

## SPECIFICATIONS

### Description

The P6137 is a compact, 1.5 meter 10X, passive voltage probe designed specifically for use with the TEKTRONIX 2400 Series oscilloscopes. It is fully compatible with the Tektronix family of compact probe accessories.

### Electrical Characteristics (Probe installed on 2400 Series Oscilloscopes)

Attenuator: 10X  $\pm 1\%$  at dc.

Input Impedance (System): 10 M $\Omega$  shunted by 10.8 pF at DC. (See Figure 1.)

Compensation Range: 12 pF to 18 pF.

Signal Delay: Delay difference between any two probes of equal length is < 200 ps.

System Bandwidth (-3dB): Use of the P6137 on a 2400 Series oscilloscope with a bandwidth measured to be greater than 350 MHz from a properly terminated 50  $\Omega$  source, and having an input capacitance of 15 pF  $\pm 2$  pF, will result in a system bandwidth of at least 350 MHz. A similar correspondence is achieved for all 2400 Series oscilloscopes of identical input capacitance and different bandwidths up to a system maximum bandwidth of 400 MHz.

Maximum Nondestructive Input Voltage: 500 V (dc + peak ac) to 1.3 MHz. (See Figure 2 for voltage derating curve.)

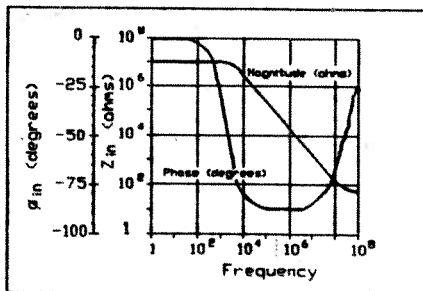


Figure 1. Typical Input Impedance

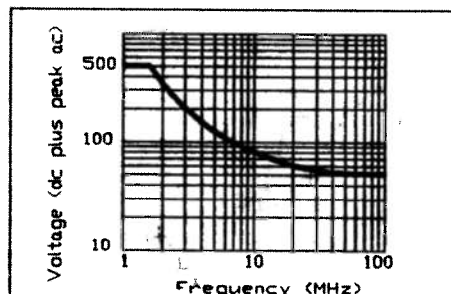


Figure 2. Typical voltage derating versus frequency.

### Environmental Characteristics

Temperature Range (Operating): -15°C to +75°C (+5°F to +167°F).

Temperature Range (Nonoperating): -62°C to +85°C (-80°F to +185°F).

Humidity: Five cycles (120 hr) at 95% to 97% relative humidity. Per Tek Standard 062-2847-00, Class 3. Ref to MIL-E-16400F, paragraph 4.5.9 through 4.5.9.5.1, Class 4.

### Physical Characteristics

Net Weight (Includes Assessoris): 168 g (6oz).

Probe Cable Length: 1.5m ( $\approx$  5ft).

### Safety

To avoid explosion do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

This product meets the requirements of UL 1244.

First Printing MARCH 1988

Revised FEB 1990

Copyright© 1985, Tektronix, Inc. All rights reserved.

INSTRUCTION  
SHEET  
NO. 070-6432-00  
PRODUCT GROUP 60

TEK

PROBE  
AND ACCESSORIES

P6137

10x PASSIVE PROBE

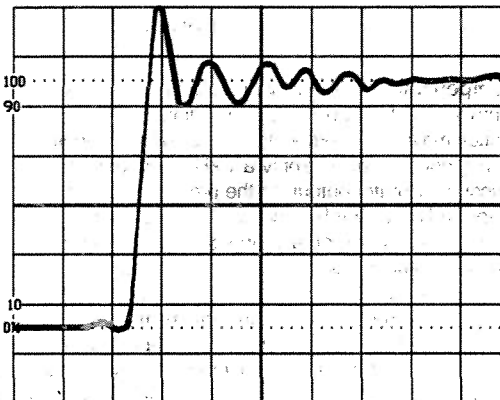
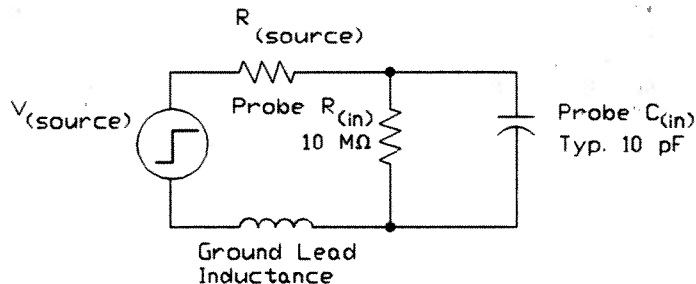
FOR 2400 SERIES OSCILLOSCOPES

