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Model 7064 Low-Voltage Scanner Card

Instruction Manual

Contains Operating and Servicing Information

KEITHLEY

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Keithley Instruments, Inc. • 28775 Aurora Road • Cleveland, OH 44139 • 440-248-0400 • Fax: 440-248-6168 • http://www.keithley.com

BELGIUM:	**Keithley Instruments B.V.**	Bergensesteenweg 709 • B-1600 Sint-Pieters-Leeuw • 02/363 00 40 • Fax: 02/363 00 64
CHINA:	**Keithley Instruments China**	Yuan Chen Xin Building, Room 705 • 12 Yumin Road, Dewai, Madian • Beijing 100029 • 8610-62022886 • Fax: 8610-62022892
FRANCE:	**Keithley Instruments Sarl**	B.P. 60 • 3, allée des Garays • 91122 Palaiseau Cédex • 01 64 53 20 20 • Fax: 01 60 11 77 26
GERMANY:	**Keithley Instruments GmbH**	Landsberger Strasse 65 • D-82110 Germering • 089/84 93 07-40 • Fax: 089/84 93 07-34
GREAT BRITAIN:	**Keithley Instruments Ltd**	The Minster • 58 Portman Road • Reading, Berkshire RG30 1EA • 0118-9 57 56 66 • Fax: 0118-9 59 64 69
INDIA:	**Keithley Instruments GmbH**	Flat 2B, WILOCRISSA • 14, Rest House Crescent • Bangalore 560 001 • 91-80-509-1320/21 • Fax: 91-80-509-1322
ITALY:	**Keithley Instruments s.r.l.**	Viale S. Gimignano, 38 • 20146 Milano • 02/48 30 30 08 • Fax: 02/48 30 22 74
NETHERLANDS:	**Keithley Instruments B.V.**	Postbus 559 • 4200 AN Gorinchem • 0183-635333 • Fax: 0183-630821
SWITZERLAND:	**Keithley Instruments SA**	Kriesbachstrasse 4 • 8600 Dübendorf • 01-821 94 44 • Fax: 01-820 30 81
TAIWAN:	**Keithley Instruments Taiwan**	1 Fl. 85 Po Ai Street • Hsinchu, Taiwan, R.O.C. • 886-3572-9077• Fax: 886-3572-9031

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Model 7064 Low-Voltage Scanner Card Instruction Manual

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SPECIFICATIONS

MODEL 7064 LOW VOLTAGE SCANNER CARD

CHANNELS PER CARD: 20
CONTACT CONFIGURATION: 2-pole Form A, common guard connection.
CONNECTOR TYPE: Screw terminal, No. 18 AWG maximum wire size.
RELAY DRIVE CURRENT: 14mA per relay typical.
MAXIMUM SIGNAL LEVEL: 40V, 100mA, 2VA peak (resistive load).
CONTACT LIFE: 10^8 closures (cold switching); 10^6 closures (at maximum signal level).
CONTACT RESISTANCE: <2Ω to rated life.
CONTACT POTENTIAL: <1μV differential voltage, input to output with copper leads (<200nV typical <1 minute after actuation).
WARM UP: 1 hour in mainframe for thermal stability.
ACTUATION TIME: <4ms, exclusive of mainframe.
CHANNEL ISOLATION: $>10^{12}$Ω and <10pF.
INPUT ISOLATION,
Differential: $>10^9$Ω and <75pF.
Common Mode: $>10^9$Ω and <150pF.
COMMON MODE VOLTAGE: <100V peak.
ENVIRONMENT,
Operating: 0° to 50°C, up to 35°C at 70% R.H.
Storage: −25° to 65°C.
DIMENSIONS, WEIGHT: 32mm high × 114mm wide × 272mm long (1¼" × 4½" 10¾"). Net weight 0.54kg (1 lb, 3 oz.).

Specifications subject to change without notice.

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SECTION 1
GENERAL INFORMATION

1.1 INTRODUCTION

The Model 7064 is a 20 channel low-voltage scanner card. The card is designed to introduce a minimum of voltage offset error (less than 1μV differential thermal offset from input to output with copper leads) for sensitive tests such as low-level transducer and thermocouple output switching. Channel switching allows one signal to be switched to as many as 20 channels or 20 channels to one channel. In the latter configuration the channels are switched one at a time.

The Model 7064 works in conjunction with an appropriate scanner mainframe such as the Keithley Model 705 or Model 706. The card is configured as desired then plugged into the mainframe. The mainframe controls channel switching using either the front panel controls or commands over the IEEE-488 bus. With multiple Model 7064 cards and several Model 706 mainframes daisy chained together, up to 1000 channels can be switched.

High channel isolation, $10^{12}\Omega$, minimizes cross channel interference and noise. Expected relay life, greater than 1,000,000 closures, is obtained when signals less than 10V or 10mA are switched (non-inductive load only). However, peak signals up to 40V or 100mA can be switched. Quick disconnect screw terminals facilitate input and output connections to the scanner card.

1.2 WARRANTY INFORMATION

Warranty information is stated on the inside front cover of this manual. If there is a need for service, contact your Keithley representative or authorized repair facility in your area. Check the back cover of this manual for addresses. The service form supplied at the end of the manual should be used to provide the repair facility with adequate information concerning any difficulty.

1.3 MANUAL ADDENDA

Improvements or changes to the manual will be explained on an addendum sheet. Be sure to review any changes before attempting to operate or service the scanner card.

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If an additional instruction manual is required, order the manual package (Keithley Part Number 7064-901-00). The manual package includes an instruction manual and all pertinent addenda.

1.4 SAFETY SYMBOLS AND TERMS

The symbol  denotes that the user should refer to the operating instructions.

The symbol  denotes that high voltage may be present on the terminal(s).

