INSTRUCTION MANUAL

OPERATIONS - MAINTENANCE INSTRUCTIONS

AND

PARTS CATALOG

FOR

ELGAR PLUG-IN PROGRAMMER

MODEL 9012 PIP

CONTRACTOR

ELGAR CORPORATION

9250 BROWN DEER ROAD

SAN DIEGO, CALIFORNIA 92121

604-246-90

REV, A 1-27-87
REV, B 1-27-87
REV, C 8-1-87

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TECHNICAL MANUAL UPDATE NOTIFICATION

TO: Users of Elgar Power Equipment

FR: Technical Publications

RE: Installation and Users Manual Revision Status

The product you have purchased and installed from Elgar includes a comprehensive installation and users manual for reference. Due to the ongoing development effort at Elgar, a systematic revision schedule is maintained to upgrade our manuals. As a result the current version of the manual in your possession may need to be updated. Should this be desirable, please return this document to Elgar, Att: Technical Publications Dept., to receive the most current support documentation. Thank you for your continued support.

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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 9012 Plug-In Programmer (PIP).

1-2. GENERAL DESCRIPTION

The Elgar Series 9012 Plug-In Programmer is a solid state, self contained instrument intended for use in Automatic Test Equipment (ATE) systems. In response to coded commands via the IEEE-488 Bus, a controller may take control of this device and in turn the outputs from the associated Power Source(s).

1-3. PHYSICAL DESCRIPTION

The Series 9012 is configured to fit the standard oscillator cavity of all Elgar Power Sources. Note: It should not be used with the Elgar "C" Series Power sources due to servo problems.

TABLE 1-1. PERFORMANCE SPECIFICATIONS

STANDARD	
Input Power:	117VAC, +42VDC and -42VDC from associated power source.
Output Signal:	0 to 2.5VAC into an 800 ohm load (per phase).
Operating Temperature:	0°C to 50°C.
Programming:	IEEE-488-1978.
Distortion:	Less than 1% within power source range.
FREQUENCY PROGRAMMING	
Frequency Range: (Range Programmable)	45 Hz to 99.99 Hz, in 0.01 Hz steps 45 Hz to 999.9 Hz, in 0.1 Hz steps 45 Hz to 4095 Hz, in 1 Hz steps.
Frequency Accuracy:	±0.001% of programmed value, 0°C to 50°C.
AMPLITUDE PROGRAMMING	
Voltage Ranges: (Range Programmable)	0 to 135 volts in 0.1 volt steps. 0 to 270 volts in 0.1 volt steps.
Amplitude Accuracy:	±0.2% of full scale from 5% of full scale to full scale.
Load Regulation:	±0.015% from no load to full load.
Line Regulation:	±0.015% for a 10% line change within line range.
Amplitude Temco:	±0.025% °C average 0°C to 50°C.
PHASE ANGLE	
Phase Angle Accuracy:	±1° from 45 Hz to 2 kHz. Add 1° per kHz above 2 kHz.
Separation:	120° and 240° for three phase. 90° for two phase. 60° for open delta.

TABLE 1-2

TEST BOARD, SPECIFICATIONS

ALL SPECIFICATIONS ARE FROM 5% F.S. TO F.S. AND FROM 45 Hz to 5 KHz.
ALL TC'S ARE PER DEGREE C AVERAGE FROM ZERO TO 50 DEGREES C.

ALL VOLTAGE AND CURRENT READINGS ARE TRUE RMS.

1.	VOLTS	F.S. = 300V RESOLUTION = 0.1 VOLT ACCURACY = 0.1% F.S. ± 0.1% RDG TC = 0.01% F.S. ± 0.01% RDG PER DEGREE C
2.	CURRENT	F.S. = 5A, 10A, 20A, 40A. RESOLUTION = 0.01 AMP ACCURACY = 1% F.S. ± 1% RDG CREST FACTOR = 3.5 TO 1 MIN TC = 0.02% F.S. ± 0.02% RDG PER DEGREE C
3.	POWER	F.S. = 500W, 1KW, 2KW, 4KW RESOLUTION = 1 WATT ACCURACY = 1% F.S. ± 1% RDG TC = 0.01% F.S. ± 0.02% RDG PER DEGREE C
4.	FREQUENCY	F.S. = 5 KHz RESOLUTION = 2 Hz ACCURACY = 0.12% F.S. ± 0.008% RDG TC = 0.012% F.S. ± 0.008% RDG PER DEGREE C

SECTION II
INSTALLATION

2-1. GENERAL

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

2-2. PRE-INSTALLATION 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 loads 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. 90° TWO PHASE OPERATION

When the Series 9012 is connected for 90° two phase operation, the drive for 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.

2-7. 60° 3 PHASE OPEN DELTA OPERATION

When the Series 9012 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. 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.

TABLE 2-2. JUMPER CONFIGURATIONS

A. MAIN BOARD

1. W1 Jumper Adjacent to U4.
   This is a clad jumper which must be cut and a jumper installed in the alternate configuration to activate. This will change the ZERO command so that zero crossing voltage change will always occur on the positive going swing of the sine wave and the PEAK command will no longer cause peak changes but will now cause zero crossing changes when the sine wave is going in the negative direction. The jumper must be in the alternate position to utilize the DROP command.

2. To change from 120°/240° three phase operation to 60° open delta. Remove R50, CR16 and CR17.

3. To change from 120°/240° three phase operation to 90° two phase. Remove R50 and change R39 to R38 position. Remove CR16 and CR17.

B. MICROPROCESSOR BOARD

1. The memory expansion jumper is a factory configuration only and thus is not field changeable.

2. W1 Jumper (located next to Address Switch) is normally open. If installed, it causes the microprocessor to recognize DAP type language in place of ABLE language. On models with test board, this jumper determines the scaling of the readouts (see Item C below).

C. PROGRAM SELECTION

1. PROM program 1200 is used for Model 9012 without test board.

2. PROM program 1211 is used for single phase 500, 750, or 1000 VA power sources. For 500 VA sources jumper W1 is open.

3. PROM program 1214 is used for single phase 1750 or 3000 VA power sources. For 1750 VA sources jumper W1 is open.

4. PROM program 1231 is used for three phase sources of 500, 750, or 1000 VA per phase. For 500 VA sources jumper W1 is open.

5. PROM program 1234 is used for three phase 1750 or 3000 power sources. For 1750 VA sources jumper W1 is open.

TABLE 2-3. J1 CONNECTIONS ON REAR OF ASSOCIATED POWER SOURCE

PIN #	
1	Output Common
2	BØ Output
3	CØ Output
4	AØ Output
5	+5V Relay 50 MA Max
6	Relay Drive (Range)
7	Sync Output
8	Relay Drive (Output)
9	Sense Common
10	CØ Sense High
11	BØ Sense High
12	AØ Sense High

SECTION III
OPERATION

3-1. INTRODUCTION

This section contains information regarding the preliminary functional checkout of the Series 9012 as well as programming information.

3-2. IEEE-488-1978 PROGRAMMING

IEEE-488 SUBSETS: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0.

ABLE SYNTAX:

VOLTS	Prefix for voltage, followed by number in floating point decimal.
CURL	Prefix for current limit, followed by number in floating point decimal.
FREQ	Prefix for frequency, followed by number in floating point decimal.
RNG	Prefix for amplitude range, followed by 0 for 135V range and 1 for 270V range.
RNGF	Prefix for frequency range, followed by 0 for 99.99 Hz range, 1 for 999.9 Hz range, and 2 for 5 kHz range.
CLS	Close output relay. If installed in power source.#
OPN	Open output relay.#
LOCK	Disable fault shutdown.
UNLK	Enable fault shutdown.
ZERO	Wait for next zero crossing to change voltage and frequency.**

**ZERO, PEAK or OVER will clear after each use and must be in the message string that contains the VOLT or FREQ change.
If system grounding is not clean, it will become necessary to program the output voltage to zero prior to sending CLS or OPN.

PEAK	Wait for next peak of sine wave to change voltage and frequency.**
OVER	Inhibits checking of voltage and frequency input limits. !!!USE WITH CAUTION!!! DAMAGE TO ASSOCIATED POWER SOURCE COULD RESULT!!!
DROP (n)	Prefix for Dropout. 1 through 9 cycles may be dropped out. (See Table 2-2.) ##
OFF	Puts output voltage to zero at next zero crossing. May be reprogrammed or see "ON".
ON 0	If previous command was OFF, returns to original volts.
ON 1	If previous command was OFF, returns to original volts at next zero crossing.
ON 2	If previous command was OFF, returns to original volts at next peak.

NOTE

OFF, ON 0, ON 1, ON 2, DROP (n) and all test commands are sent as stand-alone messages.

Jumper W1 on Main Board must be in the alternate position. If the Test Board is installed, this will cause the FREQ Test to read ½ Frequency. If R25 on Test Board is increased to 21K1⅛ then R23 will calibrate the FREQ Test properly.

TEST FUNCTION COMMANDS

TEST 0	Measure Frequency
TEST 1	Measure A phase voltage.
TEST 2	Measure B phase voltage.
TEST 3	Measure C phase voltage
TEST 4	Measure A phase current.
TEST 5	Measure B phase current.
TEST 6	Measure C phase current.
TEST 7	Measure A phase power in watts.
TEST 8	Measure B phase power in watts.
TEST 9	Measure C phase power in watts.

NOTE

All "TEST (n)" commands will cause the 9012 to send SRQ and Status Byte 79 when measurement is complete. The controller should then send the Model 9012 its Talk Address to receive the results.

Message separator is a comma and there must be a space between a prefix and its numbers.

EXAMPLES: 1. "VOLTS 1.15E+2,FREQ 444,PEAK" (CR/LF).
(This would set 115 volts at 444 Hz and enter change at next peak of sine wave.)

2. "ZERO,VOLTS 88.8" (CR/LF).
(This would leave frequency at previous setting and change the voltage at the next zero crossing.)

3. "FREQ 5000E-1" (CR/LF).
(This would change the freq to 500 Hz and enter data without waiting for the next peak or zero crossing.)

SERIAL POLL STATUS BYTES:

64 Servo Error. This can be caused by open servo or overload.***

67 Overvoltage Error. This is caused by power source voltage exceeding programmed value.***

71 A phase current limit reached.***

72 B phase current limit reached.***

73 C phase current limit reached.***

74 Syntax Error. Caused by mistaken entry. Spelling, etc.

75 Command Error. Wrong value sent.

76 Buffer Overflow. Input message exceeded 128 bytes.

78 Test board overloaded.

79 Measurement complete, send Talk Address.

***9012 will shut down output voltage prior to setting SRQ.

When using CLS and OPN above 130V, the output should be programmed to zero before OPN or CLS is sent.

A TTL compatible sync pulse, whose falling edge occurs at start of dropout, appears at pin 7 of the rear panel J1 connector. See Table 2-3.

When using the Drop (n) command, after about 15 milliseconds of drop, there will be some undershoot when returning to the programmed voltage. This will vary from zero to about 7% after 100 milliseconds of dropout. The undershoot will completely recover in about 5 line cycles at the programmed frequency.

3-3. DAP INPUT PROGRAMMING

DAP input format is NOT available if the test board is installed. If the PROM on the processor is labeled "1200" the DAP input format may be accessed by installing jumper W1 on processor board. Refer to Table 2-2.

A command message to the PIP consists of a string of ASCII characters of 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). A typical ENTRY sequence would be: 0400F1200A. This would set 400 Hz at 120.0VAC. NOTE: CR, LF or EOI must be sent.

3-4. 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 right rear 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.

3-5. LOCAL CONTROL

The 9012 powers up in local control with the voltage at zero and the frequency at 400 Hz in the 5 kHz range. The voltage range initializes in the 0 to 135 volt range.

To enter a value into Voltage, key in four numbers, (the decimal is understood to be to the left of the last number) and then press # and then 1. The display will now show the number with decimal indicating what has been loaded. If the display shows c 75, this indicates that an out-of-range entry was attempted. Simply enter a proper in-range number and continue.

To enter a new value into Frequency, key in four numbers (the decimal is understood to be to the right of the four numbers if in the 5 kHz range) and then press # and then 6. If the display indicates c 75, this indicates that a frequency below 45 Hz or above 5099 Hz was entered.

To change Voltage Range, key a 1 into the least significant digit and then press # and then 8. The range will change to the 260 volt range as indicated by the LED to the right of the display. The voltage output will drop to zero to allow range change and must be reprogrammed to a voltage. To go back to the 130 volt range, enter a zero into the least significant digit and press # and then 8.

To change Frequency Range, key a 1 for 999.9 Hz range or a 0 for the 99.99 Hz range into the least significant digit and then press # and then 7. To return to the 5 kHz range, put a 2 in the least significant digit and press # and then 7. When going to the 99.99 Hz range the frequency will default to 60.00 Hz and when going to the 999.9 Hz range or the 5 kHz range the frequency will default to 400 Hz.

To close the Output Relay, key a 1 into the least significant digit and then press # and then 3. To return to the open relay condition, key a 0 into the least significant digit and then press # and then 3.

To recall information, press * and then the number of the information to be recalled. Number 1 recalls voltage, number 6 recalls frequency and number 9 recalls current limit. Other loaded information is available by decimal position (frequency range) or LED annunciators for CLS and voltage range. Recall of 0, 2, 3, 4, 7, and 8 leave display in previous condition.

To cause the 9012 to drop a number of line cycles; load the number of cycles into the least significant digit of the display and the press # and then 2. 2. Note: See reference to W1 Jumper in Section 3-2

The following apply only if the Optional Test Board is installed.

To set a current limit, key in four digits (the decimal is understood to be in between the second and third digits) and then press # and then 9. If the current limit is all zeros, the function is locked out. NOTE: The current limit will not shut the oscillator down if the measurement function is in operation.

To measure the A phase output voltage, Key a 1 into the least significant digit and then press # and then 4. The reading will continuously update until another key is pressed.

To measure other functions, press the appropriate number key and then press # and then 4. The functions are:

1. A phase voltage.
2. B phase voltage.
3. C phase voltage.
4. A phase current.
5. B phase current.
6. C phase current.
7. A phase wattage.
8. B phase wattage.
9. C phase wattage.
0. Frequency.