**Tektronix**  
COMMITTED TO EXCELLENCE

## OPERATING CONSIDERATIONS

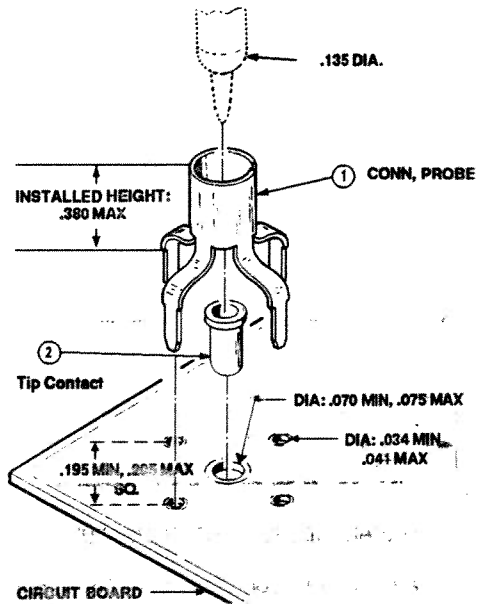
**Probe Compensation.** Due to variations in oscilloscope input characteristics, probe low-frequency compensation should be checked and adjusted after moving the probe from one input to another. To adjust low-frequency compensation, apply a 1 kHz square-wave signal (such as an oscilloscope calibrator output) to the probe tip. Using a low-reactance alignment tool, adjust the probe's compensation capacitor through the hole in the compensation box to obtain the squarest waveform at front corner.

### ADVERSE EFFECTS OF GROUND LEAD INDUCTANCE

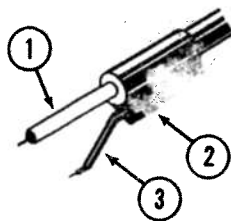


Typical response with a 3-inch ground lead,  $T_r = 2$  ns.

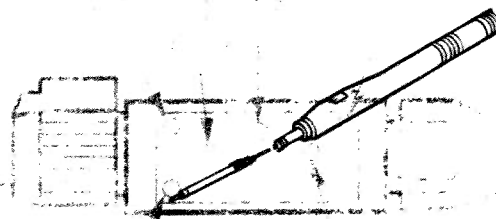
Ground Lead inductance can significantly reduce the performance of a probe. As shown in the model above, the ground lead inserts a series inductance into the signal path forming a series-resonant circuit between  $C_{in}$  of the probe and ground lead  $L$ , with only  $R_{source}$  as damping. This forms a resonant circuit with  $f_0 = 1 / (2\pi \sqrt{LC})$ . A three-inch ground lead has  $\approx 70$  nH of inductance causing an  $f_0$  of  $\approx 180$  MHz, which is within the midfrequency response of the instrument. This greatly degrades risetime, bandwidth, and transient accuracy (see illustration). For best results, make sure that the ground lead inductance is at a minimum. Two methods for doing so are described below, the ECB-to-probe tip adapter, and the low inductance ground lead.



ECB to Probe-Tip Adapters provide high quality connection test points when installed on circuit boards. The ribbed-plastic tip cover on the probe must be removed. The probe will then plug into the test point directly. Adapters are available in packages of 100, 131-4244-00 (see "Replaceable Parts").



The Low-Inductance Lead provided with all Tek P6137 probes allow for a substantial reduction or ground-lead  $L$  ( $\approx 32$  nH instead of 70 nH). Remove the ribbed plastic tip cover (1), install the ground collet (2), so that the socket is pointing toward the probe tip. Reinstall the ribbed cover. Insert the Low-Inductance Lead (3), from the accessory pack, into the ground socket.



The Compact Probe Tip Assembly can be replaced by unscrewing the old probe tip assembly from the probe head/cable assembly and screwing the new probe tip assembly into the probe head/cable assembly.

