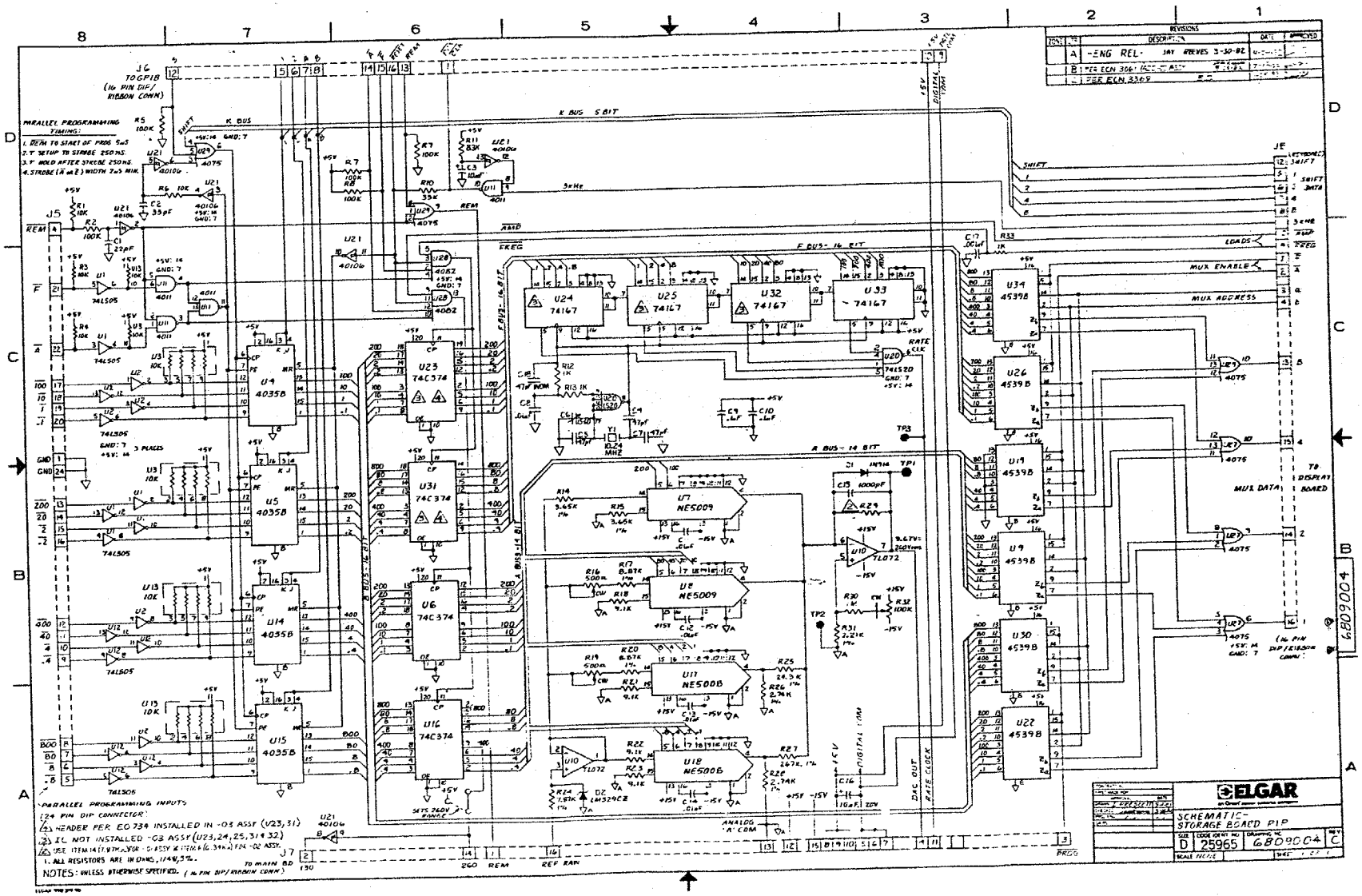


Figure 7-10. Storage Board Schematic, PIP, 6809004