3-6. FUNCTIONAL CHECKOUT

1. Connect a GPIB controller to the input connector on the rear of the power source.
2. Set address switch of 9012 to a proper address. (The 9012 is normally shipped on address 17 decimal.) .
3. Turn on Power Source.
4. Have GPIB controller send ATTN/ADDRESS with REN true and IFC false.
5. Have GPIB controller send "VOLTS 100,FREQ 800" (CR)(LF). Output of power source should be 100 volts at 800 Hz.
6. Have GPIB controller send "OFF" (CR)(LF). Output should drop to zero.
7. Have GPIB controller send "ON 1" (CR)(LF). Output should return to 100 volts at 800 Hz.

8. Open servo loop. Output should drop to zero and 9012 should set SRQ. Upon Serial Poll, status byte 64 should be returned.
9. Close servo loop and program "VOLTS 1.15E+2". Output should go to 115 volts at 800 Hz.
10. Have controller send ATTN-SDC. Output should drop to zero.

TABLE 3-1. IEEE INTERFACE LISTEN ADDRESS

ASCII CHARACTER	DECIMAL	IEEE Interface Board Settings SW5	SW4	SW3	SW2	SW1
Space	0	OFF	OFF	OFF	OFF	OFF
!	1	OFF	OFF	OFF	OFF	ON
"	2	OFF	OFF	OFF	ON	OFF
#	3	OFF	OFF	OFF	ON	ON
$	4	OFF	OFF	ON	OFF	OFF
%	5	OFF	OFF	ON	OFF	ON
&	6	OFF	OFF	ON	ON	OFF
'	7	OFF	OFF	ON	ON	ON
(	8	OFF	ON	OFF	OFF	OFF
)	9	OFF	ON	OFF	OFF	ON
*	10	OFF	ON	OFF	ON	OFF
+	11	OFF	ON	OFF	ON	ON
,	12	OFF	ON	ON	OFF	OFF
-	13	OFF	ON	ON	OFF	ON
.	14	OFF	ON	ON	ON	OFF
/	15	OFF	ON	ON	ON	ON
0	16	ON	OFF	OFF	OFF	OFF
1	17	ON	OFF	OFF	OFF	ON
2	18	ON	OFF	OFF	ON	OFF
3	19	ON	OFF	OFF	ON	ON
4	20	ON	OFF	ON	OFF	OFF
5	21	ON	OFF	ON	OFF	ON
6	22	ON	OFF	ON	ON	OFF
7	23	ON	OFF	ON	ON	ON
8	24	ON	ON	OFF	OFF	OFF
9	25	ON	ON	OFF	OFF	ON
:	26	ON	ON	OFF	ON	OFF
;	27	ON	ON	OFF	ON	ON
<	28	ON	ON	ON	OFF	OFF
=	29	ON	ON	ON	OFF	ON
>	30	ON	ON	ON	ON	OFF

SECTION IV
THEORY OF OPERATION

4-1. INTRODUCTION

This section contains an overall description of the operation of the Plug-In Programmer Series 9012, 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 Model 9012 the microprocessor is cleared and in turn clears all registers to zero except the frequency storage register. The frequency is initialized at 400Hz.

The stored frequency information is converted to a continuous string of pulses which is 1024 times the output frequency.

The string of frequency pulses is counted down by 1024 and this drives a PROM which has a sine Look-Up-Table as its program. The sine look up table drives a Digital to Analog converter (DAC) which produces a sinewave output. This is filtered and becomes the oscillator output signal.

The stored amplitude information is converted to a DC Programming voltage by a 12 bit binary DAC which controls the output servo feedback system and in turn the output amplitude.

In the test mode the sense voltage and the output from a wide-band current transformer is taken to the test board where the measurements are made.

4-3. DETAILED CIRCUIT DESCRIPTION

In the following paragraphs, those circuits which make the 9012 possible are described in detail. In preparing this text it has been assumed that the technician is familiar with microprocessors, digital devices, and analog devices such as operational amplifiers and Digital to Analog Converters. Therefore, the internal circuitry of these devices is not described in this manual. The technician is referred to the manufacturer's publications for this information.

4-3.1 Microprocessor Board Logic

When power is applied, C19 holds U17 pins 13 high for approximately 200 milliseconds. Pin 12 of U17 will go low for this period. This low resets the

microprocessor, U18 and the GPIB interface, U27 and creates an orderly start-up sequence.

After PON resets, the microprocessor, U18 initializes the latch conditions, presets the frequency to 400 Hz, and initializes the GPIA, U27.

The oscillator consisting of U17 pins 1 to 4 is frequency controlled to 10.24 mHz by crystal Y1. The 10.24 mHz is the frequency input required by rate multipliers U1, U2, U5 and U6. This frequency is divided by 2 in U16 and at U16 pin 5 the 5.12 mHz is fed to the microprocessor U18.

U28 receives data from the keyboard which is latched by STO K. This latching is required as the keyboard information is scanned rather than causing an interrupt. U16 pin 9 stores the information that a keyboard entry was made. When port B6 (pin 30) of the processor goes low, U16 is reset and U28 is enabled. This allows the processor to read the data and reset U16 ready for the next keyboard entry.

The display MUX is controlled by output port U22. The port is updated every two milliseconds and puts out BCD 1248 information and MUX 1 and MUX 2. MUX1 and MUX 2 determine which of the four displays is turned on to display the BCD data. The decimal line is set high when the appropriate display is on.

Output port U12 controls frequency range, the function LEDs of the display and SEL1 and SEL2 lines. The SEL1 and SEL2 control the output data lines from the test board.

The output data lines from the test board share input port A of U18 with the keyboard input data. The same port A lines control the operation of the test board when they are used as output lines.

Digital to Analog Converter (DAC) U7 is a 12 bit DAC that programs the output voltage amplitude. This device has built in storage latches which are actuated by pin 17. CR1 is a 6.9V reference which is amplified to -10V at U7 pin 19. The negative output current of the DAC is converted to a voltage and inverted by U4 pins 1, 2, and 3. This voltage is proportional to the output voltage and should be 2.5 volts ±5% when the voltage is programmed to 100V output.

Latches U8 and U9 store the frequency data for rate multipliers U1, U2, U5 and U6. The rate multiplier is a unique device that put out a number of pulses set by the BCD input for every ten pulses input. They can put out zero to nine clocks for every ten clocks in. During the tenth clock period the down cascade takes place. The outputs of the four rate multipliers are NANDED together at U3 pin 6. The output of U3 pin 8 is always 1024 times the output frequency of the oscillator. This frequency produces 256 steps per quarter wave.

Memory Map Decoder U24 determines which memory device is active. U23 further breaks this down when the 9012 function latches are addressed.

Address latch U14 stores the 8 LSB address bits while U18 sends the MSB address bit direct via pins 15 through 19.

The Main Program Memory is U19, and U20 is an expansion memory used only for special applications.

Integrated circuit U21 is the Random Access Memory (RAM) used for storage of the message strings prior to parsing them.

GPIA U27, in conjunction with bus transceivers U25 and U26 controls the actual transfer of data under overall control of the microprocessor U18. Address switch S1 to S5 is accessed by the microprocessor via U11.

4-3.2 Main Board Logic

The rate clock as generated by the rate multipliers is present on pin 10 of U9 which is a 12 bin binary counter. It uses the 8 LSD as counting bits and Q9 and Q10 as control bits. U9 is continuously counting up and the 8 LSD bits are each put to one input of an exclusive OR gate. When the count changes from 255 to 256 the Q9 line changes state as do the 8 LSD bits. The results are the outputs of the exclusive OR gates is the same but now the output is counting down.

The outputs of the exclusive OR gates are sent to sine PROM U18 which converts the linear stair steps to sine weighted stair steps. As the stair steps are up/down counting this causes DAC U17 to put out a sine weighted half-wave of current which is converted to voltage by U3 pins 5, 6, and 7.

Amplifier U2 pins 1, 2, and 3 together with Q6 form an invert/non invert circuit which inverts every other half-wave and the result is a sine-wave on its output. Pin 14 of U9 is a square wave at the output frequency so when it is high it turns on enhancement mode FET Q6. When Q6 is on the amplifier is an inverting amplifier and when off is a non-inverting amplifier.

Amplifier U2 pins 5, 6, and 7 and associated components for an active filter which is cornered at 22.5 kHz. This allow the sine-wave to pass but the stair steps are filtered out.

Amplifier U7 pins 1, 2, and 3 is a variable gain amplifier with the gain controlled by output of error amplifier U7, pins 5, 6, and 7.

Error amplifier U7 pins 5, 6, and 7 has one input to its summing junction from the programming voltage (DAC OUT) from the microprocessor board. It also has a voltage which is proportional to the servo voltage fed back from the load. When these are equal and opposite, the error integrator summing junction is satisfied and the error integrator output will idle at approximately minus 2V. When the servo senses a drop in voltage due to increased load, the error integrator output will go more negative and this will increase the current through the photo diode of U1. When the diode gets brighter, the resistance of the photo resistor will drop thus increasing the gain of variable gain amplifier U7 pins 1, 2, and 3. The increased oscillator output will thus have compensated for the increased load.

If the servo is opened or the associated power source is overloaded, the error integrator will swing to negative saturation. This is sensed by comparator U16 and causes the microprocessor to shut down the output of the oscillator. If the output of the associated power sources goes to a voltage higher than that programmed, the other section of U16 will sense this and again the microprocessor will shut down the output.

The B and C phases are generated in much the same manner as the A phase except the generation PROM is a Cosine program instead of a sine program. The Cosine is differentially mixed with the sine in U26 pins 5, 6, and 7 and the output is of equal amplitude but at 240 degrees. The 240° is differentially mixed with the sine (at 0) and the difference is 120° at U20 pin 7. The servos and fault detection circuits for B and C phase work in the same manner as those of the A phase.

4-3.3 Display Board Logic

MUX 1 and MUX 2 from the processor port are converted from 2-line to 4-line data by U3. The 4-line information is fed to U4 which is a source driver. The source driver turn on the +5V RAW (approximately +8V unregulated) to one of the 4 displays. At the same time the BCD information is converted to 7 segment data and tries to drive all four displays. Since only one display has voltage applied, only that one will display the BCD/7 segment data.

Keyboard SW1 pulls both a column and a row low when a key is pressed. The fact a column went low is detected by U5 pins 8 or 9 and is delayed by R7/C2 to prevent key bounce from double entering the data. The output of U5 pin 4 causes the processor board to latch the column and row information for later processing by the microprocessor.

4-3.4 Test Board Logic

The test board consists of signal conditioning, various signal conversion devices, Analog to Digital Converter (A/D) and input/output control.

The sequence starts when a data byte (DB1 to DB8) is latched into U2 by the SET bit. U2 is an octal latch with the outputs controlling analog multiplexers U5, U9 and U10.

If all outputs from U2 are high with the exception of pin 5 and pin 6, then U10 pin 15 to pin 14 is on, applying the attenuated A sense voltage through U10 pin 6 to pin 7 to buffer amplifier U8 pin 5. The output of U8 is the input to TRMS converter U15 which in turn is applied to the active filter of U6 pins 1, 2, and 3 through U5 pin 10 to pin 11. The output of the active filter is applied to U1 pin 2. The 12 bit successive approximation A/D converter, U1 will convert the A sense voltage to digital information for the microprocessor to act upon.

A current measurement is made when the current transformer output is applied through U10 pin 2 to pin 3, to U11 pin 3. The output of U11 pin 3 is applied through U10 pin 10 to pin 11 and on to U8 pin 5. Now the path is the same as for A phase voltage previously described.

4-3.4 (Continued)

When A phase wattage is selected, the A phase voltage is applied to pin 6 of multiplier U13 and the A phase current is applied to pin 1 of the same device. The instantaneous result is coupled through U5 pin 7 to pin 6 and to the active filter where it joins with the other signal paths. The voltage at pin 6 of the multiplier is the sense voltage divided by 50 so if the input voltage is 110V the pin 6 voltage is 2.2V RMS. the current input is always scaled where .909 volts out of the CT is equal to 4.545A, 9.09A, 18.18A or 36.36A depending on model of power source used. This voltage is doubled by U11 pins 1, 2, and 3 and applied to pin 1 of the multiplier. So if we have 2.2 volts x 1.818 volts the result will be 4 volts. Thus 4 volts equals full scale for any model power source and the microprocessor program makes the proper manipulations to arrive at the correct answer based upon the program used.

Frequency to voltage converter U14 takes the logic signal that is two times the output frequency and coverts it to a DC level that is proportional to frequency. This voltage is coupled through U5 pin 15 to pin 14 where it joins the common signal path for filtering and conversion to digital.

Monostable multivibrator U3 is started by the SET signal that stored the input program. This timer will delay approximately 330 ms before starting the A to D converter. This delay is to ensure settling the appropriate converter and the active filter prior to making a measurement.

SEL1 input when low enables U1 to put output data on the Data Bus and SEL2 determines if it is the low byte or high byte of data.

When SET starts the sequence, it sets the RS latch of U4 causing EXT INPUT 1 to go high. When U1 completes its conversion, it will cause EXT INPUT 1 to go low signifying to the microprocessor that data is ready to be taken.

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 9012. 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 Service Department should be requested. Equipment should not be returned to the Elgar factory without the express authorization of Elgar Corporation or its appointed representative. 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

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 microprocessor board, troubleshoot from top of processor board. If trouble is not on processor board, remove the two screws which are 3/4 of the way to the rear of the processor board and hinge the processor board up to provide access to the main board.

5-4 CALIBRATION ADJUSTMENTS

There are only a comparative few adjustments to be made in the Series 9012. These are made at the factory and should not require recalibration unless a component has been changed or the power source and oscillator has been exposed to severe vibration/shock.

If the 9012 PIP is moved from one type Elgar Power Source to another, the only adjustment that need be made is step 5.

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

5-4.1 Main Board Calibration

1. Key in voltage to 100 and frequency to 800.
2. Monitor A phase output with AC DMM and distortion analyzer.
3. Adjust THD-HI AØ and THD-LO AØ for minimum distortion on distortion analyzer.
4. If multiphase, monitor B phase output and adjust THD-HI B and C and THD-LO B and C for minimum distortion on distortion analyzer. Return monitor to A phase.
5. Open servo leads and adjust A OPEN for 110.0 volts. If multi-phase, repeat for B and C phases.
6. Close servo and connect a clip lead from output low (white binding post) to digital common of 9012 (negative end of 4700 uF cap on main board). Record A phase voltage reading.
7. Move clip lead from Output Low to Output High and adjust A CMR so reading equals reading recorded in step 6.
8. If multiphase 9012, repeat steps 6 and 7 for B and C phases. Remove clip lead.
9. Adjust A-FS pot for 100.0 volts output (adjust B-FS and C-FS if multiphase unit).
10. Load voltage to 10.0V and adjust A ZERO for 10.0 volts output. Repeat for B and C phase if multiphase unit.
11. Repeat steps 9 and 10 as required to compensate for interaction of adjustments.