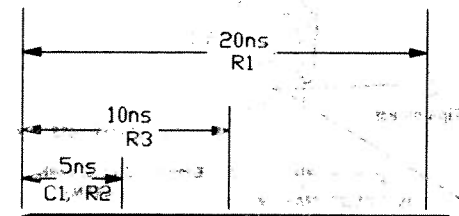
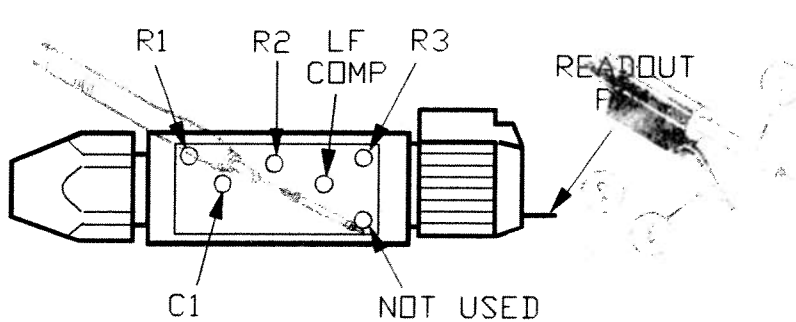
# PROBE ADJUSTMENT / MAINTENANCE

## WARNING

The following servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any probe maintenance while the probe is connected to a signal source.

**Probe Compensation.** Due to variations in oscilloscope input characteristics, probe low-frequency compensation should be checked and adjusted after moving the probe from one input to another. To adjust low-frequency compensation, apply a 1 kHz square-wave signal (such as an oscilloscope calibrator output) to the probe tip. Using a low-reactance alignment tool, adjust the probe's compensation capacitor through the hole in the compensation box to obtain the squarest waveform at front corner. High-frequency compensation seldom requires adjustment. However, if the probe has excessive high-frequency aberrations or insufficient bandwidth, high-frequency adjustments can be made through holes in the compensation box inner shield (the outer plastic cover must first be removed, see Probe Module Replacement). Typical test equipment required includes a Tektronix PG506 pulse generator ( $\leq 1$ -ns) & Tunnel Diode Pulser (Tek Part Number 067-0681-01) with pulse risetime  $\leq 125$  psec. terminated with a 50  $\Omega$  terminated BNC-to-compact probe tip adapter (such as Tektronix Part No. 013-0227-00). Refer to the illustrations below for additional information on compensation procedures.

**Cleaning.** Accumulated dirt can be removed with a soft cloth dampened with a nonresidue type cleaner, preferably isopropyl alcohol. Before using any other type of cleaner, consult your Tektronix Service Center or representative. In particular, avoid benzene, toluene, xylene, acetone, or similar solvents.



COMPENSATION BOX

### TYPICAL ADJUSTMENT PROCEDURE:

1. Adjust LF Compensation for squarest waveform at front corner.
2. Adjust R1 and R3 for best long-term flatness.
3. Adjust R2 and C1 for flatness.
4. Readjust R1 (or R2, R3 and C1) if needed because of interaction.

5ns/div

# Compensation Box/Cable Assembly Replacement

## NOTE

Probe adjustment may be necessary after assembly replacement. (See "Adjustment Procedure").

The probe tip assembly, compensation box, and cable are available as separate units through your local Tektronix Field Office or representative. Individual components within the compensation box are not replaceable.

## Compensation Box/Cable Assembly Disassembly and Replacement

Use the following procedure to disassemble and replace the compensation box or the cable assembly (refer to Figure 1 for parts nomenclature).

- Loosen the cable-retainer nut and pull it back onto the cable assembly.
- Use the adjustment tool included in the accessory pack to remove the top and bottom plastic covers. Insert the adjustment tool into the side of the compensation box and pry upward and outward.
- Pry off the BNC connector shell with a wide-blade screwdriver. **GENTLY** pry the BNC shell away from the compensation box.

### Note

A new BNC shell comes with the replacement cable/compensation box assemblies.

- Remove the retainer spring.
- Lift the top half of the compensation box off.
- Remove the cable assembly.

### Note

If you are replacing the cable assembly, you need to use the cable-retainer nut from your old cable assembly.

- Use a new cable or a new compensation box, and snap the cable assembly into place in the bottom half of the compensation box.
- Place the top half of the compensation box onto the lower half, slide the cable-nut up and tighten.
- Replace the retainer spring. Press the new BNC shell onto the compensation box making sure the identification pin goes through the oval slot in the shell. (See Figure 1.)
- Snap the plastic covers back in place.

## Compact Probe Tip Assembly Replacement

Unscrew the old probe tip assembly from the probe head/cable assembly. Screw the new probe tip assembly into the probe head/cable assembly.

