

## SPECIFICATIONS

### Description

The P6511 is a 10X, dc-to-300 MHz probe designed for placement into a bed-of-nails fixture or other fixtured applications. The probe is designed for low circuit loading and high bandwidth signal acquisition. The probe geometry permits mounting on standard 100-mil centers.

### Electrical Characteristics

Attenuation:  $10X \pm 1\%$  at dc. (Probe terminated by  $50\Omega \pm 0.5\%$ .)

Input Capacitance:  $\leq 3.8$  pF.

Input Resistance:  $1M\Omega \pm 1\%$ .

Low-Frequency Compensation: Fixed, flat  $\pm 3\%$ .

Propagation Delay:  $3.8$  ns  $\pm 100$  ps. (Probe tip to end of cable.)

System Bandwidth ( $-3$  dB): DC to 300 MHz. (Instrument risetime  $\leq 100$  ps.)

System Risetime: 1.17 ns. (Instrument risetime  $\leq 100$  ps.)

Probe Aberrations:  $\leq \pm 6\%$ , 8% p-p in the first 4 ns;  $\leq \pm 2\%$ , 3% p-p after 4 ns.

Output Zero:  $\leq \pm 2$  mV.

DC Thermal Drift:  $\leq 50$   $\mu$ V/C.

Input Linear Dynamic Range: -15 V to +15 V.

Maximum Nondestructive Input Voltage:  $\pm 30$  V(dc + peak ac).

### Environmental Characteristics

Temperature Range (Operating):  $0^\circ\text{C}$  to  $+50^\circ\text{C}$  ( $+32^\circ\text{F}$  to  $+122^\circ\text{F}$ ).

Temperature Range (Nonoperating):  $-55^\circ\text{C}$  to  $+75^\circ\text{C}$  ( $-67^\circ\text{F}$  to  $+167^\circ\text{F}$ ).

Humidity: Five cycles (120 hr) at 90% to 95% relative humidity,  $+30^\circ\text{C}$  to  $+60^\circ\text{C}$ . Per Tek Standard 062-2847-00, Class 5.

### Physical Characteristics

Net Weight (Includes accessories, excludes packaging): Approx. 55 g (2.0 oz).

Recommended Minimum Center Spacing: 0.100 inches (2.54 mm)

Spring Force: 2.0 oz (Pre-Load). 5.5 oz. (2/3 Travel).

Spring Contact Life: 500,000 cycles (2/3 Travel).

Full Travel: 0.240 inches.

Recommended Travel: 0.167 inches (2/3 Full Travel).

### Safety

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

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INSTRUCTION  
SHEET  
NO. 070-6777-00  
PRODUCT GROUP 60

**TEK** PROBE  
AND ACCESSORIES

**P6511**

**SPRING CONTACT  
PROBE**

**Tektronix**  
COMMITTED TO EXCELLENCE

## INTRODUCTION

The P6513 is a 10X, dc-to-300 MHz probe designed for one-time placement into a bed-of nails or similar fixture. The probing system consists of the probe assembly, receptacles (which provide signal feedthrough and a means of rigidly mounting the probe to the fixture), and spring-loaded contact tips to provide a signal path between the points under test and the receptacles.

## OPERATING CONSIDERATIONS

### Probe Handling

The P6511 has been designed for use in fixture-mounted probing applications and is not intended to be used as a hand-held probe. The probe should be handled carefully at all times. Dropping or flexing the probe can cause the probe head receptacle to break. Do not attempt to disassemble the probe head or damage will result. Avoid crushing, pulling or placing excessive strain or connecting cables.

Instructions for exposing probe circuitry and checking electrical performance are included in the optional P6511 Instruction Manual (Tektronix Part Number: 070-6776-00). To avoid damaging the static sensitive components, do not remove the compensation circuitry covers without reading the instruction manual warnings.

### Accessories

Each probe is supplied with two probe receptacles (which have a short tail), four ground-probe receptacles (long tail), four 3-inch ground leads, and five spring-loaded, crown contact tips. Additional receptacles and tips may be purchased separately from Tektronix. Contact tips are also available with various point styles and may be ordered directly from Q.A. Technology Inc. (Phone: 603-926-1193) by requesting 2500-Series compatible spring contacts.

### Power Supply

The Tektronix 1102 Power Supply will provide power for up to four P6511's. To order, call your local Tektronix Sales Office, or call Tek's National Marketing Center, Toll Free: 1-800-426-2200, Ext. 99. In Oregon call collect: 503-627-9000. Ext. 99.

An optional unterminated connector (Tek Part Number: 131-4408-00) is also available so the P6511 can be powered from other power supplies. Refer to the optional P6511 Instruction Manual (Tek Part Number: 070-6776-00) for power and voltage requirements and wiring instructions (refer to "Replaceable Parts" illustration for connector pin layout and voltage assignments).

## PROBE MOUNTING

### Preparation

The P6511 probe and ground lead receptacles should be inserted in a rigid plate material at least 0.375 inches thick. An epoxy glass laminate material is

widely accepted for this application. Determine the desired probe positions and drill holes which gage from 0.067 to 0.069 inches in diameter. (The drill bit size must be selected for the specific material used to obtain the required dimension.) A hand drill is not recommended since it cannot guarantee vertical alignment. If a ground plane is used on the mounting plate, remove the ground plane material from the area around the receptacles for a distance of at least 0.100 inches (both signal and ground) to prevent direct contact as well as to reduce capacitive coupling to the ground plane.