12. If multiphase unit, set voltage to 100.0. Connect phase meter between A and B phases. Adjust 240° LO pot for 240.0° phase angle.

13. If multiphase set frequency to 2000 (CR)(LF) and adjust C11 for 240° phase angle.

5-4.2 Test Board Calibration

1. Manually program PIP to 120V and 400 Hz.

2. Measure from TP3 (high) to TP2 (common) with DC voltmeter.

3. Adjust R8 for +5.000 ± 0.001 volts DC.

4. Change meter to AC 10 volt scale and move high lead from TP3 to TP1.

5. Program PIP 1 # 4.

6. Adjust R30 for 2.4 VAC ± 0.005VAC.

7. Move voltmeter high lead to U10 pin 7 and adjust R37 for 1.2VAC ± 0.005VAC.

8. Program PIP voltage to 100 VAC and adjust R44 for 100.0 on PIP display. (must do 1 #4)

9. Program PIP voltage to 10.0 VAC and adjust R~~50~~ 49 for 010.0 on PIP display.

10. Repeat steps 7 and 8 as required to compensate for interaction of adjustments.

11. Program PIP voltage to 110.0 volts at 400 Hz and apply a load of approximately 80% of full load for the associated power source.

12. Program PIP 4 # 4.

13. Measure AC voltage (on 1 VAC range) at R33.

14. Measure AC voltage at U11 pin 1 and adjust R36 for exactly twice the voltage measured at R33.

15. Measure actual current to load with a precision ammeter.

16. Adjust current transformer adjustment until PIP display equals current measured by precision ammeter.

17. Remove load from power source and monitor U13 pin 4 with DC voltmeter.

18. Adjust R49 for zero on DC voltmeter.

19. Reapply load and calculate amps times volts (or use precision voltmeter) to get watts being drawn by load.

5-4.2 (Continued)

20. Program PIP 7 # 4.

21. Adjust R40 so PIP display equals calculated watts.

22. Program PIP to zero volts at 50 Hz.

23. Program PIP 0 # 4.

24. Adjust R43 for 0050. on PIP display.

25. Program PIP to 5000 Hz.

26. Program PIP 0 # 4.

27. Adjust R23 for 5000. on PIP display.

28. Repeat steps 22 through 27 as required to compensate for interaction of adjustments.

Following steps are for three phase test board only.

29. Program PIP to 100.0 volts at 400 Hz.

30. Program PIP 2 # 4.

31. Adjust R16 for 100.0 on PIP display.

32. Program PIP 3 # 4.

33. Adjust R15 for 100.0 on PIP display.

34. Program PIP to 400 Hz at 110.0 volts.

35. Apply a load of approximately 80% of full load for the associated power source.

36. Monitor phase B current with precision ammeter.

37. Program 5 # 4.

38. Adjust B phase current transformer adjustment so that PIP display equals readout on precision ammeter.

39. Move precision ammeter to C phase and apply same load as in step 35.

40. Program 6 # 4.

41. Adjust C phase current transformer adjustment so that PIP display equals readout on precision ammeter.

End of test board calibration.

SECTION VI
PARTS LIST

6-1. GENERAL

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.

6-2. SPARE PARTS

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 Corporation 9250 Brown Deer Rd., San Diego, CA 92121. Specify assembly number, instrument series number and instrument name.

MAIN BOARD ASSEMBLY 9012 PIP - 5809911-01

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER NAME	MANUFACTURER PART NUMBER	ELGAR PART NUMBER
C1,19,20	10 uF	Cap Tant	20V	Sprague	196D106X0020JA1	823-106-41
C2,3,5	33 uF	Cap Tant	25V	Sprague	196D336X0025PE4	823-336-51
C4	4700uF	Cap Electro.	16V	Sprague	501D478F016TV	824-478-01
C6,7,8	.1 uF	Cap Disc	25V	Sprague	HY-550	821-104-05
C9,10	.001 uF	Cap Disc	50V	Centralab	DDM102	821-102-00
C11	14-115pF	Cap Var		Sprague	GZC12100	828-141-15
C12	390 pF	Cap Mica	500V,5%	CDE	CD15FD391J03	820-391-05
C13,14	1000pF	Cap Mica	500V,1%	CDE	CD15FD102F03	820-102-01
C15	500pF	Cap Mica	500V,5%	CDE	CD15FD501J03	820-501-05
CR7,8	15V	Zener	1W,5%	Any	1N4744A	843-474-4A
CR3,4,30,31		Rect Diode	400V,1A	Any	1N4004	845-400-4X
CR1,2,5,6,10,12 14,15,18,19,24,25,32		Signal Diode	75V	Any	1N914	844-914-XX
K1		Relay	6V DC	Douglas Randall	6MG3A	861-6MG-3A
Q5,6		DMOS FET		SPI	SD213	842-SD2-13
Q7,10		PNP Transistor		National	PN2907	832-P29-07
Q8,9		NPN Transistor			PN3643	835-364-3P
Q11		Transistor		Motorola	MPSA13	833-MPS-AI
R2,3	3.9 ohm	Resistor	1/4W,5%	A-B	RC07GF3R9J	801-3R9-05
R4,26,27,44, 42,46,51,90-92	10K	Resistor	1/4W,5%	A-B	RC07GF103J	801-103-05
R8,9	3.3K	Resistor	1/2W,5%	A-B	RC07GF332J	802-332-05
R12,22,23, 30,33	4.99K	Resistor	1%	Dale	RN60C4991F	813-499-1F
R13,16,45,73	1K	Resistor	1/4W,5%	A-B	RC07GF102J	801-102-05
R14	4.75K	Resistor	1%	Dale	RN60C4751	813-475-1F
R15,32,28, 76-78	500 ohm	Potentiometer		Spectrol	63P501	819-501-63
R18,24	1M	Resistor	1/4W,5%	A-B	RC07GF106J	801-105-05
R19,25,63-65	100K	Potentiometer		Spectrol	63P104	819-104-63
R21,35,40	33K	Resistor	1/4W,5%	A-B	RC07GF333J	801-333-05
R29,31,54	5K	Potentiometer		Spectrol	64W502	819-502-64
R34	73.2K	Resistor	1/4%	Dale	RN60C7322C	814-732-2C
R36,37,66, 68,70	510K	Resistor	1/4W,5%	A-B	RC07GF514J	801-514-05
R39,48,50,52	50K	Resistor	1/4%	Dale	RN60C5002C	814-500-2C
R41,49	100K	Resistor	1/4%	Dale	RN60C1003C	814-100-3C
R43	4.7K	Resistor	1/4W,5%	A-B	RC07GF472J	801-472-05
R47	240 ohm	Resistor	1/4W,5%	A-B	RC07GF241J	801-241-05

MAIN BOARD ASSEMBLY 9012 PIP - 5809911-01 (Continued)

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
R55,57,58	15K	Resistor	1/4W,5%	A-B	RC07GF153J	801-153-05
R62	47K	Resistor	1/4W,2%	Corning	SMA0747K02%	801-473-05
R56,59,61	3.3K	Resistor	1/4W,5%	A-B	RC07GF332J	801-332-05
R72,1	100 ohm	Resistor	1/4W,5%	A-B	RC07GF101J	801-101-05
R79,81,83	9.76	Resistor	1%	Dale	RN60C9761F	813-976-1F
R84-89	390K	Resistor	1%	Dale	RN65C3903E	818-390-3F
T1		Transformer	16V-CT	Signal	ST5-16	850-ST5-16
U1,10,19		Photomod		Clairex	CLM51	849-CLM-51
U2,3,5,7,13, 15,16,20,22 23,25,26		Dual Amp		TI	TL072	849-TL0-72
U4,11,12		Integrated Ckt		Motorola	MC74HC86N	849-H86-XX
U6,8,14,21,24	10K	Resistor PAC		Beckman	698-3-10KF	818-103-DR
U9		Integrated Ckt		Motorola	MC74HC4040	849-H40-40
U17,27		DAC 8 Bit		Signetics	DA08EN	849-N50-08
U18		PROM		Elgar		849-SA2-5D
U28		PROM		Elgar		849-CA2-5D

TOP ASSEMBLY 9012 PIP - 5809908

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
Q2		NPN Transistor	80V	T.I.	TIP29B	842-TIP-29
Q3		PNP Transistor	80V	T.I.	TIP30B	842-TIP-30
VR1		Regulator	5V	SG	SG7805CP	849-780-5P
		Thumbscrew Kit		Elgar		899-263-09
		Insulator Washer				109-220-PD
		Shoulder Washer				109-093-SW
Interconnect		Cable Assy 16 pin		Elgar		5261014-01
Interconnect		Cable Assy 26 pin		Elgar		5970007-02
		Front Panel		Elgar		9809913-01

PROCESSOR ASSEMBLY 9012 PIP - 5809912-01

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
C1	10/70	Var Cap		Sprague	GZC70000	828-10X-70
C2	22 pF	Cap Mica	500V	Sprague	CM05FD220J03	820-330-05
C4	47 pF	Cap Mica	500V	Sprague	CM05FD470J03	820-470-05
C5,10-18	.1	Cap, Disc	50V	Sprague	HY550	821-104-05
C6,8,9,19,20	10 uF	Cap, Tant	20V	Sprague	196D106X0020JA1	823-106-41
C7	33 pF	Cap Mica	500V	Sprague	CM05FD330J03	820-330-05
CR1	6.9V	Reference		National	LM329CZ	848-LM3-29
J7		Cable Assy		Elgar		
R1	10M	Resistor	¼W,5%	Dale	RC07GF106J	801-106-05
R2	15 ohm	Resistor	2W,5%	Dale	RC42GF150J	804-150-05
R3,5	6.65K	Resistor	¼W,5%	Dale	RN60C6651F	813-665-1F
R4	3.01K	Resistor	¼W,5%	Dale	RN60C3011F	813-301-1F
R6	33K	Resistor	¼W,5%	Dale	RC07GF333J	801-333-SP
RS1	2.2K	Resistor SIP	2%	A-B	110A222	818-222-SP
RS2	33K	Resistor SIP	2%	Dale	MSP10A01-333G	818-333-05
U1,2,5,6		Rate Multiplier		TI	SN74167N	849-741-67
U3		Dual 4 In NAND		RCA	CD74HC20E	849-H20-XX
U4		Dual Op Amp		TI	TL072CP	849-TL0-72
U7		12 Bit DAC		Ana Dev	AD7545LN	849-754-5L
U8,9,12,22,28		Octal D F/F		National	MM74C374N	849-7C3-74
U10		Dual BCD Ctr		RCA	CD74HC390E	849-H39-0X
U11		Bus Driver		RCA	CD74HC240E	849-H24-0X
U13,14		Octal Latch		RCA	CD74HC373E	849-H37-3X
U15		Quad NAND		RCA	CD74HC0EE	849-H00-XX
U16		Dual D F/F		RCA	CD74HC74E	849-H74-XX
U17		Hex Inverter		RCA	CD74HC04E	849-H04-XX
U18		Microprocessor		Motorola	MC146805E2P	849-680-5E
U19		PROM 4KX8		Intel	Elgar Program	849-273-2A
U20		PROM 2KX8		Not normally installed		
U21		RAM 2KX8		RCA	CDM6116AE2	849-611-62
U23		Decoder		RCA	CD74HC138E	849-H13-8X
U24		PROM		Signetics	Elgar Program	849-MEM-EN
U25,26		Transceiver		Motorola	MC3447P	849-344-7X
U27		GPIA		Motorola	MC68488P	849-684-88
Y1	10.24mHz	Crystal	32 pF	Monitor	MC18A-32PF-10.24mHz	864-102-4X

DISPLAY ASSEMBLY 9012 PIP 5809910-01

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
C1	10 uF	Cap, Tant	20V	Sprague	196D106X0020JA1	823-106-41
C2	1 uF	Cap, Tant	35V	Sprague	196D105X0035JA1	823-105-61
CR1-4		Diode, Signal	70V	Generic	1N914	844-914-XX
DS1-4		LED, 7 Segment		Gen-Inst	MAN4610A	848-461-0X
DS5-10		LED		H.P.	HLMP-3301	848-655-02
Q1		PNP Transistor	40V	National	PN2907	832-P29-07
Q2,3		NPN Transistor	30V	National	2N3643	835-364-3X
R1	390	Resistor	¼W,5%	Dale	RC07GF391J	801-391-05
R2,3	5.1K	Resistor	¼W,5%	Dale	RC07GF512J	801-512-05
R4,5,6,10	1K	Resistor	¼W,5%	Dale	RC07GF102J	801-102-05
R7	68K	Resistor	¼W,5%	Dale	RC07GF683J	801-683-05
R8	4.7K	Resistor	¼W,5%	Dale	RC07GF472J	801-472-05
R9	15K	Resistor	¼W,5%	Dale	RC07GF153J	801-153-05
SW1		Keypad		Grayhill	83AA1-102	860-83A-02
U1	330	Resistor DIP		Sprague	341B331	818-331-DR
U2		BCD/7 Segment		TI	SN74LS47N	849-74S-47
U3		2 to 4 Line		RCA	CD4555E	849-C45-55
U4		Source DRIVER		Sprague	UDN2981	849-298-1X
U5		Quad Schmidt		RCA	CD4093E	849-C40-93