The **WARNING** used in this manual explains dangers that could result in personal injury or death.

The **CAUTION** used in this manual explains hazards that could damage the instrument.

1.5 UNPACKING AND INSPECTION

The Model 7064 is inspected both mechanically and electrically before shipment. Upon receiving the Model 7064, unpack all items from the shipping container and check for any obvious damage that may have occurred during transit. Report any damage to the shipping agent. Retain and use the original packaging materials in case reshipment is necessary. The following items are shipped with all Model 7064 orders:

Model 7064 Scanner Card
Model 7064 Instruction Manual

1.6 SPECIFICATIONS

For detailed specifications, refer to the specifications that precede this section.

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SECTION 2
OPERATION

2.1 INTRODUCTION

This section contains the information necessary to use the Model 7064 with an appropriate Keithley scanner mainframe such as the Model 705 or Model 706. Once the scanner card is configured and placed in the appropriate slot in the mainframe refer to the scanner mainframe's instruction manual for complete operating details. This section is divided into five parts: Safety Precautions, Wiring, Installation, Operation and Switch Terminology.

2.2 SAFETY PRECAUTIONS

1. Inspect all test lead connections for wear or defects such as cracks, exposed wires, etc. Correct any defect found before operating the scanner card with the mainframe.
2. Make sure the scanner mainframe is grounded through a properly earth grounded receptacle before operation.
3. Do not exceed the Model 7064's maximum allowable signal level as defined in the specifications.
4. Turn off all power supplies and discharge any residual power before installing/removing the Model 7064 from the scanner mainframe or any wires from the Model 7064.

2.3 WIRING

Each channel on the Model 7064 consists of a two pole, Form A relay. The Model 7064 switches any one of the 20 channels to one output (or one signal to any of 20 channels). The output terminals are guarded. Cables are routed to the rear of the card and the front is plugged into the scanner mainframe (e.g. Model 705 or Model 706). To configure a card for operation it must have a minimum of two connections:

1. Input
2. Output

Actual wiring is accomplished by way of the barrier strip terminals at the rear of the card. With a contact potential of less than 1μV from input to output, #18 AWG solid copper wires are recommended to minimize the effect of thermal EMFs.

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To most effectively eliminate error voltages produced by leakage currents, the GUARD terminal should be connected to the reference connection on the channel which is most sensitive to error (that is, the one which has the lowest source voltage versus the highest series resistance). For instance, two sources are connected to the Model 7064; one having an equivalent source of 1V with a series resistance of 100kΩ, and the other having a source voltage of .1V with a 1kΩ series resistance. The 100kΩ source resistance will develop 100 times the error voltage as the 1kΩ source resistance. Its source voltage however, is only ten times as large on the 1V/100kΩ channel. The GUARD would therefore be connected to the reference point of this channel.

WARNING

Turn off the mainframe and disconnect all other equipment from the scanner card before installing/removing any wires.

Absolute maximum peak instaneous rating is 40V, 100mA or 2V•A with a resistive load. The load must be nonreactive.

The operating environment is 0°C to 50°C up to 35°C at 70% relative humidity.

CAUTION

Reactances in the system will cause transients during switching. These should not exceed the ratings given in the specifications. If they do, the contact life of the relays will be degraded.

2.3.1 Special Card Handling

Because of the high impedance of the board, special care should be taken in both handling and using to prevent degradation of performance. Handle the board by the edges only and keep the board free of body oils, dirt and contaminants. To clean the board use Freon TMS or TE (or equivalent) and clean cotton swab or soft brush. Care should be taken to ensure that the solvent is not contaminated before using it on the board. After the solvent has been applied blow dry the board with dry nitrogen gas.

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2.4 INSTALLATION

WARNING

Turn off the mainframe and disconnect all other equipment from the scanner card before installing/removing.

Before installing the Model 7064 into the scanner mainframe, it must be wired with the desired configuration. Refer to paragraph 2.3. In general, the scanner card plugs into the appropriate slot in the rear panel of the mainframe. In some mainframes the scanner cards are placed horizontally into the unit. The cards are labeled top or bottom. In other mainframes the cards are placed vertically into the unit and numbered 1-10. Scanner cards are placed in the mainframe with the card edge connector first.

Align the card with the grooves in the slot and insert the card to its full depth. Make sure the card is properly seated into the connector in the mainframe. When the card is fully inserted, the locking tabs should be pushed forward toward the center of the card to lock it in the mainframe.

NOTE

Refer to the mainframe's instruction manual for complete details.

2.4.1 Removal

To remove a scanner card, first turn off the mainframe and disconnect all equipment. Unfasten the locking tabs on the card by pulling the tabs outward. Grasp the end of the card and carefully pull it out of the mainframe.

2.5 OPERATION

Model 7064 operation consists two parts:

1. Wiring the Model 7064 for the desired configuration.
2. Mainframe control of the channels.

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Refer to paragraph 2.3 for complete wiring information. Refer to the scanner mainframe's instruction manual for information concerning channel control. The mainframe must be in the 1-pole mode (Program 6, pole 1) or the matrix mode (Program 6, pole 0) to operate the channels of the Model 7064 card. Refer to Tables 2-1, 2-2, 2-3 and 2-4 for Model 7064 channel assignments as shown on the scanner mainframe. The Model 7064 is designed to operate in the 1-pole mode of the scanner mainframe. It will also operate in the matrix mode, but two crosspoints are required to be accessed to close one 7064 channel.

NOTE

Close one channel at a time when using the Model 7064 with the 705 or 706 mainframes. Otherwise, other channels are closed on the card and show up on the mainframe display. For example: close channels 2 and 5, and channels 1 and 4 also close.