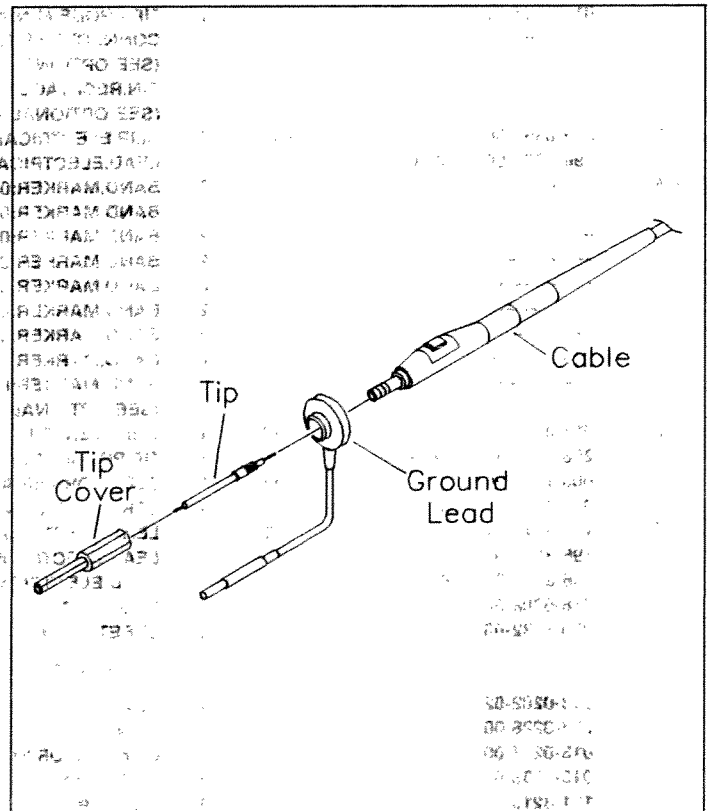
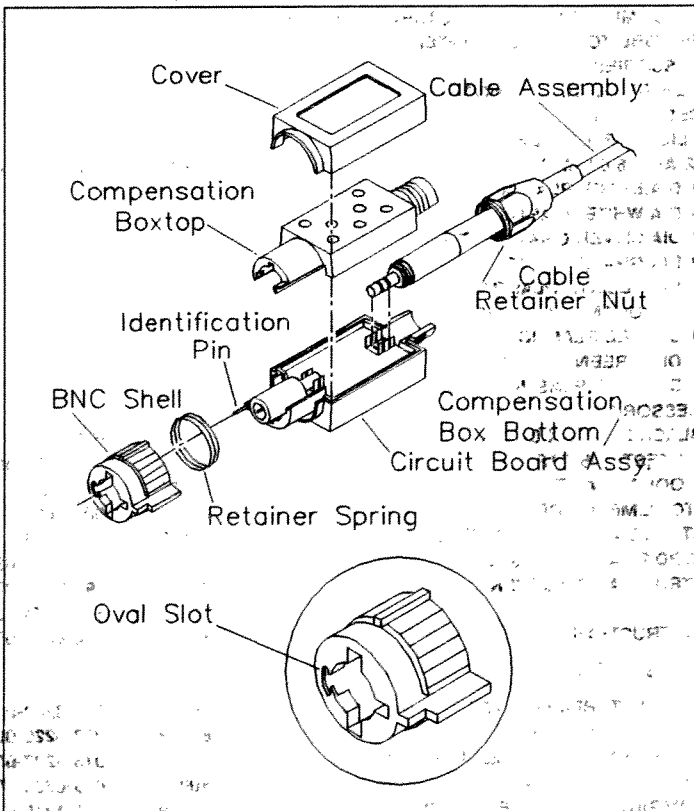


Figure 1. Compensation Box/Cable Assembly Replacement.

Figure 2. Probe Tip Assembly Replacement.