TEST BOARD ASSEMBLY 9012 PIP 5809909-01

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
C1,2,7,19,20	10 uF	Capt, Tant	20V	Sprague	196D106X0020JA1	823-106-41
C3,5,6,15,17	.1 uF	Cap Disc	25V	Sprague	HY-550	824-104-05
C4	.0022	Cap Mylar	100V,1%	Sprague	192P22292	822-222-05
C8	560 pF	Cap Mica	500V,5%	CDE	CD15FD561J03	820-561-05
C9	.0039 uF	Cap Mylar	100V,5%	IMB	BA1B392F	822-392-11
C10	.68 uF	Cap Mylar	100V,1%	IMB	BA2B684F	822-684-12
C11	.27 uF	Cap Poly P	200V,1%	IMB	GA2C274F	822-274-PP
C12	1 uF	Cap Poly P	200V,1%	IMB	GA2C105F	822-105-PP
C13	2500 pF	Cap Mica	500V,1%	CDE	CD25FD252F03	820-252-01
C14,18	1 uF	Cap Tant	35V	Sprague	196D105X0035JA1	823-105-61
C16	.01	Cap Disc	50V	Sprague	DDM103	821-103-00
C21	.82 uF	Cap Poly P	200V,1%	IMB	GA2C824F	822-824-PP
CR1,2		Diode Signal	75V	TI	1N914	844-914-XX
CR3	6.9	Ref Diode	5%	National	LM329CZ	848-LM3-29
R1	57.6K	Resistor Film	1%	Dale	RN60C5762F	813-576-2F
R2	1.6M	Resistor Comp	5%	A-B	RC07GF165J	801-165-05
R3,51	20K	Resistor Film	1%	Dale	RN60C2002F	813-200-2F
R4,19,21,31	3.74K	Resistor Film	1%	Dale	RN60C3741F	813-374-1F
R5	2.15K	Resistor Film	1%	Dale	RN60C2151F	813-215-1F
R6,45-48	22.1K	Resistor Film	1%	Dale	RN60C2212F	813-221-2F
R7	6.49K	Resistor Film	1%	Dale	RN60C6491F	813-649-1F
R8	1K	Potentiometer	20 turn	Bourns	3299-102	819-102-32
R9-14	536K	Resistor Film	1%	Dale	RN65C5363F	816-536-3F
R15,16,30, 36,37	500 ohm	Potentiometer	20 turn	Bourns	3299-501	819-501-99
R17,18,20,28, 29,32	11.5K	Resistor Film	1%	Dale	RN60C1152F	813-115-2F
R23	10K	Potentiometer	20 turn	Bourns	3299-103	819-103-55
R24,41	3.3M	Resistor Comp	5%	A-B	RC07GF335J	801-335-05
R25	24.3K	Resistor Film	1%	Dale	RN670C2432F	813-243-2F
R26	2.2K	Resistor Comp	5%	A-B	RC07GF222J	801-222-05
R27	12K	Resistor Comp	5%	A-B	RC07GF123J	801-123-05
R33,34,35	15 ohm	Resistor Film	1%	Dale	CMF60,7 ohm	818-15T-2F
R38	3.65K	Resistor Film	1%	Dale	RN60C3651F	813-365-1F
R39	40.2K	Resistor Film	1%	Dale	RN60C4022F	813-402-2F
R40	2K	Potentiometer	20 turn	Bourns	3299-202	819-202-64

TEST BOARD ASSEMBLY 9012 PIP 5809909-01 (Continued)

SCHEMATIC DESIGNATION	VALUE	DESCRIPTION OR TYPE	RATING	MANUFACTURER		ELGAR PART NUMBER
				NAME	PART NUMBER	
R42	2K	Resistor Film	1%	Dale	RN60C2001F	813-200-2F
R43,49,50	100K	Potentiometer	20 turn	Bourns	3299-104	819-104-99
R44	20K	Potentiometer	20 turn	Bourns	3299-203	819-203-99
U1		A to D Conv.	12 bit	Ana.Dev.	AD7582K	849-758-2K
U2		Octal Latch		National	MM74C374N	849-7C3-74
U3		Dual Mono		RCA	CD4098E	849-C40-98
U4		Quad NAND		RCA	CD4011E	849-C40-11
U5,9,10		Analog MUX		Siliconix	DG201A	849-DG2-01
U6		Dual Op Amp		TI	TL072	849-TL0-72
U7,8,11		Dual Op Amp		Motorola	MC340002A	849-340-2A
U13		Ana Multiplier		Ana.Dev.	AD632A	849-AD6-32
U14		V to F Conv.		Burr Brown	VFC32KP	849-VFC-32
U15		TRMS Conv.		Burr Brown	4341	849-434-1X
VR1		Regulator	-5V	National	LM79L05AC	849-79L-05

SECTION VII
DIAGRAMS

7-1. GENERAL

This section contains the schematic diagrams for the Series 9012 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.

7-2. DIAGRAMS

Diagrams included in this section are as follows:

Top Assembly, 5809915
Main Board Schematic, 6809907
Main Board Single Phase Assembly Drawing, 5809911
Main Board Three Phase Assembly Drawing, 5809907
Processor Board Schematic, 6809912
Processor Board Assembly Drawing, 5809912
Display Board Assembly Drawing, 5809910
Display Board Schematic, 6809910
Test Board Assembly Drawing, 5809909
Test Board Schematic, 6809909

ASSY PART NO.	TITLE	SHT. 1 OF 10	REV.	ELGAR
5809915-00	MAIN ASSY 9012 SERIES	1-9-A SHT 10 IS C SIZE	C	

DRAWN CAROL JABASA	DATE 6/8/85	PROJ. ENG. Dale Mueller	DATE 6-21-85
CHECKED [signature]	DATE 6-20-85	QA-REL.	DATE

REVISIONS

REV.	ASSY DASH NO. 01	02	03	04	05	06	07	08	DESCRIPTION	DRAFTER	CHECKED	APPROVED	DATE
A	X	X	X	X					ENG. REL.	CJD	[signature]	[signature]	11-26-85
B	X	X	X	X					ECN 6255 INCORP.	CD	[signature]	[signature]	1-26-87
C	X	X	X	X					ECN 6562 2/19/88	K.P.		[signature]	2-23-88

ITEM NO.	ASSY DASH NO. 01	02	03	04	05	06	07	08	ASSEMBLY DESCRIPTION	REMARKS
1	X								MAIN ASSY. ONE PHASE WITHOUT TEST BD.	9012-1
2		X							MAIN ASSY. THREE PHASE WITHOUT TEST BD	9012-3
3			X						MAIN ASSY ONE PHASE WITH TEST BD.	9012-1T
4				X					MAIN ASSY THREE PHASE WITH TEST BD	9012-3T
5					X					
6						X				
7							X			
8								X		

1001030-01

SINGLE LEVEL PARTS LIST

PAGE:

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-01	C FINAL ASSY 9012 1PH A	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
02	5809911-01	C MAIN VD ASY 9030-10	A 4	09	EA	1
	REFERENCE DESIG					
02	5809910-01	A PCB ASSY DISPLAY 9012	A 4	11	EA	1
	REFERENCE DESIG					
02	5809912-01	F PCA PROC W/OTEST 9012	A 4	12	EA	1
	REFERENCE DESIG					
02	261014-01	B FLAT CABLE ASSY	A 6	13	EA	1
	REFERENCE DESIG					
02	9809913-01	C FRONT PANEL PIP 9012	A 4	15	EA	1
	REFERENCE DESIG					
01	899-263-09	RETAINER KIT FERRUL/SCR	A 4	16	PR	2
	REFERENCE DESIG					
01	849-780-5P	REG UA7805UC 5V-T02	A 4	17	EA	1
	REFERENCE DESIG VR1					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-01	C FINAL ASSY 9012 1PH A	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	842-TIP-30	P TIP30B 80V AM/SW T2	A 4	18	EA	1
	REFERENCE DESIG Q1					
01	842-TIP-29	N-TIP29B 80V AM/SW T2	A 4	19	EA	1
	REFERENCE DESIG Q2					
01	9809916-01	A FILTER-POLARIZER 9012	A 4	20	EA	1
	REFERENCE DESIG					
01	109-220-PD	INSULATOR 3323-07FR-56	A 4	21	EA	3
	REFERENCE DESIG					
01	109-093-SW	WASHER SHOULDER	A 4	22	EA	3
	REFERENCE DESIG					
01	110AH04-A2	SCREW BINDER HD 2-56X5/	A 4	24	EA	3
	REFERENCE DESIG					
01	110CA04-04	SCREW #4-40 X 1/4 PH	A 4	25	EA	2
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION		UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-01	C FINAL ASSY 9012 1PH	A	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	110DA04-14	SCREW 6-32 PPH 7/8	A 4	26	EA	2
	REFERENCE DESIG					
01	110DH05-06	SCREW 6-32 SBH 3/8	A 4	27	EA	8
	REFERENCE DESIG					
01	111DF80-01	WASHER #6 FIBRE SHLDR	A 4	29	EA	4
	REFERENCE DESIG					
01	5970080-01	A ASY CABLE GPIB 2253M2	S 4	30	EA	1
	REFERENCE DESIG					
01	109-IEE-MT	STUD MT GPIB PIP 552633	S 4	31	EA	1
	REFERENCE DESIG					
01	6809907-01	B SCHEM MAIN BD 9030	A 6	34	EA	1
	REFERENCE DESIG					
01	6809910-01	A SCHM-DISPLAY BD 9012	A 6	35	EA	1
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION		UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-01	C FINAL ASSY 9012 1PH	A	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	6809912-01	F SCHEM PROCESSOR 9012	A 6	36	EA	1
	REFERENCE DESIG					

END OF REPORT : :

SINGLE LEVEL PARTS LIST

PAGE:

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-02	C FIAL ASSY 9012 3PH A	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
02	5809907-01	C MAIN BD ASY 9012/9030 A	4	10	EA	1
	REFERENCE DESIG					
02	5809910-01	A PCB ASSY DISPLAY 9012 A	4	11	EA	1
	REFERENCE DESIG					
02	5809912-01	E PCA PROC W/OTEST 9012 A	4	12	EA	1
	REFERENCE DESIG					
02	5261014-01	B FLAT CABLE ASSY A	6	13	EA	1
	REFERENCE DESIG					
02	9809913-01	C FRONT PANEL PIP 9012 A	4	15	EA	1
	REFERENCE DESIG					
01	899-263-09	RETAINER KIT FERRUL/SCR A	4	16	PR	2
	REFERENCE DESIG					
01	849-780-5P	REG UA7805UC 5V-T02 A	4	17	EA	1
	REFERENCE DESIG	VR1				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-02	C FIAL ASSY 9012 3PH A	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	842-TIP-30	P TIP30B 80V AM/SW T2 A	4	18	EA	1
	REFERENCE DESIG	Q1				
01	842-TIP-29	N-TIP29B 80V AM/SW T2 A	4	19	EA	1
	REFERENCE DESIG	Q2				
01	9809916-01	A FILTER-POLARIZER 9012 A	4	20	EA	1
	REFERENCE DESIG					
01	109-220-PD	INSULATOR 3323-07FR-56 A	4	21	EA	3
	REFERENCE DESIG					
01	109-093-SW	WASHER SHOULDER A	4	22	EA	3
	REFERENCE DESIG					
01	110AH04-A2	SCREW BINDER HD 2-56X5/ A	4	24	EA	3
	REFERENCE DESIG					
01	110CA04-04	SCREW #4-40 X 1/4 PH A	4	25	EA	2
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

PAGE:

MATERIAL ITEM NO.	DESCRIPTION		UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-02	C FIAL ASSY 9012 3PH	A	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	110DA04-14	SCREW 6-32 PPH 7/8	A 4	26	EA	2
	REFERENCE DESIG					
01	110DH05-06	SCREW 6-32 SBH 3/8	A 4	27	EA	8
	REFERENCE DESIG					
01	111DF80-01	WASHER #6 FIBRE SHLDR	A 4	29	EA	4
	REFERENCE DESIG					
01	5970080-01	A ASY CABLE GPIB 2253M2	S 4	30	EA	1
	REFERENCE DESIG					
01	109-IEE-MT	STUD MT GPIB PIP 552633	S 4	31	EA	1
	REFERENCE DESIG					
01	6809907-01	B SCHEM MAIN BD 9030	A 6	34	EA	1
	REFERENCE DESIG					
01	6809910-01	A SCHM-DISPLAY BD 9012	A 6	35	EA	1
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION		UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-02	C FIAL ASSY 9012 3PH	A	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER

END OF REPORT : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-03	C FINAL ASY 9012 1PH TEST	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
02	5809911-01	C MAIN VD ASY 9030-10	A	4 09	EA	1
	REFERENCE DESIG					
02	5809910-01	A PCB ASSY DISPLAY 9012	A	4 11	EA	1
	REFERENCE DESIG					
02	5261014-01	B FLAT CABLE ASSY	A	6 13	EA	1
	REFERENCE DESIG					
02	5809912-02	F PC ASSY PROC W/TEST	A	4 14	EA	1
	REFERENCE DESIG					
02	9809913-01	C FRONT PANEL PIP 9012	A	4 15	EA	1
	REFERENCE DESIG					
01	899-263-09	RETAINER KIT FERRUL/SCR	A	4 16	PR	2
	REFERENCE DESIG					
01	849-780-5P	REG UA7805UC 5V-T02	A	4 17	EA	1
	REFERENCE DESIG VR1					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-03	C FINAL ASY 9012 1PH TEST	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	842-TIP-30	P TIP30B 80V AM/SW T2	A	4 18	EA	1
	REFERENCE DESIG Q1					
01	842-TIP-29	N-TIP29B 80V AM/SW T2	A	4 19	EA	1
	REFERENCE DESIG Q2					
01	9809916-01	A FILTER-POLARIZER 9012	A	4 20	EA	1
	REFERENCE DESIG					
01	109-220-PD	INSULATOR 3323-07FR-56	A	4 21	EA	3
	REFERENCE DESIG					
01	109-093-SW	WASHER SHOULDER	A	4 22	EA	3
	REFERENCE DESIG					
02	5809909-01	D PCB TEST BD 9012 1PH	A	4 23	EA	1
	REFERENCE DESIG					
01	110AH04-A2	SCREW BINDER HD 2-56X5/	A	4 24	EA	3
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-03	C FINAL ASY 9012 1PH TEST	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	110CA04-04	SCREW #4-40 X 1/4 PH	A 4	25	EA	2
	REFERENCE DESIG					
01	110DA04-14	SCREW 6-32 PPH 7/8	A 4	26	EA	2
	REFERENCE DESIG					
01	110DH05-06	SCREW 6-32 SBH 3/8	A 4	27	EA	9
	REFERENCE DESIG					
01	111DF80-01	WASHER #6 FIBRE SHLDR	A 4	29	EA	4
	REFERENCE DESIG					
01	5970080-01	A ASY CABLE GPIB 2253M2	S 4	30	EA	1
	REFERENCE DESIG					
01	109-IEE-MT	STUD MT GPIB PIP 552633	S 4	31	EA	1
	REFERENCE DESIG					
01	6809907-01	B SCHEM MAIN BD 9030	A 6	34	EA	1
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-03	C FINAL ASY 9012 1PH TEST	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	6809910-01	A SCHM-DISPLAY BD 9012	A 6	35	EA	1
	REFERENCE DESIG					
01	6809912-01	F SCHEM PROCESSOR 9012	A 6	36	EA	1
	REFERENCE DESIG					
01	6809909-01	B SCH TEST BD 9012	A 6	37	EA	
	REFERENCE DESIG					