The preceding channel/display assignment is for slot 1 of the Model 706 and the top card of the Model 705. More channels are available when connecting several Model 7064 cards and several mainframes together. The Model 705 has two card slots. Thus, using one Model 705, 40 channels could be configured. With the maximum of five Model 705s daisy chained, 200 channels could be configured.

The Model 706 has 10 card slots. Thus, using one Model 706 200 channels could be constructed. With the maximum of five Model 706s daisy chained, 1000 channels could be configured.

NOTE

Refer to the mainframe's instruction manual for information concerning daisy chain operation.

To configure such a large switching scheme, 50 Model 7064 cards and five Model 706 mainframes are required. Connections between the cards and the mainframe may be accomplished using the following format.

Connect card 1 OUTPUT to card 2 OUTPUT (etc). The channel/mainframe display assignments are shown in Tables 2-2, 2-3 and 2-4.

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Table 2-1. Channel/Mainframe Display

7064 Channel	1-Pole Mode Mainframe Display 706**	705**	*Matrix Mode Mainframe Display 706**		705**	
CH1	001	01	0011	002 3	01 1	02 3
CH2	002	02	0011	001 3	01 1	01 3
CH3	003	03	0021	002 3	02 1	02 3
CH4	004	04	0021	001 3	02 1	01 3
CH5	005	05	0031	002 3	03 1	02 3
CH6	006	06	0031	001 3	03 1	01 3
CH7	007	07	0041	002 3	04 1	02 3
CH8	008	08	0041	001 3	04 1	01 3
CH9	009	09	0051	002 3	05 1	02 3
CH10	010	10	0051	001 3	05 1	01 3
CH11	011	11	0012	002 3	01 2	02 3
CH12	012	12	0012	001 3	01 2	01 3
CH13	013	13	0022	002 3	02 2	02 3
CH14	014	14	0022	001 3	02 2	01 3
CH15	015	15	0032	002 3	03 2	02 3
CH16	016	16	0032	001 3	03 2	01 3
CH17	017	17	0042	002 3	04 2	02 3
CH18	018	18	0042	001 3	04 2	01 3
CH19	019	19	0052	002 3	05 2	02 3
CH20	020	20	0052	001 3	05 2	01 3

*Requires two crosspoints to be accessed for one 7064 channel.
**For slot 1 of mainframe.

For example, to close channel 01, crosspoints 01 1 and 02 3 must be accessed.

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Table 2-2. Model 706 Channel/Display Assignment

Card #	Master	Slave #1	Slave #2	Slave #3	Slave #4
1	001-020	201-220	401-420	601-620	801-820
2	021-040	221-240	421-440	621-640	821-840
3	041-060	241-260	441-460	641-660	841-860
4	061-080	261-280	461-480	661-680	861-880
5	081-100	281-300	481-500	681-700	881-900
6	101-120	301-320	501-520	701-720	901-920
7	121-141	321-340	521-540	721-740	921-940
8	141-160	341-360	541-560	741-760	941-960
9	161-180	361-380	561-580	761-780	961-980
10	181-200	381-400	581-600	781-800	981-1000

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Table 2-3. Model 706 Channel/Display Assignment (Matrix Mode)*

Card#	Master	Slave #1	Slave #2	Slave #3	Slave #4
1	001 1-005 2	051 1-055 2	101 1-105 2	151 1-155 2	201 1-205 2
**odd	002 3	052 3	102 3	152 3	202 3
even	001 3	051 3	101 3	151 3	201 3
2	006 1-010 2	056 1-060 2	106 1-110 2	156 1-160 2	206 1-210 2
odd	007 3	057 3	107 3	157 3	207 3
even	006 3	056 3	106 3	156 3	206 3
3	011 1-015 2	061 1-065 2	111 1-115 2	161 1-165 2	211 1-215 2
odd	012 3	062 3	112 3	162 3	212 3
even	011 3	061 3	111 3	161 3	211 3
4	016 1-020 2	066 1-070 2	116 1-120 2	166 1-170 2	216 1-220 2
odd	017 3	067 3	117 3	167 3	217 3
even	016 3	066 3	116 3	166 3	216 3
5	021 1-025 2	071 1-075 2	121 1-125 2	171 1-175 2	221 1-225 2
odd	022 3	072 3	122 3	172 3	222 3
even	021 3	071 3	121 3	171 3	221 3
6	026 1-030 2	076 1-080 2	126 1-130 2	176 1-180 2	226 1-230 2
odd	027 3	077 3	127 3	177 3	227 3
even	026 3	076 3	126 3	176 3	226 3
7	031 1-035 2	081 1-085 2	131 1-135 2	181 1-185 2	231 1-235 2
odd	032 3	082 3	132 3	182 3	232 3
even	031 3	081 3	131 3	181 3	231 3
8	036 1-040 2	086 1-090 2	136 1-140 2	186 1-190 2	236 1-240 2
odd	037 3	087 3	137 3	187 3	237 3
even	036 3	086 3	136 3	186 3	236 3
9	041 1-045 2	091 1-095 2	141 1-145 2	191 1-195 2	241 1-245 2
odd	042 3	092 3	142 3	192 3	242 3
even	041 3	091 3	141 3	191 3	241 3
10	046 1-050 2	096 1-100 2	146 1-150 2	196 1-200 2	246 1-150 2
odd	047 3	097 3	147 3	197 3	247 3
even	046 3	096 3	146 3	196 3	246 3

*Matrix mode requires two crosspoints to close one channel on 7064.
**Odd and even refer to the odd and even numbered channels.