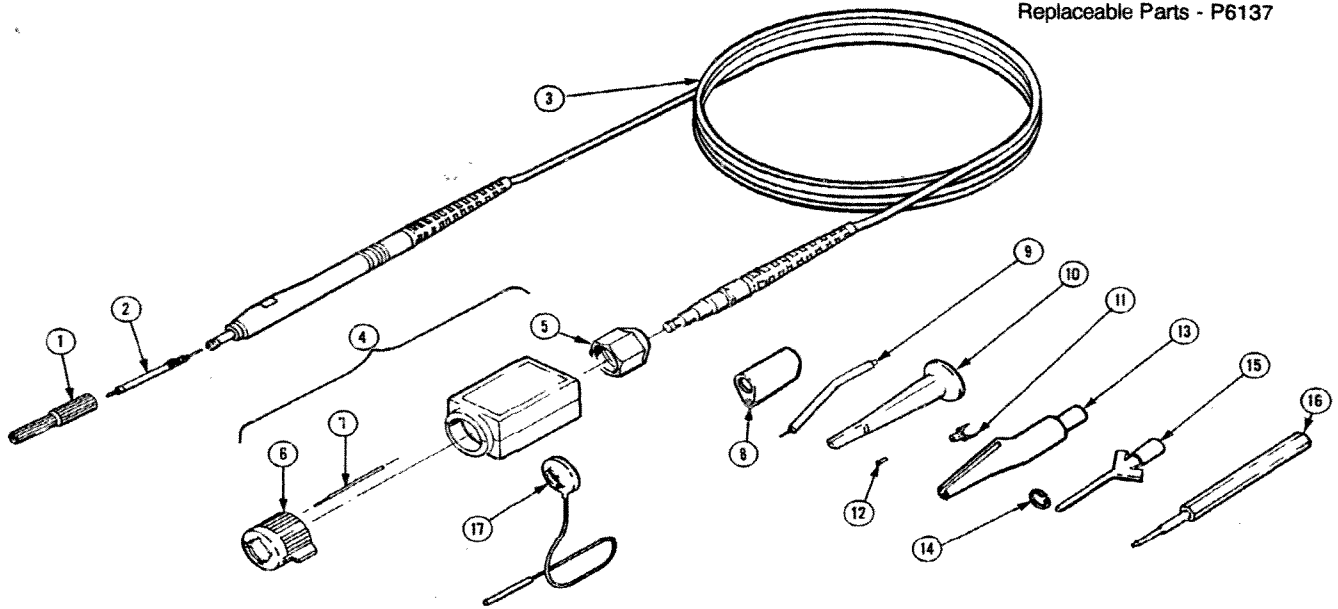


Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	No. Dscont	Mfr. Qty	12345 Name & Description	Code	Mfr. Part No.
3-1	204-1049-00			1	BODY SHELL,TIP COVER	80009	204-1049-00
-2	206-0378-00			1	PROBE TIP ASSY:10X,11.8PF,9M OHM	80009	206-0378-00
-3	174-1081-01		8829	1	CABLE ASSY,RF:50 OHM COAX,1.5M	80009	174-1081-01
	174-1081-03	8830	8908	1	CABLE ASSY,RF:50 OHM COAX,1.5M L,W/CONN	80009	174-1081-03
	174-1081-04	8909		1	CABLE ASSY,RF:50 OHM COAX,1.5M L,W/CONN SHELL	80009	174-1081-04
-4	206-0389-00		8908	1	COMP BOX ASSY:1.5 METER,P6137	80009	206-0389-00
	206-0389-01	8909		1	COMP BOX ASSY:1.5 METER,P6137	80009	206-0389-01
-5	220-0099-00			1	.NUT,RETAINER:CABLE/COMP BOX	80009	220-0099-00
-6	205-0192-00		8908	1	.SHELL,ELEC CONN:BNC,ACETAL,DOVE GRAY	80009	205-0192-00
	205-0192-01	8909		1	.SHELL,ELEC CONN:BNC,ACETAL,DOVE GRAY	80009	205-0192-01
-7	131-4446-01		8829	1	.CONTACT,ELEC:W/INSULATION	80009	131-4446-01
	131-3685-01	8830		1	.CONTACT,ELEC:SPRING TIP,GOLD PLATED	80009	131-3685-01
-8	343-1003-01			1	COLLAR,GND:	80009	343-1003-01
<b>STANDARD ACCESSORIES</b>							
-9	195-4240-00			1	LEAD,ELECTRICAL:0.025 DIA,COPPER,2.3 L	80009	195-4240-00
-10	013-0107-06			1	TIP,PROBE:MINIATURE/COMPACT SIZE,RETRACTABLE HOOK ASSY	80009	013-0107-06
-11	-----			2	CONNECTOR,PROBE:PROBE TO CKT BD ADAPTER (SEE OPTIONAL ACCESSORIES)		
-12	-----			2	PIN,RECPTACLE:PROBE TIP TO CIRCUIT BOARD (SEE OPTIONAL ACCESSORIES)		
-13	344-0398-00		8935	1	CLIP,ELECTRICAL:ALLIGATOR,0.155 L,STL CS PL	80009	344-0398-00
	196-3305-00	8936		1	LEAD,ELECTRICAL:22 AWG,6.0 L,W/CLIP	80009	196-3305-00
-14	-----			2	BAND,MARKER:0.371 DIA,BLACK,PLASTIC		
	-----			2	BAND,MARKER:0.371 DIA,WHITE,PLASTIC		
	-----			2	BAND,MARKER:0.371 DIA,SILVER GRAY,PLASTIC		
	-----			2	BAND,MARKER:0.371 DIA,GRAY,PLASTIC		
	-----			2	BAND,MARKER:0.371 DIA,YELLOW,PLASTIC		
	-----			2	BAND,MARKER:0.371 DIA,ORANGE,PLASTIC		
	-----			2	BAND,MARKER:0.371 DIA,RED,PLASTIC		
	-----			2	BAND,MARKER:0.371 DIA,GREEN,PLASTIC		