END OF REPORT : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-04	C FNL ASY 9012 3PH TEST A	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
02	5809907-01	C MAIN BD ASY 9012/9030 A	4	10	EA	1
	REFERENCE DESIG					
02	5809910-01	A PCB ASSY DISPLAY 9012 A	4	11	EA	1
	REFERENCE DESIG					
02	5261014-01	B FLAT CABLE ASSY A	6	13	EA	1
	REFERENCE DESIG					
02	5809912-02	F PC ASSY PROC W/TEST A	4	14	EA	1
	REFERENCE DESIG					
02	9809913-01	C FRONT PANEL PIP 9012 A	4	15	EA	1
	REFERENCE DESIG					
01	899-263-09	RETAINER KIT FERRUL/SCR A	4	16	PR	2
	REFERENCE DESIG					
01	849-780-5P	REG UA7805UC 5V-T02 A	4	17	EA	1
	REFERENCE DESIG VR1					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-04	C FNL ASY 9012 3PH TEST A	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	842-TIP-30	P TIP30B 80V AM/SW T2 A	4	18	EA	1
	REFERENCE DESIG Q1					
01	842-TIP-29	N-TIP29B 80V AM/SW T2 A	4	19	EA	1
	REFERENCE DESIG Q2					
01	9809916-01	A FILTER-POLARIZER 9012 A	4	20	EA	1
	REFERENCE DESIG					
01	109-220-PD	INSULATOR 3323-07FR-56 A	4	21	EA	3
	REFERENCE DESIG					
01	109-093-SW	WASHER SHOULDER A	4	22	EA	3
	REFERENCE DESIG					
01	110AH04-A2	SCREW BINDER HD 2-56X5/ A	4	24	EA	3
	REFERENCE DESIG					
01	110CA04-04	SCREW #4-40 X 1/4 PH A	4	25	EA	2
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-04	C FNL ASY 9012 3PH TEST A	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	110DA04-14	SCREW 6-32 PPH 7/8	A 4	26	EA	2
	REFERENCE DESIG					
01	110DH05-06	SCREW 6-32 SBH 3/8	A 4	27	EA	9
	REFERENCE DESIG					
02	5809909-02	D PCB TEST BD9012 2/3PH	A 4	28	EA	1
	REFERENCE DESIG					
01	111DF80-01	WASHER #6 FIBRE SHLDR	A 4	29	EA	4
	REFERENCE DESIG					
01	5970080-01	A ASY CABLE GPIB 2253M2	S 4	30	EA	1
	REFERENCE DESIG					
01	109-IEE-MT	STUD MT GPIB PIP 552633	S 4	31	EA	1
	REFERENCE DESIG					
01	6809907-01	B SCHEM MAIN BD 9030	A 6	34	EA	1
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809915-04	C FNL ASY 9012 3PH TEST A	EA	10.0	8	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	6809910-01	A SCHM-DISPLAY BD 9012	A 6	35	EA	1
	REFERENCE DESIG					
01	6809912-01	F SCHEM PROCESSOR 9012	A 6	36	EA	1
	REFERENCE DESIG					
01	6809909-01	B SCH TEST BD 9012	A 6	37	EA	
	REFERENCE DESIG					

END OF REPORT : :

ASSY PART NO.	TITLE	SHT. 1 OF 6	REV.	ELGAR
5809911-01	MAIN BD ASSY SINGLE PHASE	SHT. 6 IS D SIZE	C	

DRAWN GCC 3-26-85	DATE 3-26-85	PROJ. ENG.	DATE 4-3-85
CHECKED	DATE 4-2-85	QA-REL.	DATE

REVISIONS

REV.	ASSY DASH NO. 01	02	03	04	05	06	07	08	DESCRIPTION	DRAFTER	CHECKED	APPROVED	DATE
A	X								ENG. RELEASE	CJ			10-9-85
B	X								ECN 6379				7-9-87
C	X								ECN 6467				9-28-87

ITEM NO.	ASSY DASH NO. 01	02	03	04	05	06	07	08	ASSEMBLY DESCRIPTION	REMARKS
1	X								9012/9030 MAIN BD, SINGLE PHASE	
2		X								
3			X							
4				X						
5					X					
6						X				
7							X			
8								X		

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809911-01	C MAIN VD ASY 9030-10 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	9809911-01	B MAIN BORD 9030	A 4	09	EA	1
	REFERENCE DESIG					
01	823-106-41	10 20V 196D106X0020JA1	A 4	12	EA	3
	REFERENCE DESIG	C1,19,20				
01	823-336-51	33-25V 196D336X0025PE4	A 4	13	EA	3
	REFERENCE DESIG	C2,3,5				
01	824-478-01	4700@16V ALUM ELECTROLY	A 4	14	EA	1
	REFERENCE DESIG					
01	821-104-CK	.1 DISC 50V CK05BX104K	A 4	15	EA	2
	REFERENCE DESIG					
01	821-102-00	CAP DISC .001UF 10% 100	A 4	16	EA	1
	REFERENCE DESIG					
01	820-102-01	DIP MICA 1000PF 1% 100V	A 4	17	EA	1
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809911-01	C MAIN VD ASY 9030-10 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	820-501-05	DIP MICA 500PF 500V 5%	A 4	18	EA	1
	REFERENCE DESIG					
01	823-474-61	.47-35V 196D474X0035HA1	A 4	19	EA	1
	REFERENCE DESIG					
01	844-914-XX	1N914	A 4	23	EA	14
	REFERENCE DESIG	CR1,2,5,6,10-12,14,15,18,19,24,25,32				
01	845-400-4X	1N4004	A 4	31	EA	4
	REFERENCE DESIG	CR3,4,30,31				
01	843-474-4A	1N4744A 1W 15V ZENER MO	A 4	35	EA	2
	REFERENCE DESIG					
01	849-DIP-16	DIP SOCKET 16 PIN	A 4	39	EA	1
	REFERENCE DESIG					
01	861-6MG-3A	RELAY REED 3FORM A 6VDC	A 4	41	EA	1
	REFERENCE DESIG	K1				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809911-01	C MAIN VD ASY 9030-10 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	833-MP8-HI	TRANSISTOR DARLINGTON H	A 4	43	EA	1
	REFERENCE DESIG	Q11				
01	832-P29-07	P PN2907 40V AM/SW T	A 4	46	EA	2
	REFERENCE DESIG					
01	835-364-3P	N PN3643 30V HF/AM T092	A 4	47	EA	2
	REFERENCE DESIG	Q8,9				
01	842-SD2-13	N SD213DE 30V MOSFT T7	A 4	48	EA	1
	REFERENCE DESIG					
01	801-3R9-05	RES 1/4W 3.90HM 5%	A 4	51	EA	2
	REFERENCE DESIG					
01	801-101-05	100 OHM 1/4 WATT 2% M F	A 4	52	EA	1
	REFERENCE DESIG					
01	801-241-05	240 OHM 1/4 WATT 2% M F	A 4	53	EA	1
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809911-01	C MAIN VD ASY 9030-10 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	801-102-05	1 K OHM 1/4 WATT 2% M F	A 4	54	EA	3
	REFERENCE DESIG					
01	802-332-05	3.3 K OHM 1/2 WATT 2% M	A 4	55	EA	2
	REFERENCE DESIG					
01	801-472-05	4.7 K OHM 1/4 WATT 2% M	A 4	56	EA	1
	REFERENCE DESIG					
01	813-499-1F	1/8W 1% 4.99K RN60C4991	A 4	57	EA	3
	REFERENCE DESIG	R12,22,23				
01	813-249-1F	1/8W 1% 2.49K RN60C2491	A 4	58	EA	1
	REFERENCE DESIG	R30				
01	813-976-1F	1/8W 1% 9.76K RN60C9761	A 4	59	EA	1
	REFERENCE DESIG					
01	801-103-05	10 K OHM 1/4 WATT 2% M	A 4	60	EA	10
	REFERENCE DESIG	R4,26,27,42,44,46,51,90-92				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809911-01	C MAIN VD ASY 9030-10 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	801-153-05	15 K OHM 1/4 WATT 2% M	A 4	62	EA	1
	REFERENCE DESIG					
01	801-333-05	33 K OHM 1/4 WATT 2% M	A 4	63	EA	3
	REFERENCE DESIG					
01	818-390-3E	RES MISC 1/2W 1% 390K	A 4	64	EA	2
	REFERENCE DESIG					
01	801-514-05	510 K OHM 1/4 WATT 2% M	A 4	65	EA	3
	REFERENCE DESIG					
01	801-105-05	1 M OHM 1/4 WATT 2% M F	A 4	66	EA	1
	REFERENCE DESIG					
01	801-332-05	3.3 K OHM 1/4 WATT 2% M	A 4	67	EA	1
	REFERENCE DESIG					
01	801-473-05	47 K OHM 1/4 WATT 2% M	A 4	68	EA	1
	REFERENCE DESIG	R62				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809911-01	C MAIN VD ASY 9030-10 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	819-501-63	63P501 500R SPECTROL TR	A 4	69	EA	2
	REFERENCE DESIG					
01	819-102-32	POT 1K 25TURN PC MNT	A 4	70	EA	1
	REFERENCE DESIG					
01	819-502-64	POT 5K 10T 64W502	A 4	71	EA	1
	REFERENCE DESIG					
01	819-104-63	63P104 100K SPECTROL TR	A 4	72	EA	2
	REFERENCE DESIG					
01	818-103-DR	698-3-10KF 10K DIP BECK	A 4	75	EA	2
	REFERENCE DESIG					
01	849-CLM-51	OPTO-CLM51 PHOTO-MOD	A 4	78	EA	1
	REFERENCE DESIG					
01	849-TL0-72	LIN TL072CP 2XFET-AM	A 4	79	EA	5
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809911-01	C MAIN VD ASY 9030-10 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-H86-XX	HCMOS 74HC86 4X2 XOR	A 4	81	EA	3
	REFERENCE DESIG					
01	849-H40-40	HCMOS 74HC4040 12BITBIN	A 4	82	EA	1
	REFERENCE DESIG					
01	849-N50-08	CONV DAC08E 8BIT DAC	A 4	83	EA	1
	REFERENCE DESIG					
01	849-SA2-5D	PROM TBP28L22N SIN-LOOK	A 4	84	EA	1
	REFERENCE DESIG					
01	850-ST5-16	ST5-16 PCB XFMR SIGNAL	A 4	86	EA	1
	REFERENCE DESIG					
01	109-956-9B	STNDOFF-SWAGE 1.38"6-32	A 4	88	EA	3
	REFERENCE DESIG					

END OF REPORT : :

ASSY PART NO.	TITLE	SHT. 1 OF 6	REV.	ELGAR
5809907-01	MAIN BOARD ASSY 3 PHASE	SHT. 6 IS D SIZE	C	

DRAWN	DATE	PROJ. ENG.	DATE
GC CANEDY	4-4-85		4-5-85
CHECKED	DATE	QA-REL.	DATE
	4-5-85		

REVISIONS

REV.	ASSY DASH NO. 01	02	03	04	05	06	07	08	DESCRIPTION	DRAFTER	CHECKED	APPROVED	DATE
A	X								ENG. REL.	CJ			10-9-85
B	X								ECN 6379				7-9-87
C	X								ECN 6467				9-28-87

ITEM NO.	ASSY DASH NO. 01	02	03	04	05	06	07	08	ASSEMBLY DESCRIPTION	REMARKS
1	X								9012/9030 MAIN BD, 3 PHASE	
2		X								
3			X							
4				X						
5					X					
6						X				
7							X			
8								X		