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Table 2-4. Model 705 Channel/Display Assignment

1-Pole Mode					
Card #	**Master**	**Slave #1**	**Slave #2**	**Slave #3**	**Slave #4**
Top	01-20	41-60	81-100	121-140	161-180
Bottom	21-40	61-80	101-120	141-160	181-200
Matrix Mode					
Top	01 1-05 2	11 1-15 2	21 1-25 2	31 1-35 2	41 1-45 2
**(odd)	02 3	12 3	22 3	32 3	42 3
(even)	01 3	11 3	21 3	31 3	41 3
Bottom	06 1-10 2	16 1-20 2	26 1-30 2	36 1-40 2	46 1-50 2
(odd)	07 3	17 3	27 3	37 3	47 3
(even)	06 3	16 3	26 3	36 3	46 3

*Matrix mode requires two crosspoints to be accessed to close one channel on 7064.

**Odd and even refer to the odd and even numbered channels.

2.6 SWITCHING TERMINOLOGY

Throughout this manual the terminology Form A is used. The term Form A is used in switch terminology and is described as follows:

1. Form A is a single pole normally open (SPNO) switch. Refer to Figure 2-1. A 2-pole switch normally open is classified as a 2 Form A.
2. Form B is similar to Form A except that its contacts are normally closed. Refer to Figure 2-1. A 2-pole switch that is normally closed is classified as a 2 Form B.
3. Form C is shown in Figure 2-1 as a single pole double throw switch. It could also be a multiple switch such as a 2-pole which would be classified as a 2 Form C.

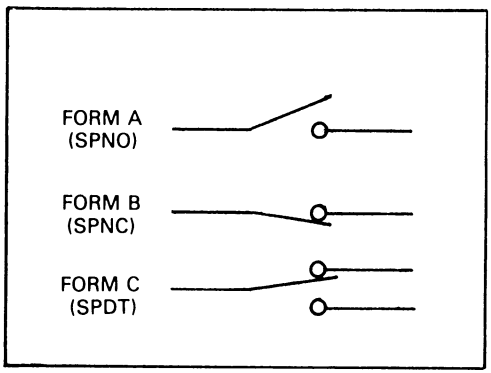


Figure 2-1. Switch Terminology

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SECTION 3
MAINTENANCE

3.1 INTRODUCTION

This section contains a performance verification procedure. Since there are no calibration adjustments, no calibration is necessary. Recommended maintenance includes: inspection of the scanner plug in card and card edge connectors to ensure good electrical contact. In an industrial environment annual cleaning using dry nitrogen gas and Freon TMS or TE is recommended. The verification procedure should be performed every 12 months or at time maintenance is performed on the card.

3.2 REQUIRED TEST EQUIPMENT

Recommended test equipment is given in Table 3-1. Test equipment other than the recommended may be substituted if specifications equal or exceed the stated characteristics.

Table 3-1. Recommended Test Equipment

Item	Description	Specification	Mfg.	Model
A	4 Terminal Ohmmeter	Resolution to 1mΩ	Keithley	195A
B	Scanner Mainframe	—	Keithley	705 or 706
C	Kelvin Test Leads	—	Keithley	1641
D	Microvoltmeter	Zero drift 100nV	Keithley	181
E	Chart Recorder	—	H-P	7035B
F	Low Thermal Cable	—	Keithley	1506
G	Voltage Source	100V	Keithley	230
H	Electrometer	10^{-12}A	Keithley	614 or 617

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3.3 PERFORMANCE VERIFICATION

This section gives procedures to verify operation of the Model 7064 is within specifications. The thermal offset test should be done in a temperature controlled environment of 23°C ±1°C. Other tests may be performed within environmental limits given in the specifications.

3.3.1 Thermal Offset Test

1. The equipment required for this test includes: the Model 7064, scanner mainframe, Model 181 Nanovoltmeter and a chart recorder.
2. Set up the configuration shown in Figure 3-1.
3. Turn on power to the Model 181 and allow at least four hours for warm up. Also, turn on power to the chart recorder.
4. The input of the Model 181 should be shorted with the Model 1506 cable (short the alligator clips). During the warm up time, the analog output of the Model 181 should be connected to the chart recorder and a recording made to establish a baseline for the voltage measurement. Set the analog output of the Model 181 to 1k. Set the Model 181 to the 2mV range and set the chart recorder to 5V full scale.
5. Short the HI and LO terminal of each channel (use clean copper wire). Refer to Figure 3-2. The OUTPUT terminals of the Model 7064 should be connected to short copper wires to facilitate connection of alligator clips from the Model 1506 cable. With the Model 1506 cable attached to the output, the scanner card should be inserted into the scanner mainframe.
6. Turn on power to the mainframe and allow it to warm up along with the rest of the equipment.
7. After warm up time has elapsed and a stable baseline is visible on the chart recorder, move the alligator clip to the test point on the card.
8. Set the scanner mainframe to channel 1, channel mode and the single program mode. The scanner mainframe should now be clocked at a rate of 1 channel every 15 minutes (900 second interval time). The mainframe should go through all 20 channels on the Model 7064 card.
9. Thermal EMF generated in each channel will be visible as a deflection on the baseline recording. The maximum deflection should be no more than ±1μV from the baseline of any channel.