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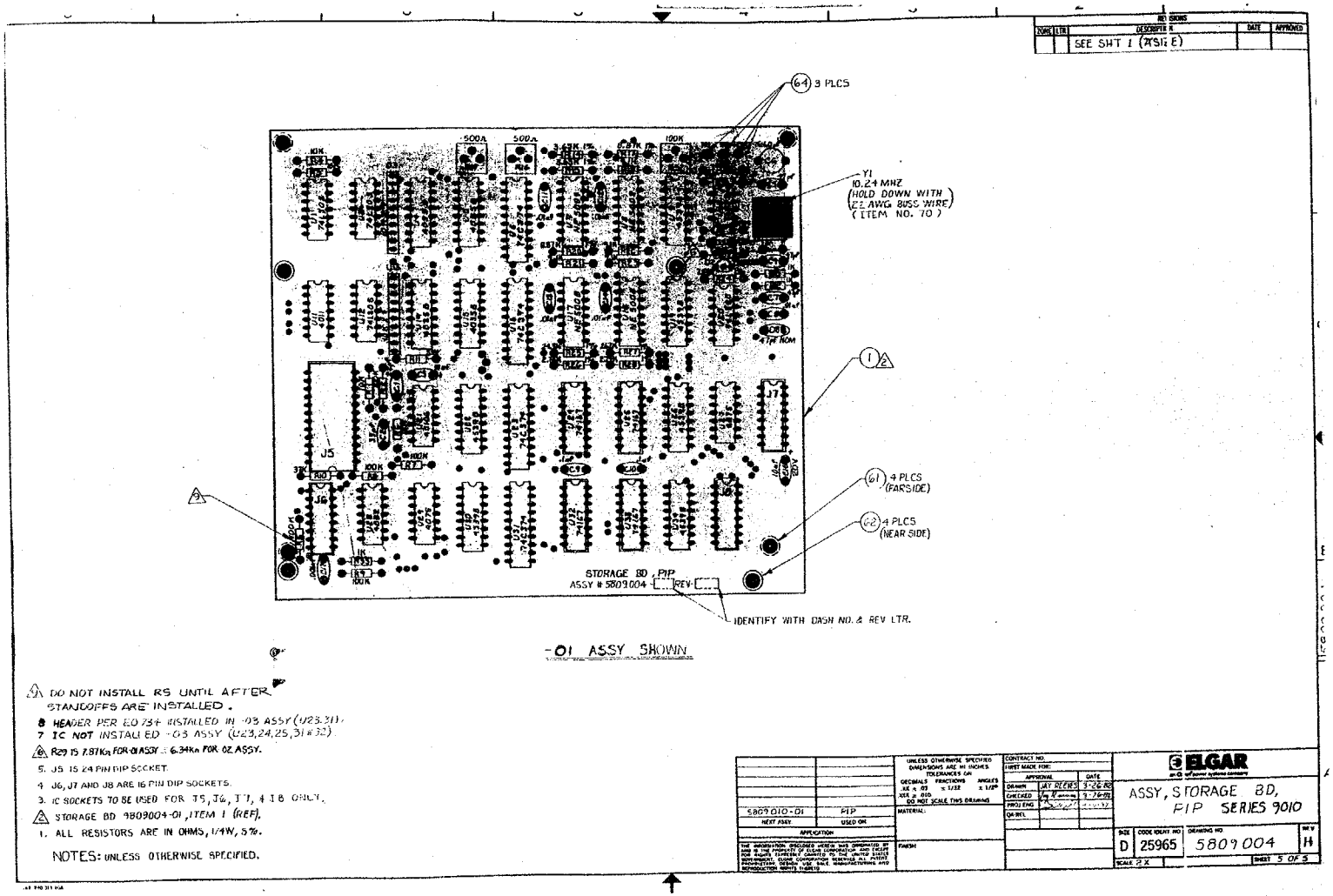