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809907-01	C MAIN BD ASY 9012/9030 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	9809907-01	B MAIN BOARD 9030	A 4	09	EA	1
	REFERENCE DESIG					
01	820-102-01	DIP MICA 1000PF 1% 100V	A 4	13	EA	2
	REFERENCE DESIG	C13,14				
01	820-501-05	DIP MICA 500PF 500V 5%	A 4	14	EA	1
	REFERENCE DESIG	C15				
01	820-391-05	DIP MICA 390PF 500V 5%	A 4	15	EA	1
	REFERENCE DESIG	C12				
01	821-102-00	CAP DISC .001UF 10% 100	A 4	16	EA	2
	REFERENCE DESIG	C9,C10				
01	821-104-CK	.1 DISC 50V CK05BX104K	A 4	17	EA	2
	REFERENCE DESIG	C6,8				
01	823-106-41	10 20V 196D106X0020JA1	A 4	18	EA	3
	REFERENCE DESIG	C1,19,20				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809907-01	C MAIN BD ASY 9012/9030 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	823-336-51	33-25V 196D336X0025PE4	A 4	19	EA	3
	REFERENCE DESIG	C2,3,5				
01	823-474-61	.47-35V 196D474X0035HA1	A 4	20	EA	3
	REFERENCE DESIG	C16,17,18				
01	824-478-01	4700@16V ALUM ELECTROLY	A 4	21	EA	1
	REFERENCE DESIG	C4				
01	828-141-15	CAP VAR 14-115PF GZC121	A 4	22	EA	1
	REFERENCE DESIG	C11				
01	843-474-4A	1N4744A 1W 15V ZENER MO	A 4	25	EA	2
	REFERENCE DESIG	CR7,8				
01	845-400-4X	1N4004	A 4	27	EA	4
	REFERENCE DESIG	CR3,4,30,31				
01	844-914-XX	1N914	A 4	28	EA	25
	REFERENCE DESIG	CR1,2,5,6,10-29,32				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809907-01	C MAIN BD ASY 9012/9030 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-DIP-16	DIP SOCKET 16 PIN	A 4	36	EA	1
	REFERENCE DESIG	J2				
01	861-6MG-3A	RELAY REED 3FORM A 6VDC	A 4	38	EA	1
	REFERENCE DESIG	K1				
01	833-MP8-HI	TRANSISTOR DARLINGTON H	A 4	39	EA	1
	REFERENCE DESIG	Q11				
01	832-P29-07	P PN2907 40V AM/SW T	A 4	40	EA	2
	REFERENCE DESIG	Q7,10				
01	835-364-3P	N PN3643 30V HF/AM TO92	A 4	41	EA	2
	REFERENCE DESIG	Q8,9				
01	842-SD2-13	N SD213DE 30V MOSFT T7	A 4	42	EA	2
	REFERENCE DESIG	Q5,6				
01	801-101-05	100 OHM 1/4 WATT 2% M F	A 4	43	EA	4
	REFERENCE DESIG	R1,60,72,80				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809907-01	C MAIN BD ASY 9012/9030 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	801-102-05	1 K OHM 1/4 WATT 2% M F	A 4	44	EA	6
	REFERENCE DESIG	R13,16,45,73,74,75				
01	801-103-05	10 K OHM 1/4 WATT 2% M	A 4	46	EA	11
	REFERENCE DESIG	R4,17,26,27,42,44,46,51,90-92				
01	801-105-05	1 M OHM 1/4 WATT 2% M F	A 4	48	EA	2
	REFERENCE DESIG	R18,24				
01	801-153-05	15 K OHM 1/4 WATT 2% M	A 4	49	EA	3
	REFERENCE DESIG	R55,57,58				
01	801-241-05	240 OHM 1/4 WATT 2% M F	A 4	50	EA	1
	REFERENCE DESIG	R47				
01	801-3R9-05	RES 1/4W 3.90HM 5%	A 4	51	EA	2
	REFERENCE DESIG	R2,3				
01	801-332-05	3.3 K OHM 1/4 WATT 2% M	A 4	52	EA	3
	REFERENCE DESIG	R56,59,61				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809907-01	C MAIN BD ASY 9012/9030 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	801-333-05	33 K OHM 1/4 WATT 2% M	A 4	53	EA	3
	REFERENCE DESIG	R21,35,40				
01	801-472-05	4.7 K OHM 1/4 WATT 2% M	A 4	54	EA	1
	REFERENCE DESIG	R43				
01	801-514-05	510 K OHM 1/4 WATT 2% M	A 4	55	EA	5
	REFERENCE DESIG	R36,37,66,68,70				
01	802-332-05	3.3 K OHM 1/2 WATT 2% M	A 4	56	EA	2
	REFERENCE DESIG	R8,9				
01	813-475-1F	1/8W 1% 4.75KR RN60C475	A 4	57	EA	1
	REFERENCE DESIG	R14				
01	813-499-1F	1/8W 1% 4.99K RN60C4991	A 4	58	EA	3
	REFERENCE DESIG	R12,22,23				
01	813-249-1F	1/8W 1% 2.49K RN60C2491	A 4	59	EA	3
	REFERENCE DESIG	R30,33,53				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809907-01	C MAIN BD ASY 9012/9030 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	813-976-1F	1/8W 1% 9.76K RN60C9761	A 4	60	EA	3
	REFERENCE DESIG	R79,81,83				
01	814-100-3C	1/8W .25% 100KR RN60C10	A 4	61	EA	2
	REFERENCE DESIG	R41,49				
01	814-500-2C	1/8W .25% 50KR RN60C500	A 4	62	EA	4
	REFERENCE DESIG	R39,48,50,52				
01	814-732-2C	1/8W .25% 73.2KRN60C732	A 4	63	EA	1
	REFERENCE DESIG	R34				
01	801-473-05	47 K OHM 1/4 WATT 2% M	A 4	64	EA	1
	REFERENCE DESIG	R62				
01	818-390-3E	RES MISC 1/2W 1% 390K	A 4	71	EA	6
	REFERENCE DESIG	R84-89				
01	819-102-32	POT 1K 25TURN PC MNT	A 4	73	EA	3
	REFERENCE DESIG	R67,69,71				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809907-01	C MAIN BD ASY 9012/9030 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	819-104-63	63P104 100K SPECTROL TR	A	4	74	EA	5
REFERENCE DESIG		R19,25,63,64,65					
01	819-501-63	63P501 500R SPECTROL TR	A	4	75	EA	6
REFERENCE DESIG		R15,28,32,76,77,78					
01	819-502-64	POT 5K 10T 64W502	A	4	77	EA	3
REFERENCE DESIG		R29,31,54					
01	850-ST5-16	ST5-16 PCB XFMR SIGNAL	A	4	82	EA	1
REFERENCE DESIG		T1					
01	109-956-9B	STNDOFF-SWAGE 1.38"6-32	A	4	86	EA	3
REFERENCE DESIG							
01	849-CLM-51	OPTO-CLM51 PHOTO-MOD	A	4	91	EA	3
REFERENCE DESIG		U1,10,19					
01	849-CA2-5D	PROM-TBP28L22N-COS-LOOK	A	4	92	EA	1
REFERENCE DESIG		U28					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809907-01	C MAIN BD ASY 9012/9030 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-SA2-5D	PROM TBP28L22N SIN-LOOK	A	4	93	EA	1
REFERENCE DESIG		U18					
01	849-H86-XX	HCMOS 74HC86 4X2 XOR	A	4	94	EA	3
REFERENCE DESIG		U4,11,12					
01	849-H40-40	HCMOS 74HC4040 12BITBIN	A	4	95	EA	1
REFERENCE DESIG		U9					
01	849-N50-08	CONV DAC08E 8BIT DAC	A	4	96	EA	2
REFERENCE DESIG		U17,27					
01	849-TL0-72	LIN TL072CP 2XFET-AM	A	4	97	EA	12
REFERENCE DESIG		U2,3,5,7,13,15,16,20,22,23,25,26					
01	818-103-DR	698-3-10KF 10K DIP BECK	A	4	100	EA	5
REFERENCE DESIG		U6,8,14,21,24					

END OF REPORT : :

ASSY PART NO.	TITLE	SHT. 1 OF 10	REV.	ELGAR
5809912-00	PROCESSOR BOARD 9012 PIP	SHT. 10 IS D SIZE	G	

DRAWN	J. WENER	DATE	5-15-85	PROJ. ENG.	DATE 6-21-85
CHECKED		DATE	6-14-85	QA-REL.	DATE

REVISIONS

REV.	ASSY DASH NO. 01	02	03	04	05	06	07	08	DESCRIPTION	DRAFTER	CHECKED	APPROVED	DATE
A	X	X							ENG. RELEASE	CJ			11-26-85
B	X	X							ECN # 6022	MRS			2-21-86
C	X	X							ECN 6163 INCORP	CD			6-17-86
D	X	X							ECN 6305 INCORP HANDWRITTEN PL OBSOLETE	CD			1-22-87
E	X	X							ECN 6368 INCORP	CD			6-25-87
F	X	X							ECN 6941	J. ADESSIO			12-16-88
G	X	X							ECN 7029	KLH			1-24-89

ITEM NO.	ASSY DASH NO. 01	02	03	04	05	06	07	08	ASSEMBLY DESCRIPTION	REMARKS
1	X								PROC. BD. WITHOUT TEST BD OPERATION	
2		X							PROC. BD. WITH TEST BD. OPERATION	
3			X							
4				X						
5					X					
6						X				
7							X			
8								X		

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-01	G PCA PROC W/OTEST 9012 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	828-10X-70	CAP MISC-VAR 8-80PF	A 4	09	EA	1
REFERENCE DESIG	C1					
01	820-220-05	DIP MICA 22PF 500V 5%	A 4	10	EA	1
REFERENCE DESIG	C2					
01	820-470-05	DIP MICA 47PF 500V 5%	A 4	11	EA	1
REFERENCE DESIG	C4					
01	821-104-CK	.1 DISC 50V CK05BX104K	A 4	12	EA	11
REFERENCE DESIG	C3,C5,C10-18					
01	823-106-41	10 20V 196D106X0020JA1	A 4	13	EA	4
REFERENCE DESIG	C6,8,9,20					
01	820-330-05	DIP MICA 33PF 500V 5%	A 4	14	EA	1
REFERENCE DESIG	C7					
01	823-105-61	1-35V 196D105X035JA1	A 4	15	EA	1
REFERENCE DESIG	C19					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-01	G PCA PROC W/OTEST 9012 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-DIP-8X	DIP SOCKET 8 PIN	A 4	17	EA	1
REFERENCE DESIG	XU4					
01	848-LM3-29	LM329CZ DIODE REFERENCE	A 4	18	EA	1
REFERENCE DESIG	CR1					
01	849-DIP-20	DIP SOCKET 20 PIN	A 4	19	EA	11
REFERENCE DESIG	XU7-9,XU11-14,XU22,25,26,28					
01	849-DIP-16	DIP SOCKET 16 PIN	A 4	21	EA	7
REFERENCE DESIG	J4,XU1,2,5,6,23,24					
01	5970007-02	A CABLE ASSY 4" LG	A 4	22	EA	1
REFERENCE DESIG	J7					
01	849-DIP-24	DIP SOCKET 24 PIN	A 4	23	EA	4
REFERENCE DESIG	J6,XU19-21					
01	849-DIP-40	DIP SOCKET 40 PIN	A 4	24	EA	2
REFERENCE DESIG	XU18,27					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-01	G PCA PROC W/OTEST 9012 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-DIP-14	DIP SOCKET 14 PIN	A 4	25	EA	5
	REFERENCE DESIG	XU3,XU15-17,XU29				
01	801-106-05	10 M OHM 1/4 WATT 5%	A 4	26	EA	1
	REFERENCE DESIG	R1				
01	804-150-05	2W 5% 15R RC42GF150	A 4	27	EA	1
	REFERENCE DESIG	R2				
01	813-665-1F	1/8W 1% 6.65KR RN60C665	A 4	28	EA	2
	REFERENCE DESIG	R3,5				
01	813-301-1F	1/8W 1% 3.01K RN60C3011	A 4	29	EA	1
	REFERENCE DESIG	R4				
01	801-333-05	33 K OHM 1/4 WATT 2% M	A 4	30	EA	1
	REFERENCE DESIG	R6				
01	801-512-05	5.1 K OHM 1/4 WATT 2% M	A 4	31	EA	1
	REFERENCE DESIG	R7				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-01	G PCA PROC W/OTEST 9012 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	818-222-SP	RES SIP 9RES 10PIN 2.2K	A 4	33	EA	1
	REFERENCE DESIG	RS1				
01	818-333-SP	RES SIP 9RES 10PIN 2% 3	A 4	34	EA	1
	REFERENCE DESIG	RS2				
01	849-741-67	TTL 74167PC BCD-RATEMU	A 4	37	EA	4
	REFERENCE DESIG	U1,2,5,6				
01	849-H20-XX	CMOS 2X4IN NAND HCMOS	A 4	38	EA	1
	REFERENCE DESIG	U3				
01	849-TL0-72	LIN TL072CP 2XFET-AM	A 4	39	EA	1
	REFERENCE DESIG	U4				
01	849-754-5L	CONV AD7545LN/CQ 12BITD	A 4	40	EA	1
	REFERENCE DESIG	U7				
01	849-7C3-74	CMOS MM74C374N OCTAL-LA	A 4	41	EA	6
	REFERENCE DESIG	U8,9,12,13,22,28				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-01	G PCA PROC W/OTEST 9012 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-H39-0X	CMOS 2XDECADE CTR HCMOS	A 4	42	EA	1
	REFERENCE DESIG U10					
01	849-H24-0X	CMOS 8XINVERTING TRISTA	A 4	43	EA	1
	REFERENCE DESIG U11					
01	849-H37-3X	CMOS OCT LATCH	A 4	45	EA	1
	REFERENCE DESIG U14					
01	849-H00-XX	CMOS 4X2IN-NAND	A 4	46	EA	1
	REFERENCE DESIG U15					
01	849-H74-XX	HCMOS DUAL D FLIP FLOP	A 4	47	EA	1
	REFERENCE DESIG U16					
01	849-H04-XX	CMOS HEX INVERTER HCMOS	A 4	48	EA	1
	REFERENCE DESIG U17					
01	849-680-5E	CMOS MICROPROC	A 4	49	EA	1
	REFERENCE DESIG U18					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-01	G PCA PROC W/OTEST 9012 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-273-2A	EPROM 2732A NO PROG 4KX	A 4	50	EA	1
	REFERENCE DESIG U19					
01	849-611-62	RAM 2KX8 SRAM	A 4	52	EA	1
	REFERENCE DESIG U21					
01	849-H13-8X	CMOS 1 OF 8 DECODER HCM	A 4	53	EA	1
	REFERENCE DESIG U23					
01	849-MEM-EN	PROM MEM DECODE	A 4	54	EA	1
	REFERENCE DESIG U24					
01	849-751-60	MOS GPIB TX/RX 75160	A 4	55	EA	1
	REFERENCE DESIG U26					
01	849-991-4A	MOS GPIA TMS9914A 488	A 4	56	EA	1
	REFERENCE DESIG U27					
01	864-102-4X	XTLMC18A-10.24MHZ 005%	A 4	57	EA	1
	REFERENCE DESIG Y1					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-01	G PCA PROC W/OTEST 9012 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-78L-10	REG UA78L10ACP 10V-T09 A	4	58	EA	1
REFERENCE DESIG	VR1					
01	860-206-5X	206-5 DIP SWITCH5 CTS A	4	59	EA	1
REFERENCE DESIG	SW1					
01	109-A15-70	STANDOFF SWAGE5/8X1/4.1 A	4	60	EA	2
REFERENCE DESIG						
01	849-751-61	MOS GPIB TX/RX 75161 A	4	61	EA	1
REFERENCE DESIG	U25					
01	9809912-01	F PCB PROCESSOR 9012 A	4	62	EA	1
REFERENCE DESIG						
01	849-H02-XX	CMOS CD74HC02E 4X2 NOR A	4	63	EA	1
REFERENCE DESIG	U29					
01	6809912-01	F SCHEM PROCESSOR 9012 A	6	64	EA	1
REFERENCE DESIG						

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-01	G PCA PROC W/OTEST 9012 A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	2809912-01	F A/W PROCESSOR BD 9012 A	6	65	EA	
REFERENCE DESIG						
01	856-243-7X	MALE HEADER 24PIN FLAT A	4	66	EA	1
REFERENCE DESIG	J6A					