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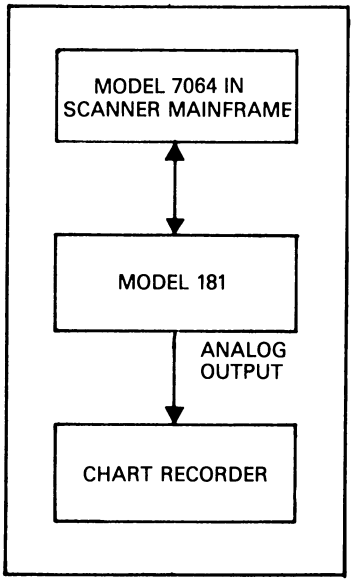


Figure 3-1. Thermal Offset Configuration

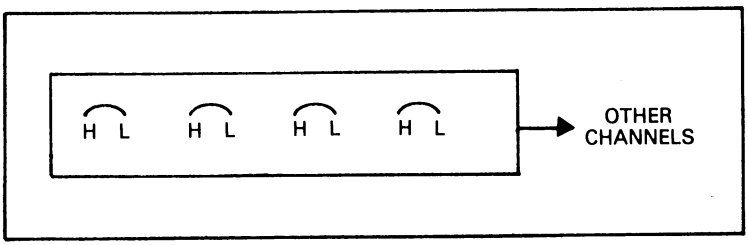


Figure 3-2. Shorting HI and LO on Each Channel

3.3.2 Contact Resistance Test

1. Connect a short piece (1" or less) of copper wire (#18 AWG) to the HI of the input channel to be tested. Connect another piece of copper wire to the HI of the output channel. This makes connection to the Kelvin test leads easier.
2. Zero the Model 195A with the Model 1641 Kelvin test leads shorted together.
3. After the Model 195A is zeroed, connect the leads from the Model 195A to the HI of the channel to be tested and HI of the output channel. Refer to Figure 3-3.

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4. Insert the Model 7064 into the mainframe, apply power and select the channel to which the HI test lead has been connected.
5. Use the mainframe to close the selected channel. The total signal path resistance can now be measured. The reading should be approximately less than 2Ω to life of the relays.
6. Repeat steps 1 through 5 with LO of the same channel.
7. Repeat steps 1 through 6 with the remaining channels on the card.

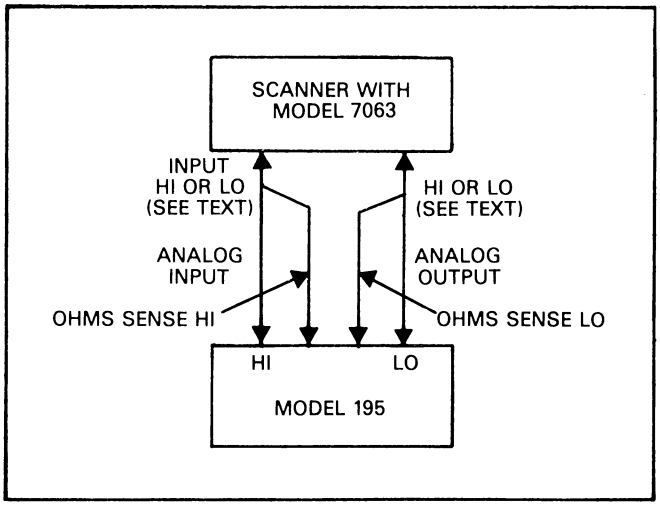


Figure 3-3. Configuration for Contact Resistance Test

3.3.3 Isolation Tests

Channel Isolation (Guarded)

1. This test measures the leakage resistance between two channels on the card. During the test one channel is open and the other is closed. Set up the test configuration shown in Figure 3-4.
2. Short the HI and LO connections of each channel on the Model 7064.
3. Set the mainframe to the channel mode, channel 1 and the step mode. Set electrometer to amps and zero check. Program channel 1 as open and all the other channels as closed. Program the Model 230 to output 100V. Take the electrometer out of zero check.
4. Note the reading on the electrometer. The reading should be less than 1×10^{-10}A. Using Ohm's law calculate the channel isolation. For example: $R = E/I = 100V/10^{-10}\,A = 10^{12}\Omega$. Due to the capacitance of the circuit, the offset current may be high until the capacitance of the circuit is charged. Wait until the readings settle.

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5. Place the Model 230 in the standby mode and set the electrometer to zero.
6. Repeat steps 3, 4 and 5 for each channel on the card.

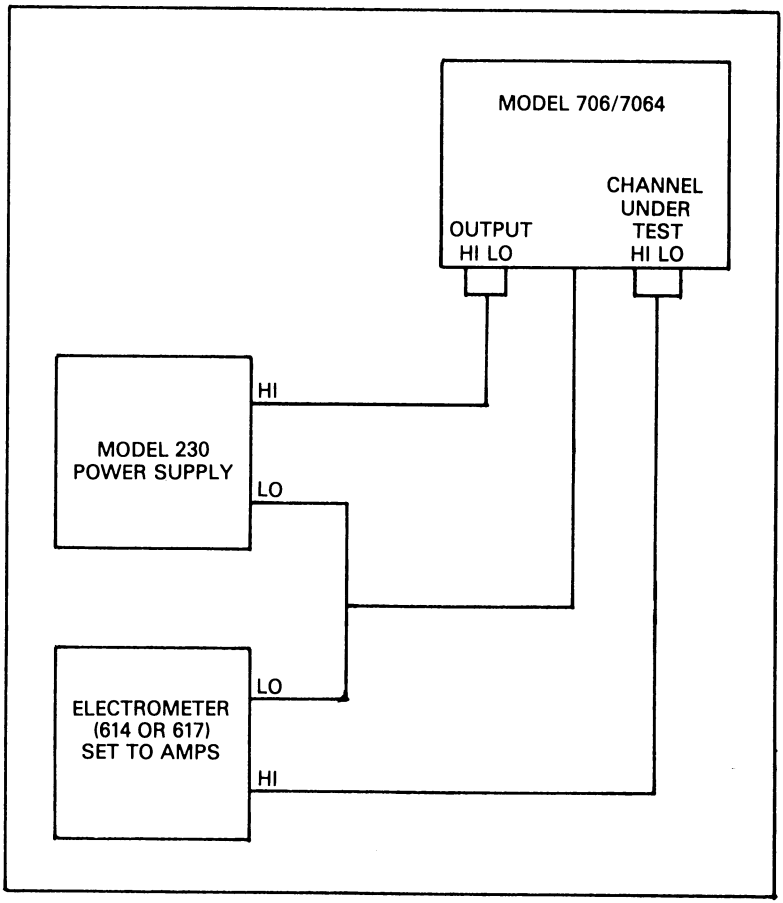


Figure 3-4. Configuration for Channel Isolation

Input Isolation, Differential (Guarded)

1. This test measures the differential input isolation which is the leakage resistance between a guarded channel's HI and LO connections. Set up the configuration in Figure 3-5.
2. Set the mainframe to the channel mode, channel 1 and the step mode. Set the electrometer to amps and zero check. Program the Model 230 to output 100V. Take the electrometer out of zero check.