	-----			2	BAND,MARKER:0.371 DIA,BLUE,PLASTIC (SEE OPTIONAL ACCESSORIES)		
-15	013-0217-00		8820	1	GRABBER,IC LEAD:BLACK,2.047 L X 0.137 DIA	TK1473	973 592 500
	206-0364-00	8821		1	TIP,PROBE:MICROCKT TEST,0.05 CTR	80009	206-0364-00
-16	003-1417-00		8844	1	SCREWDRIVER:ADJ TOOL,METAL TIP	52769	GTT-5G
	003-1433-00	8845		1	SCREWDRIVER:ADJ TOOL,METAL TIP	30009	003-1433-00
-17	196-3113-01		8831	1	LEAD,ELECTRICAL:STRD,26 AWG,3.0 L,0-N W/CLR	80009	196-3113-01
	196-3113-03	8832	8935	1	LEAD,ELECTRICAL:STRD,22 AWG,3.0 L,8-N	80009	196-3113-03
	196-3113-02	8936		1	LEAD,ELECTRICAL:STRD,22 AWG,3.0 L,8-N	80009	196-3113-02
	016-0708-00			1	POUCH,ACCESSORY:	TK1556	ZIP-6.25X9.25ID
	070-6432-00			1	SHEET,TECHNICAL:INSTRUCTION	80009	070-6432-00
<b>OPTIONAL ACCESSORIES</b>							
	013-0202-02			1	ADAPTER,PROBE:SUBMINIATURE/COMPACT TO MIN	80009	013-0202-02
	013-0226-00			1	CONNECTOR,BNC:BNC TO PROBE TIP ADAPTER	80009	013-0226-00
	013-0227-00			1	CONNECTOR,BNC:50 OHM,BNC TO PROBE TIP ADAPTER	80009	013-0227-00
	016-0633-00			1	MARKER SET,CA:2 EA VARIOUS COLORS	80009	016-0633-00
	131-4210-00			1	ADPTR,PROBE TIP:COMPACT TIP SIZE,TEST JACK	80009	131-4210-00
	131-5031-00	8926		1	CONNECTOR,PROBE:PKG OF 25,COMPACT	80009	131-5031-00
	131-4244-00			1	CONN,PROBE:PKG OF 100 EACH	80009	131-4244-00
	196-3113-00		8831	1	LEAD,ELECTRICAL:STRD,26 AWG,6.0 L,0-N W/CLR	80009	196-3113-00
	196-3113-02	8832		1	LEAD,ELECTRICAL:STRD,22 AWG,6.0 L,8-N	80009	196-3113-02
	003-1433-01	8845		1	SCREWDRIVER:ADJ TOOL,PKG OF 5	80009	003-1433-01

**CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER**

Mfr Code	Manufacturer	Address	City, State, Zip Code
52769 80009	SPRAGUE-GOODMAN ELECTRONICS INC TEKTRONIX INC	134 FULTON AVE 14150 SW KARL BRAUN DR PO BOX 500 MS 53-111 PO BOX 229/INDUSTRIAL ROW	GARDEN CITY PARK NY 11040-5352 BEAVERTON OR 97707-0001
TK1473 TK1556	RICHARD HIRSCMANN OF AMERICA CONSOLIDATED VINYL SALES	PO BOX 229/INDUSTRIAL ROW 1237 S SAN GABRIEL BLVD	RIVERDALE NJ 07457 SAN GABRIEL CA 91776

MANUFACTURER TO NUMBER