END OF REPORT : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-02	G PC ASSY PROC W/TEST A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	828-10X-70	CAP MISC-VAR 8-80PF	A 4	09	EA	1
REFERENCE DESIG	C1					
01	820-220-05	DIP MICA 22PF 500V 5%	A 4	10	EA	1
REFERENCE DESIG	C2					
01	820-470-05	DIP MICA 47PF 500V 5%	A 4	11	EA	1
REFERENCE DESIG	C4					
01	821-104-CK	.1 DISC 50V CK05BX104K	A 4	12	EA	11
REFERENCE DESIG	C3,C5,C10-18					
01	823-106-41	10 20V 196D106X0020JA1	A 4	13	EA	4
REFERENCE DESIG	C6,8,9,20					
01	820-330-05	DIP MICA 33PF 500V 5%	A 4	14	EA	1
REFERENCE DESIG	C7					
01	823-105-61	1-35V 196D105X035JA1	A 4	15	EA	1
REFERENCE DESIG	C19					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-02	G PC ASSY PROC W/TEST A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	820-271-05	DIP MICA 270PF 500V 5%	S 4	16	EA	1
REFERENCE DESIG	C23					
01	849-DIP-8X	DIP SOCKET 8 PIN	A 4	17	EA	1
REFERENCE DESIG	XU14					
01	848-LM3-29	LM329CZ DIODE REFERENCE	A 4	18	EA	1
REFERENCE DESIG	CR1					
01	849-DIP-20	DIP SOCKET 20 PIN	A 4	19	EA	11
REFERENCE DESIG	XU7-9,XU11-14,XU22,XU25,XU26,XU28					
01	5970007-02	A CABLE ASSY 4" LG	A 4	20	EA	
REFERENCE DESIG	REF					
01	849-DIP-16	DIP SOCKET 16 PIN	A 4	21	EA	7
REFERENCE DESIG	J4,XU1,2,5,6,23,24					
01	849-DIP-24	DIP SOCKET 24 PIN	A 4	23	EA	4
REFERENCE DESIG	J6,XU19-21					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-02	8 PC ASSY PROC W/TEST A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-DIP-40	DIP SOCKET 40 PIN	A 4	24	EA	2
	REFERENCE DESIG	XU18,27				
01	849-DIP-14	DIP SOCKET 14 PIN	A 4	25	EA	5
	REFERENCE DESIG	XU3,XU15-17,XU29				
01	801-106-05	10 M OHM 1/4 WATT 5%	A 4	26	EA	1
	REFERENCE DESIG	R1				
01	804-150-05	2W 5% 15R RC42GF150	A 4	27	EA	1
	REFERENCE DESIG	R2				
01	813-665-1F	1/8W 1% 6.65KR RN60C665	A 4	28	EA	2
	REFERENCE DESIG	R3,5				
01	813-301-1F	1/8W 1% 3.01K RN60C3011	A 4	29	EA	1
	REFERENCE DESIG	R4				
01	801-333-05	33 K OHM 1/4 WATT 2% M	A 4	30	EA	1
	REFERENCE DESIG	R6				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-02	G PC ASSY PROC W/TEST A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	801-512-05	5.1 K OHM 1/4 WATT 2% M	A 4	31	EA	1
	REFERENCE DESIG	R7				
01	818-222-SP	RES SIP 9RES 10PIN 2.2K	A 4	33	EA	1
	REFERENCE DESIG	RS1				
01	818-333-SP	RES SIP 9RES 10PIN 2% 3	A 4	34	EA	1
	REFERENCE DESIG	RS2				
01	849-741-67	TTL 74167PC BCD-RATEMU	A 4	37	EA	4
	REFERENCE DESIG	U1,2,5,6				
01	849-H20-XX	CMOS 2X4IN NAND HCMOS	A 4	38	EA	1
	REFERENCE DESIG	U3				
01	849-TL0-72	LIN TL072CP 2XFET-AM	A 4	39	EA	1
	REFERENCE DESIG	U4				
01	849-754-5L	CONV AD7545LN/CQ 12BITD	A 4	40	EA	1
	REFERENCE DESIG	U7				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-02	G PC ASSY PROC W/TEST A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-7C3-74	CMOS MM74C374N OCTAL-LA	A 4	41	EA	6
	REFERENCE DESIG	U8,9,12,13,22,28				
01	849-H39-0X	CMOS 2XDECADE CTR HCMOS	A 4	42	EA	1
	REFERENCE DESIG	U10				
01	849-H24-0X	CMOS 8XINVERTING TRISTA	A 4	43	EA	1
	REFERENCE DESIG	U11				
01	849-H37-3X	CMOS OCT LATCH	A 4	45	EA	1
	REFERENCE DESIG	U14				
01	849-H00-XX	CMOS 4X2IN-NAND	A 4	46	EA	1
	REFERENCE DESIG	U15				
01	849-H74-XX	HCMOS DUAL D FLIP FLOP	A 4	47	EA	1
	REFERENCE DESIG	U16				
01	849-H04-XX	CMOS HEX INVERTER HCMOS	A 4	48	EA	1
	REFERENCE DESIG	U17				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
809912-02	G PC ASSY PROC W/TEST A	EA	10.0	4	

EVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-680-5E	CMOS MICROPROC	A 4	49	EA	1
	REFERENCE DESIG	U18				
01	849-273-2A	EPROM 2732A NO PROG 4KX	A 4	50	EA	1
	REFERENCE DESIG	U19				
01	849-611-62	RAM 2KX8 SRAM	A 4	52	EA	1
	REFERENCE DESIG	U21				
01	849-H13-8X	CMOS 1 OF 8 DECODER HCM	A 4	53	EA	1
	REFERENCE DESIG	U23				
01	849-MEM-EN	PROM MEM DECODE	A 4	54	EA	1
	REFERENCE DESIG	U24				
01	849-344-7X	TTL OCT BUS TR	A 4	55	EA	2
	REFERENCE DESIG	U25,26				
01	849-684-88	MOS 488 GPIA	A 4	56	EA	1
	REFERENCE DESIG	U27				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-02	G PC ASSY PROC W/TEST A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	864-102-4X	XTLMC18A-10.24MHZ 005% A	4	57	EA	1
	REFERENCE DESIG Y1					
01	849-78L-10	REG UA78L10ACP 10V-T09 A	4	58	EA	1
	REFERENCE DESIG					
01	860-206-5X	206-5 DIP SWITCH5 CTS A	4	59	EA	1
	REFERENCE DESIG SW1					
01	109-A15-70	STANDOFF SWAGE5/8X1/4.1 A	4	60	EA	2
	REFERENCE DESIG					
01	9809912-01	F PCB PROCESSOR 9012 A	4	62	EA	1
	REFERENCE DESIG					
01	6809912-01	F SCHEM PROCESSOR 9012 A	6	64	EA	1
	REFERENCE DESIG					
01	2809912-01	F A/W PROCESSOR BD 9012 A	6	65	EA	
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809912-02	G PC ASSY PROC W/TEST A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER

END OF REPORT : :

ASSY PART NO.	TITLE	SHT. 1 OF 4	REV.	ELGAR
5809910-01	DISPLAY BD ASSY 9012	SHT. 4 IS C SIZE	A	

DRAWN CAROL JABASA	DATE 6/5/85	PROJ. ENG	DATE 6-21-85
CHECKED	DATE 6-14-85	QA-REL.	DATE

REVISIONS

REV.	ASSY DASH NO. 01	02	03	04	05	06	07	08	DESCRIPTION	DRAFTER	CHECKED	APPROVED	DATE
A	X								ENG. RELEASE 11-25-85	CJ			11-26-85

ITEM NO.	ASSY DASH NO. 01	02	03	04	05	06	07	08	ASSEMBLY DESCRIPTION	REMARKS
1	X								DISPLAY BD. ASSY 9012	
2		X								
3			X							
4				X						
5					X					
6						X				
7							X			
8								X		

SSY PART NO.	TITLE	REV	SHT.	OF	
580990-01	DISPLAY BD ASSY	A	2	4	ELGAR

ITEM NO.	QUANTITY PER ASSEMBLY 01	02	03	04	05	06	07	08	UNIT OF MEA	PART NUMBER	ITEM DESCRIPTION	REMARKS
9	4								EA	801-102-05	RESISTOR, 5%, 1K, 1/4W	R4, R5, R6, R10
0	1									801-153-05	,15K,	R9
1	1									801-271-05	,270Ω,	R1
2	1									801-472-05	4.7K,	R8
3	2									801-512-05	5.1K,	R2, R3
4	1									801-683-05	RESISTOR, 5%, 68K, 1/4W	R7
5	1									818-103-SP	IC, 10K, SIP	U6
6	1									818-331-DS	,RESISTOR PAC, 330Ω	U1
7	1									849-C40-93	CD4093	U5
8	1									849-145-55	CD4555	U3
9	1									849-298-1X	2981	U4
0	1									849-74S-47	IC, 74LS47	U2
1	4									848-461-0X	DISPLAY	DS1-DS4
2	6									848-655-02	LED	DS5-10
3	1									832-P29-07	XSISTOR, PN 2907, 40V, T92	Q1
4	2									835-364-3X	XSISTOR, 2N3643, 30V	Q2, Q3
5	1									856-262-7X	SOCKET	J1
6	1									860-33A-02	SWITCH	SW1
7	1									823-106-41	CAPACITOR, 10μf, 20V	C1
8	1									823-105-61	CAPACITOR, 1μf 35V	C2
9	4								EA	844-914-XX	DIODE, IN914	CR1-4

ASSY PART NO.	TITLE	REV	SHT.	OF
5809910-01	DISPLAY BD ASSY	A	3	4

ELGAR

ITEM NO.	QUANTITY PER ASSEMBLY 01	02	03	04	05	06	07	08	UNIT OF MEA	PART NUMBER	ITEM DESCRIPTION	REMARKS
30	1								EA	9809910-01	P.C. BOARD	
31	4								EA	849-DIP-14	SOCKETS	XDS1-XDS4
32	6								EA	109-908-08	SPACER, LED	INSTALL UNDER DS5-DS10
33	2								EA	109-302-2X	SPACER, HINGE	
34	2								EA	111CC04-01	WASHER, LK. #4	
35	2								EA	110CH04-04	SCREW, #4-40 X 1/4	
36												
37	REF									2809910-01	ARTWORK	
38	REF									6809910-01	SCHEMATIC	

ASSY PART NO.	TITLE	SHT. 1 OF 12	REV.	ELGAR
5809909-00	TEST BD ASSY	SHT. 12 IS D SIZE	E	

DRAWN C. JABASA	DATE 8/1/85	PROJ. ENG.	DATE 8-8-85
CHECKED	DATE 8-8-85	QA-REL.	DATE

REVISIONS

REV.	ASSY DASH NO. 01	02	03	04	05	06	07	08	DESCRIPTION	DRAFTER	CHECKED	APPROVED	DATE
A	X	X							ENG. REL.	CJD			11-26-85
B	X	X							INCORP. ECN 6104	JW			5-8-86
C	X	X							ECN 6379				7-9-87
D	X	X							ECN 6880 10-21-88	KLH			10-24-88
E	X	X							ECN 6967 11-29-88	KLH			11-29-88

ITEM NO.	ASSY DASH NO. 01	02	03	04	05	06	07	08	ASSEMBLY DESCRIPTION	REMARKS
1	X								TEST BD. ASSY 9012 PIP 1 PH	
2		X							TEST BD ASSY 9012 PIP 2/3 PH	
3			X							
4				X						
5					X					
6						X				
7							X			
8								X		