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3. Note the reading on the electrometer. The reading should be less than 10^{-7}A. Using Ohm's law calculate the isolation (leakage resistance). R = E/I = 100V/10^{-10}A = $10^{12}\Omega$. Due to the capacitance of the circuit the offset may be high until the capacitance is charged. Wait until the readings settle.
4. Place the Model 230 in the standby mode and set the electrometer to zero check.
5. Repeat steps 2, 3 and 4 for each channel on the card.

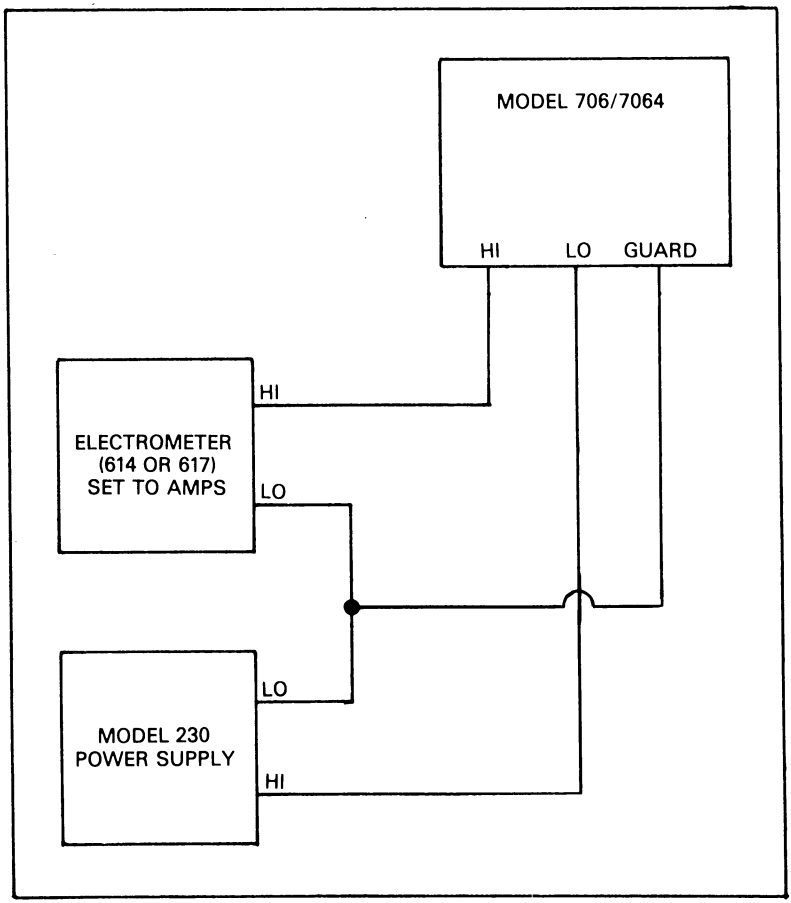


Figure 3-5. Guarded Differential Isolation Configuration

Input Isolation, Common Mode

1. This test measures the leakage resistance between signal lines and guard. Set up the configuration shown in Figure 3-6.

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2. Short the HI and LO terminals of each channel with a short piece of solid copper wire. Do not connect the channels together, just short the HI terminal to the LO terminal.
3. Insert the Model 7064 into the mainframe and set the mainframe to the channel mode, channel 1 and the step mode. Set the electrometer to the zero check mode.
4. Set the electrometer to amps and program the Model 230 to output 100V. Take the electrometer out of zero check.
5. Note the reading on the electrometer. The reading should be less than 10^{-7}A. Using Ohm's law calculate the isolation (leakage resistance). For example: $R = E/I = 100V/10^{-10}A = 10^{12}\Omega$. Due to the capacitance of the circuit, the offset current may be high until the capacitance charges. Wait until the reading settles.
6. Place the Model 230 to the standby mode and set the electrometer to zero check.
7. Repeat steps 3, 4, 5 and 6 for each channel on the card.