Figure 7-11. Storage Board Assembly, PIP, 5809004

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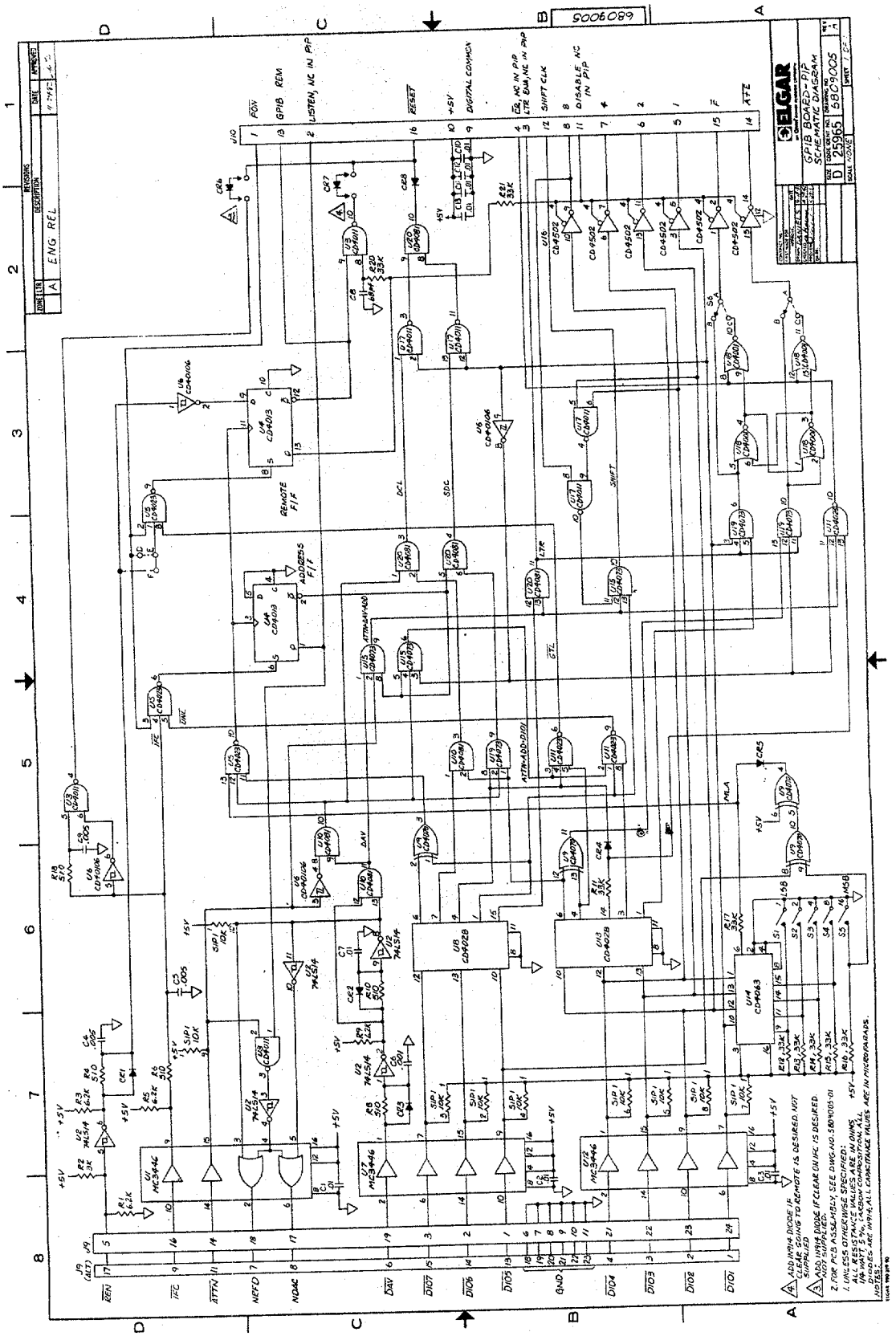
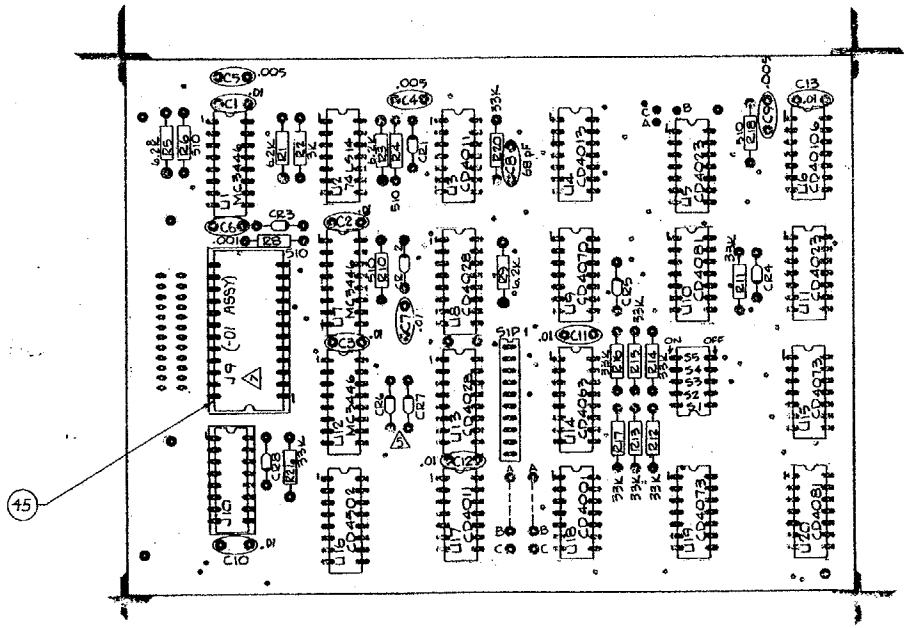


Figure 7-12. GPIB Board Schematic, 6809005

7-25/7-26

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lover_Tue 11/23/99 6:53:36 AM



SEE SHT 1 (A SIZE)

⚠ ITEM 46 P/N 9809008-01 CABLE-GPIB CONNECTS TO J9

6. IC SOCKETS TO BE USED ON J9 & J10 ONLY.

⚠ CR6, CR7 ARE OPTIONAL INSTALLATIONS.

4. ALL DIODES ARE IN914.
3. ALL CAPACITANCE IS IN µF.
2. RESISTANCE IS IN OHMS.
1. ALL RESISTORS ARE ¼W, 5%.

NOTES: UNLESS OTHERWISE SPECIFIED

5809010	PIP SERIES 9010	END 005 CHARITY 12/11/81	ELGAR	
			ASSY. DWG. P.C. BOARD GPIB INTERFACE	
			D 25965 5809005	D

Figure 7-13. GPIB Board Assembly, 5809005

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