1001030-01

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-01	E PCB TEST BD 9012 1PH A	EA	0.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	801-123-05	12 K OHM 1/4 WATT 2% M	A 4	09	EA	1
	REFERENCE DESIG	R27				
01	801-222-05	2.2K OHM 1/4 WATT 2% M	A 4	10	EA	1
	REFERENCE DESIG	R26				
01	801-335-05	3.3 M OHM 1/4 WATT 5%	A 4	11	EA	2
	REFERENCE DESIG	R24,41				
01	813-115-2F	1/8W 1% 11.5K RN60C1152	A 4	12	EA	2
	REFERENCE DESIG	R28,29				
01	813-200-1F	1/8W 1% 2KR RN60C2001F	A 4	13	EA	1
	REFERENCE DESIG	R42				
01	813-215-1F	1/8W 1% 2.15KRN60C2151F	A 4	14	EA	1
	REFERENCE DESIG	R5				
01	813-221-2F	1/8W 1% 22.1KR RN60C221	A 4	15	EA	5
	REFERENCE DESIG	R6,45,46,47,48				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-01	E PCB TEST BD 9012 1PH A	EA	0.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	813-105-2F	1/8W 1% 10.5KR RN60C105	S 4	16	EA	1
	REFERENCE DESIG	R25				
01	813-200-2F	1/8W 1% 20KR RN60C2002F	A 4	17	EA	2
	REFERENCE DESIG	R3,51				
01	813-365-1F	1/8W 1% 3.65K RN60C 365	A 4	18	EA	1
	REFERENCE DESIG	R38				
01	813-374-1F	1/8W 1% 3.74KR RN60C374	A 4	19	EA	2
	REFERENCE DESIG	R4,31				
01	813-402-2F	1/8W 1% 40.2K RN60C4022	A 4	20	EA	1
	REFERENCE DESIG	R39				
01	813-576-2F	1/8W 1% 57.6KR RN60C576	A 4	21	EA	1
	REFERENCE DESIG	R1				
01	813-649-1F	1/8W 1% 6.49KR RN60C649	A 4	22	EA	1
	REFERENCE DESIG	R7				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-01	E PCB TEST BD 9012 1PH A	EA	0.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	816-536-3F	RES 536K 1% RN65C	A 4	23	EA	2
	REFERENCE DESIG	R9,14				
01	818-15T-2F	RES 15 OHM 1% 1/4W	A 4	24	EA	1
	REFERENCE DESIG	R33				
01	819-203-99	POT MISC 25TURN 3299W-2	A 4	25	EA	1
	REFERENCE DESIG	R44				
01	819-102-32	POT 1K 25TURN PC MNT	A 4	26	EA	1
	REFERENCE DESIG	R8				
01	819-103-32	POT 10K 1/2S 3255W-1-10	A 4	27	EA	1
	REFERENCE DESIG	R23				
01	819-104-99	POT3296W-1-104 25T 100K	A 4	28	EA	3
	REFERENCE DESIG	R43,49,50				
01	819-202-64	POT 3299W-1-202 25TURN	A 4	29	EA	1
	REFERENCE DESIG	R40				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
809909-01	E PCB TEST BD 9012 1PH A	EA	0.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	819-501-99	POT MISC 25TURN 3299W-5	A 4	30	EA	3
	REFERENCE DESIG	R30,36,37				
01	801-155-05	1.5M OHM 1/4WATT 5% MF	A 4	31	EA	1
	REFERENCE DESIG	R2				
01	849-758-2K	CONV AD7582KN 12BIT SAA	A 4	38	EA	1
	REFERENCE DESIG	U1				
01	849-DG2-01	COMS DG201A 4X1A ANA-SW	A 4	39	EA	2
	REFERENCE DESIG	U5,10				
01	849-VFC-32	CONV VFC32KP V-TO-F CON	A 4	40	EA	1
	REFERENCE DESIG	U14				
01	849-79L-05	REG LM79L05ACZ NEG5V TO	A 4	41	EA	1
	REFERENCE DESIG	VR1				
01	849-340-2A	LIN MC34002A 2XFET-AMP	A 4	42	EA	2
	REFERENCE DESIG	U8,11				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-01	E PCB TEST BD 9012 1PH A	EA	0.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-AD6-32	MULT AD632A ANA MULT	A 4	43	EA	1
	REFERENCE DESIG	U13				
01	849-434-1X	CONV 4341 RMS CONVE	A 4	44	EA	1
	REFERENCE DESIG	U15				
01	849-C40-98	CMOS CD4098BE 4X2IN SCH	A 4	45	EA	1
	REFERENCE DESIG	U3				
01	849-C40-11	CMOS CD4011BE 4X2IN NA	A 4	46	EA	1
	REFERENCE DESIG	U4				
01	849-TL0-72	LIN TL072CP 2XFET-AM	A 4	47	EA	1
	REFERENCE DESIG	U6				
01	849-7C3-74	CMOS MM74C374N OCTAL-LA	A 4	48	EA	1
	REFERENCE DESIG	U2				
01	844-914-XX	1N914	A 4	53	EA	2
	REFERENCE DESIG	CR1,2				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-01	E PCB TEST BD 9012 1PH A	EA	0.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	848-329-BZ	DIO MISC LM329BZ 1MA 6.	A 4	54	EA	1
	REFERENCE DESIG	CR3				
01	822-105-PP	1UF 1% GA2C105F POLYPRO	A 4	57	EA	1
	REFERENCE DESIG	C12				
01	822-824-PP	.82UF GA2C824F POLYPRO	A 4	58	EA	1
	REFERENCE DESIG	C21				
01	822-274-PP	.27UF1% GA2C274F POLYPRO	A 4	59	EA	1
	REFERENCE DESIG	C11				
01	822-222-05	CAP .0022UF 10% 200VFLM	A 4	60	EA	1
	REFERENCE DESIG	C4				
01	822-392-11	.0039 100V 1% BA1B392F	A 4	61	EA	1
	REFERENCE DESIG	C9				
01	823-105-61	1-35V 196D105X035JA1	A 4	62	EA	2
	REFERENCE DESIG	C14,18				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-01	E PCB TEST BD 9012 1PH A	EA	0.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	823-106-41	10 20V 196D106X0020JA1 A	4	63	EA	5
	REFERENCE DESIG	C1,2,7,19,20				
01	820-252-01	DIP MICA 2500PF 1% 500V A	4	64	EA	1
	REFERENCE DESIG	C13				
01	820-561-05	DIP MICA 560PF 500V 5% A	4	65	EA	1
	REFERENCE DESIG	C8				
01	821-103-00	CAP .01 DISC 100V-150V A	4	66	EA	1
	REFERENCE DESIG	C16				
01	821-104-CK	.1 DISC 50V CK05BX104K A	4	67	EA	5
	REFERENCE DESIG	C3,5,6,15,17				
01	822-684-12	CAP-WRPFILL .68 100V 1% A	4	68	EA	1
	REFERENCE DESIG	C10				
01	109-A15-30	STANDOFF SWAGE 5/8X1/4 A	4	71	EA	1
	REFERENCE DESIG					

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
809909-01	E PCB TEST BD 9012 1PH A	EA	0.0	4	

EVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	9950511-02	WIRE, BUS, 16 GA TINNED A	4	72	FT	.2
	REFERENCE DESIG					
01	9809909-01	A PCB-TEST BD PIP9012 A	4	75	EA	1
	REFERENCE DESIG					
01	6809909-01	B SCH TEST BD 9012 A	6	76	EA	
	REFERENCE DESIG					
01	2809909-01	A A/W TEST BD PIP 9012 A	6	77	EA	
	REFERENCE DESIG					
01	856-262-7X	RECPT 26PIN IDC ANSLEY A	4	80	EA	1
	REFERENCE DESIG	J1				
01	856-523-4Z	RECPT 15 PIN MICROSPOX A	4	81	EA	1
	REFERENCE DESIG	J2				
01	849-DIP-28	DIP SOCKET 28 PIN A	4	83	EA	1
	REFERENCE DESIG	FOR U1				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-01	E PCB TEST BD 9012 1PH A	EA	0.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-DIP-16	DIP SOCKET 16 PIN	A 4	84	EA	2
	REFERENCE DESIG	FOR U5,U10				
01	849-DIP-14	DIP SOCKET 14 PIN	A 4	86	EA	1
	REFERENCE DESIG	FOR U15				
01	856-523-0X	PIN-CRIMP TERMINAL	A 4	88	EA	10
	REFERENCE DESIG	FOR J2 MATING				
01	856-523-1X	HOUSING-15 PIN CONN	A 4	89	EA	1
	REFERENCE DESIG	FOR J2 MATING				
01	5970007-02	A CABLE ASSY 4" LG	A 4	90	EA	1
	REFERENCE DESIG					

END OF REPORT : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-02	E PCB TEST BD9012 2/3PH A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	801-123-05	12 K OHM 1/4 WATT 2% M	A 4	09	EA	1
	REFERENCE DESIG	R27				
01	801-222-05	2.2K OHM 1/4 WATT 2% M	A 4	10	EA	1
	REFERENCE DESIG	R26				
01	801-335-05	3.3 M OHM 1/4 WATT 5%	A 4	11	EA	2
	REFERENCE DESIG	R24,41				
01	813-200-1F	1/8W 1% 2KR RN60C2001F	A 4	13	EA	1
	REFERENCE DESIG	R42				
01	813-215-1F	1/8W 1% 2.15KRN60C2151F	A 4	14	EA	1
	REFERENCE DESIG	R5				
01	813-221-2F	1/8W 1% 22.1KR RN60C221	A 4	15	EA	5
	REFERENCE DESIG	R6,45,46,47,48				
01	813-105-2F	1/8W 1% 10.5KR RN60C105	S 4	16	EA	1
	REFERENCE DESIG	R25				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-02	E PCB TEST BD9012 2/3PH A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	813-200-2F	1/8W 1% 20KR RN60C2002F	A 4	17	EA	2
	REFERENCE DESIG	R3,51				
01	813-365-1F	1/8W 1% 3.65K RN60C 365	A 4	18	EA	1
	REFERENCE DESIG	R38				
01	813-402-2F	1/8W 1% 40.2K RN60C4022	A 4	20	EA	1
	REFERENCE DESIG	R39				
01	813-576-2F	1/8W 1% 57.6KR RN60C576	A 4	21	EA	1
	REFERENCE DESIG	R1				
01	813-649-1F	1/8W 1% 6.49KR RN60C649	A 4	22	EA	1
	REFERENCE DESIG	R7				
01	819-203-99	POT MISC 25TURN 3299W-2	A 4	25	EA	1
	REFERENCE DESIG	R44				
01	819-102-32	POT 1K 25TURN PC MNT	A 4	26	EA	1
	REFERENCE DESIG	R8				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-02	E PCB TEST BD9012 2/3PH A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	819-103-32	POT 10K 1/2S 3255W-1-10	A 4	27	EA	1
	REFERENCE DESIG	R23				
01	819-104-99	POT3296W-1-104 25T 100K	A 4	28	EA	3
	REFERENCE DESIG	R43,49,50				
01	819-202-64	POT 3299W-1-202 25TURN	A 4	29	EA	1
	REFERENCE DESIG	R40				
01	819-501-99	POT MISC 25TURN 3299W-5	A 4	30	EA	3
	REFERENCE DESIG	R30,36,37				
01	801-155-05	1.5M OHM 1/4WATT 5% MF	A 4	31	EA	1
	REFERENCE DESIG	R2				
01	813-115-2F	1/8W 1% 11.5K RN60C1152	A 4	32	EA	6
	REFERENCE DESIG	R17,18,20,28,29,32				
01	813-374-1F	1/8W 1% 3.74KR RN60C374	A 4	33	EA	4
	REFERENCE DESIG	R4,19,21,31				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
809909-02	E PCB TEST BD9012 2/3PH A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	816-536-3F	RES 536K 1% RN65C	A 4	34	EA	6
	REFERENCE DESIG	R9,10,11,12,13,14				
01	818-15T-2F	RES 15 OHM 1% 1/4W	A 4	35	EA	3
	REFERENCE DESIG	R33,34,35				
01	819-501-99	POT MISC 25TURN 3299W-5	A 4	36	EA	2
	REFERENCE DESIG	R15,16				
01	849-758-2K	CONV AD7582KN 12BIT SAA	A 4	38	EA	1
	REFERENCE DESIG	U1				
01	849-VFC-32	CONV VFC32KP V-TO-F CON	A 4	40	EA	1
	REFERENCE DESIG	U14				
01	849-79L-05	REG LM79L05ACZ NEG5V TO	A 4	41	EA	1
	REFERENCE DESIG	VR1				
01	849-AD6-32	MULT AD632A ANA MULT	A 4	43	EA	1
	REFERENCE DESIG	U13				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-02	E PCB TEST BD9012 2/3PH A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-434-1X	CONV 4341 RMS CONVE	A 4	44	EA	1
	REFERENCE DESIG	U15				
01	849-C40-98	CMOS CD4098BE 4X2IN SCH	A 4	45	EA	1
	REFERENCE DESIG	U3				
01	849-C40-11	CMOS CD4011BE 4X2IN NA	A 4	46	EA	1
	REFERENCE DESIG	U4				
01	849-TL0-72	LIN TL072CP 2XFET-AM	A 4	47	EA	1
	REFERENCE DESIG	U6				
01	849-7C3-74	CMOS MM74C374N OCTAL-LA	A 4	48	EA	1
	REFERENCE DESIG	U2				
01	849-DG2-01	COMS DG201A 4X1A ANA-SW	A 4	49	EA	3
	REFERENCE DESIG	U5,9,10				
01	849-340-2A	LIN MC34002A 2XFET-AMP	A 4	50	EA	3
	REFERENCE DESIG	U7,8,11				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
809909-02	E PCB TEST BD9012 2/3PH A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	844-914-XX	1N914	A 4	53	EA	2
	REFERENCE DESIG	CR1,2				
01	848-329-BZ	DIO MISC LM329BZ 1MA 6.	A 4	54	EA	1
	REFERENCE DESIG	CR3				
01	822-105-PP	1UF 1% GA2C105F POLYPRO	A 4	57	EA	1
	REFERENCE DESIG	C12				
01	822-824-PP	.82UF GA2C824F POLYPRO	A 4	58	EA	1
	REFERENCE DESIG	C21				
01	822-274-PP	.27UF1% GA2C274F POLYPROA	4	59	EA	1
	REFERENCE DESIG	C11				
01	822-222-05	CAP .0022UF 10% 200VFLM	A 4	60	EA	1
	REFERENCE DESIG	C4				
01	822-392-11	.0039 100V 1% BA1B392F	A 4	61	EA	1
	REFERENCE DESIG	C9				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-02	E PCB TEST BD9012 2/3PH A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	823-105-61	1-35V 196D105X035JA1	A 4	62	EA	2
	REFERENCE DESIG	C14,18				
01	823-106-41	10 20V 196D106X0020JA1	A 4	63	EA	5
	REFERENCE DESIG	C1,2,7,19,20				
01	820-252-01	DIP MICA 2500PF 1% 500V	A 4	64	EA	1
	REFERENCE DESIG	C13				
01	820-561-05	DIP MICA 560PF 500V 5%	A 4	65	EA	1
	REFERENCE DESIG	C8				
01	821-103-00	CAP .01 DISC 100V-150V	A 4	66	EA	1
	REFERENCE DESIG	C16				
01	821-104-CK	.1 DISC 50V CK05BX104K	A 4	67	EA	5
	REFERENCE DESIG	C3,5,6,15,17				
01	822-684-12	CAP-WRPFILL .68 100V 1%	A 4	68	EA	1
	REFERENCE DESIG	C10				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
809909-02	E PCB TEST BD9012 2/3PH A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	109-A15-30	STANDOFF SWAGE 5/8X1/4	A 4	71	EA	1
	REFERENCE DESIG					
01	9950511-02	WIRE, BUS, 16 GA TINNED	A 4	72	FT	.2
	REFERENCE DESIG					
01	9809909-01	A PCB-TEST BD PIP9012	A 4	75	EA	1
	REFERENCE DESIG					
01	6809909-01	B SCH TEST BD 9012	A 6	76	EA	
	REFERENCE DESIG					
01	2809909-01	A A/W TEST BD PIP 9012	A 6	77	EA	
	REFERENCE DESIG					
01	856-262-7X	RECPT 26PIN IDC ANSLEY	A 4	80	EA	1
	REFERENCE DESIG	J1				
01	856-523-4Z	RECPT 15 PIN MICROSPOX	A 4	81	EA	1
	REFERENCE DESIG	J2				

CONTINUE Y OR N : :

SINGLE LEVEL PARTS LIST

MATERIAL ITEM NO.	DESCRIPTION	UM	LEAD TIME	ITEM TYPE	GROSS REQMT
5809909-02	E PCB TEST BD9012 2/3PH A	EA	10.0	4	

LEVEL	MATERIAL ITEM NO.	DESCRIPTION	ITEM TYPE	SEQ NO.	UM	QTY PER
01	849-DIP-28	DIP SOCKET 28 PIN	A 4	83	EA	1
	REFERENCE DESIG	FOR U1				
01	849-DIP-16	DIP SOCKET 16 PIN	A 4	85	EA	3
	REFERENCE DESIG	FOR U5,9,10				
01	849-DIP-14	DIP SOCKET 14 PIN	A 4	86	EA	1
	REFERENCE DESIG	FOR U15				
01	856-523-0X	PIN-CRIMP TERMINAL	A 4	88	EA	10
	REFERENCE DESIG	FOR J2 MATING				
01	856-523-1X	HOUSING-15 PIN CONN	A 4	89	EA	1
	REFERENCE DESIG	FOR J2 MATING				
01	5970007-02	A CABLE ASSY 4" LG	A 4	90	EA	1
	REFERENCE DESIG					

END OF REPORT : :