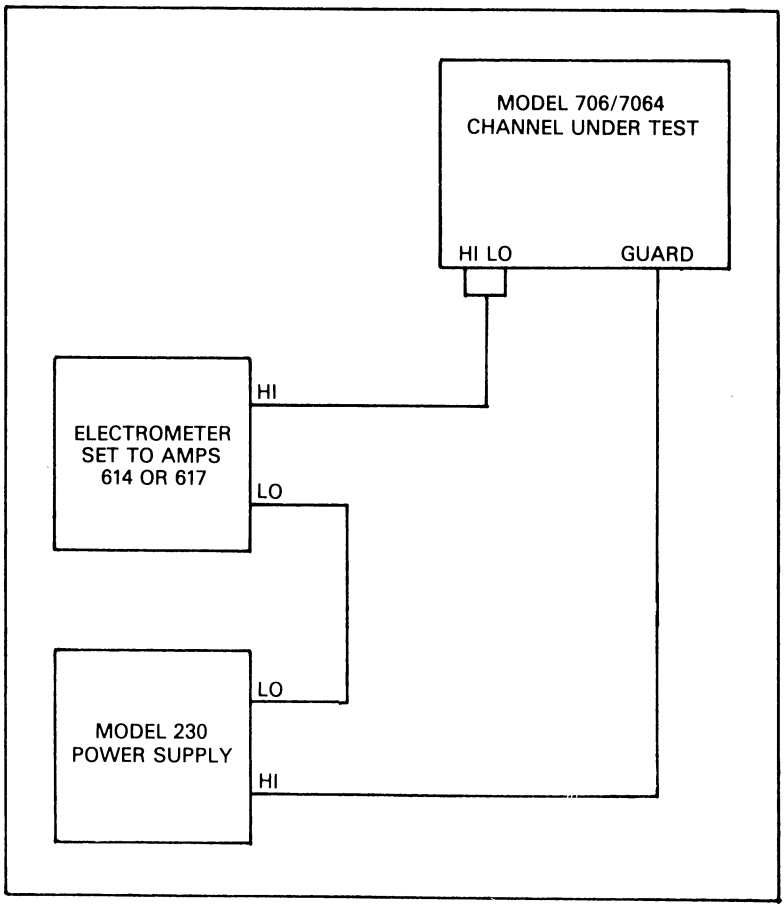


Figure 3-6. Common Mode Isolation Configuration

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SECTION 4
REPLACEABLE PARTS

4.1 INTRODUCTION

This section contains replacement parts information, a schematic diagram and a component layout for the Model 7064.

4.2 REPLACEABLE PARTS

Parts are listed alpha-numerically in order of their circuit designation. Table 4-1 contains parts list information for the Model 7064.

4.3 ORDERING INFORMATION

To place an order, or to obtain information concerning replacement parts, contact your Keithley representative or the factory. See the back cover for addresses. When ordering include the following information:

1. Instrument Model Number
2. Instrument Serial Number
3. Part Description
4. Circuit Description (if applicable)
5. Keithley Part Number

4.4 FACTORY SERVICE

If the instrument is to be returned for service, photo copy and complete the service form which follows this section and return it with the instrument.

4.5 COMPONENT LAYOUT AND SCHEMATIC DIAGRAM

Figure 4-1 contains a component layout of the Model 7064. Figure 4-2 contains a schematic diagram of the Model 7064.

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Table 4-1. Model 7064 Replaceable Parts List

Circuit Desig.	Description	Keithley Part No.
C101	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C102	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C103	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C104	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C105	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C106	Capacitor, 10μF, 24V, Aluminum Electrolytic	C-314-10
C107	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C108	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C109	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C110	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C111	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C112	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C113	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C114	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C115	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C116	Caapacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C117	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C118	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C119	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C120	Capacitor, 10μF, 25V, Aluminum Electrolytic	C-314-10
C121	Capacitor, 0.1μF, 50V, Ceramic	C-365-.1

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Table 4-1. Model 7064 Replaceable Parts List (Cont.)

Circuit Desig.	Description	Keithley Part No.
CR101	Diode, 1N914	RF-28
CR102	Diode, 1N914	RF-28
CR103	Diode, 1N914	RF-28
CR104	Diode, 1N914	RF-28
CR105	Diode, 1N914	RF-28
CR106	Diode, 1N914	RF-28
CR107	Diode, 1N914	RF-28
CR108	Diode, 1N914	RF-28
CR109	Diode, 1N914	RF-28
CR110	Diode, 1N914	RF-28
CR111	Diode, 1N914	RF-28
CR112	Diode, 1N914	RF-28
CR113	Diode, 1N914	RF-28
CR114	Diode, 1N914	RF-28
CR115	Diode, 1N914	RF-28
CR116	Diode, 1N914	RF-28
CR117	Diode, 1N914	RF-28
CR118	Diode, 1N914	RF-28
CR119	Diode, 1N914	RF-28
CR120	Diode, 1N914	RF-28
CR121	Diode, 1N914	RF-28
CR122	Diode, 1N914	RF-28
J1001	Connector, 3 terminal	CS-457-3
J1002	Connector, 3 terminal	CS-457-3
J1003	Connector, 3 terminal	CS-457-3
J1004	Connector, 3 terminal	CS-457-3
J1005	Connector, 3 terminal	CS-457-3
J1006	Connector, 3 terminal	CS-457-3
J1007	Connector, 3 terminal	CS-457-3
J1008	Connector, 3 terminal	CS-457-3
J1009	Connector, 3 terminal	CS-457-3
J1010	Connector, 3 terminal	CS-457-3
J1011	Connector, 3 terminal	CS-457-3
K101	Relay	RL-77
K102	Relay	RL-77
K103	Relay	RL-77
K104	Relay	RL-77
K105	Relay	RL-77
K106	Relay	RL-77
K107	Relay	RL-77

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Table 4-1. Model 7064 Replaceable Parts List (Cont.)

Circuit Desig.	Description	Keithley Part No.
K108	Relay	RL-77
K109	Relay	RL-77
K110	Relay	RL-77
K111	Relay	RL-77
K112	Relay	RL-77
K113	Relay	RL-77
K114	Relay	RL-77
K115	Relay	RL-77
K116	Relay	RL-77
K117	Relay	RL-77
K118	Relay	RL-77
K119	Relay	RL-77
K120	Relay	RL-77
Q101	Transistor, PNP, 2N3906	TG-84
Q102	Transistor, PNP, 2N3906	TG-84
R101	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R102	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R103	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R104	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R105	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R106	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R107	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R108	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R109	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R110	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R111	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R112	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R113	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R114	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R115	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R116	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R117	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R118	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R119	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R120	Resistor, 240Ω, 5%, ¼W, Composition	R-76-240
R121	Resistor, 2k, 5%, ¼W, Composition	R-76-2k
R122	Resistor, 2k, 5%, ¼W, Compostion	R-76-2k
R123	Resistor, 10k, 5%, ¼W, Composition	R-76-10k
R124	Resistor, 10k, 5%, ¼W, Composition	R-76-10k
	Clamp assembly, Upper	7055-303-9
	Clamp assembly, Lower	7055-308
	Handle	FA-119
	Rivet	FA-121

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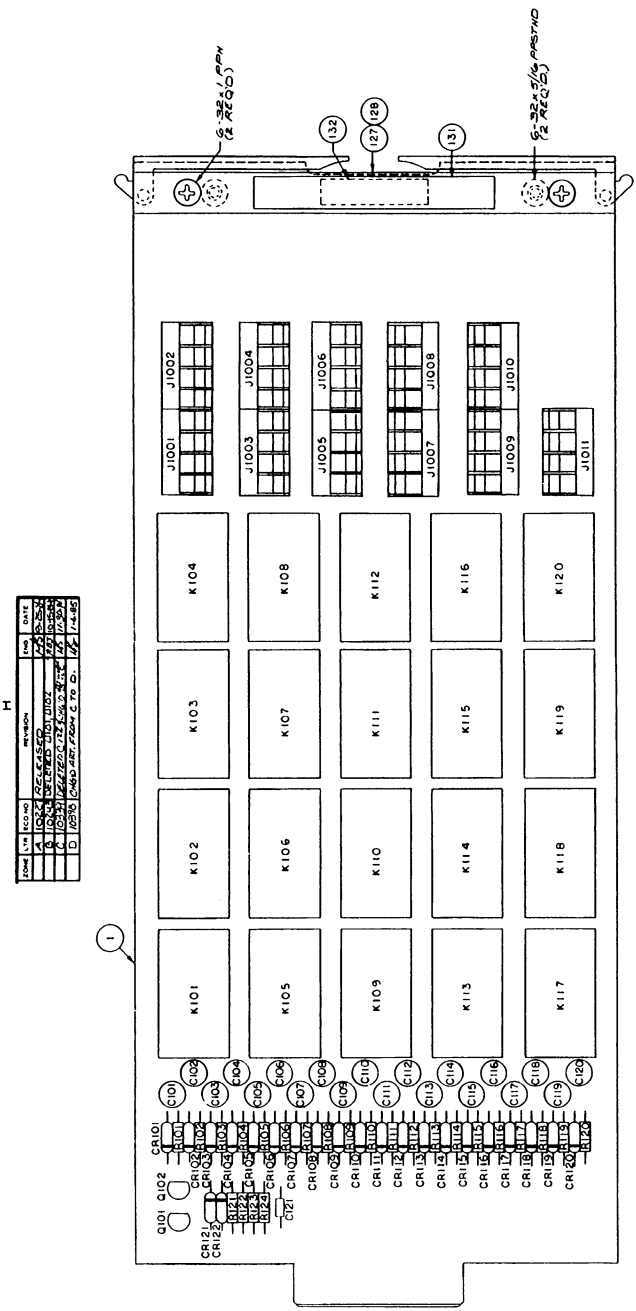


Figure 4-1. Component Layout

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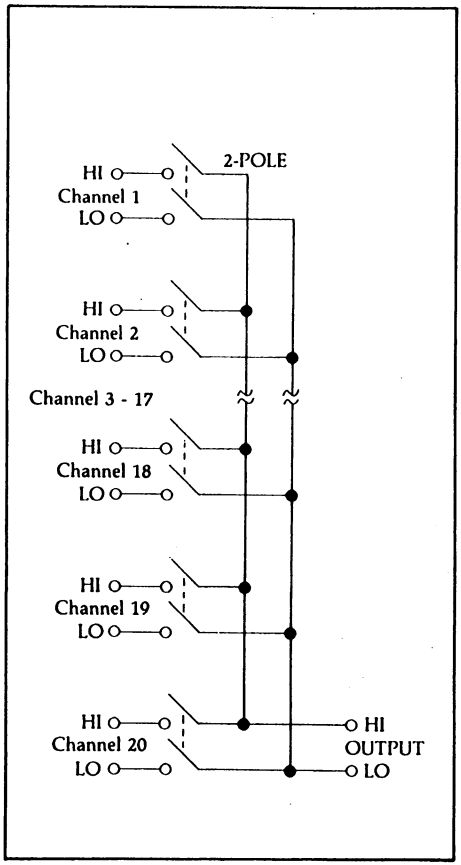


Figure 4-2. Model 7064 Simplified Schematic

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Service Form

Model No. _____ **Serial No.** _____ **Date** _____

Name and Telephone No. _____

Company _____

List all control settings, describe problem and check boxes that apply to problem.

_____

_____

❑ Intermittent
❑ IEEE failure

❑ All ranges or functions are bad
❑ Particular range or function bad; specify

_____

❑ Front panel operational
❑ Analog output follows display
❑ Obvious problem on power-up

❑ Batteries and fuses are OK
❑ Checked all cables

Display or output (check one)

❑ Drifts
❑ Unstable
❑ Overload

❑ Unable to zero
❑ Will not read applied input

❑ Calibration only
❑ Data required

❑ Certificate of calibration required

(attach any additional sheets as necessary)

Show a block diagram of your measurement system including all instruments connected (whether power is turned on or not). Also, describe signal source.

Where is the measurement being performed? (factory, controlled laboratory, out-of-doors, etc.)

_____

_____

What power line voltage is used? _____ Ambient temperature? _____ °F

Relative humidity? _____ Other? _____

Any additional information. (If special modifications have been made by the user, please describe.) _____

_____

_____

Be sure to include your name and phone number on this service form.

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