### Receptacle Installation

Refer to Fig. 4. Insert probe receptacles (termination end first from the probe tip side of the mounting plate) into the holes drilled in the previous step. Insert the tip of the installation tool into the top of the receptacle. Tap the top of the tool with a small mallet until the receptacle is seated the required distance. A press ring built into the receptacle will hold the receptacle in place and provides a gas tight seal. The receptacles can be mounted at any height from flush to 0.0250 inches protrusion. The higher protrusion enables the probe to access contact points near tall components. Installation tools set to any height within this range are available from Q.A. Technology Inc. (Phone: 603-926-1193.)

### Signal Probe Connection

The P6511 probe head is designed to plug onto the short-round-tailed receptacle supplied with the probe. The probe head should not be plugged onto the receptacle before it has been properly mounted. Attempts to connect the probe to receptacles other than the ones supplied will likely result in damage to the probe. To complete the signal probe installation, grasp the probe head near the finger grip (see Fig. 4). Slip the small plastic spacer over the end of the short-tailed receptacle. Hold the spacer in place and install the probe head by applying a slight pressure until it's fully seated (see Fig. 4B).

The P6511 has been optimized to drive a 42-inch, 50-ohm output cable (Tek Part Number: 012-0057-01), via a female-to-female BNC adapter (Tek Part Number: 103-0028-00). Any significant deviation from this length cable may result in slightly increased aberrations.

### Probe Grounding

Inductance introduced by a long ground lead will form a resonant circuit with the input capacitance of the probe that will ring and distort the true waveform if driven by a signal containing significant frequency components at or above resonance. This effect is minimized by keeping the resonant point above the bandwidth of the probe. Shorter or multiple ground return pins will greatly reduce lead inductance and improve performance. Optimum signal response will be achieved when the signal probe is surrounded by a minimum of two ground returns symmetrically positioned within a 0.5-inch radius from the signal probe. Alternative grounding methods may degrade risetime, bandwidth, and transient accuracy. For more information on grounding effects see the Optional P6511 Instruction Manual (Tek Part Number: 070-6776-00).

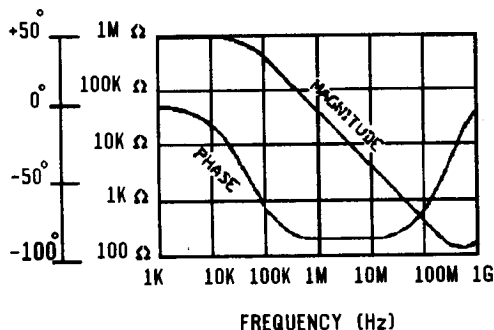


Figure 1. Typical input impedance

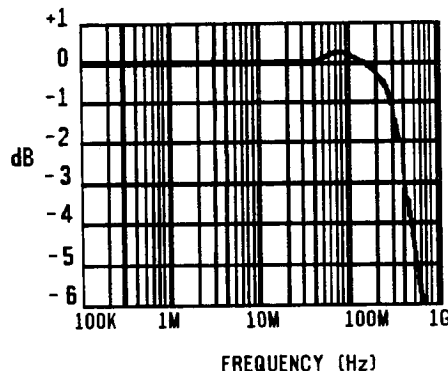


Figure 2. Typical normalized frequency response.

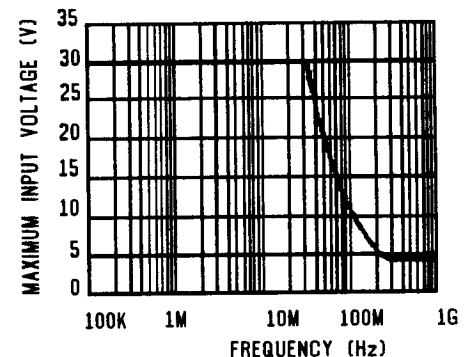


Figure 3. Typical voltage derating versus frequency.

When mounting the P6511, the following grounding tips will aid in optimization of probe response:

- Minimize ground lead length.
- Maintain ground probe symmetry relative to the signal probe.
- Provide an ac ground to a well decoupled dc voltage source if it is closer to the probe than the dc ground. This is done by soldering a coupling capacitor between receptacle and ground wire.
- It is not recommended to use the mounting plate ground plane for probe ground because a resonant cavity can form between the mounting plate ground plane and the device-under-test ground.
- Use up to four ground probes for each signal probe when symmetry and short lead length requirements cannot be met.

### Ground Lead Attachment

After mounting the signal and ground receptacles in the desired configuration, the ground leads must be attached. Four 3-inch ground leads are supplied with the P6511 for this purpose. Cut and strip ground wire to the minimum length needed to connect the ground receptacle to the signal probe. Solder the wire end to the tail of the ground receptacle. Attach the ground clip to the probe head ground sleeve on the signal probe (see Fig. 4B).

**CAUTION**

*Keep the ground leads as short as possible, but not so short that they impose mechanical side loading on the probe or damage will result. The clip end of the ground leads will provide adequate connection to the probe head ground sleeve. DO NOT attempt to solder the ground leads to the signal probe or internal damage will result.*

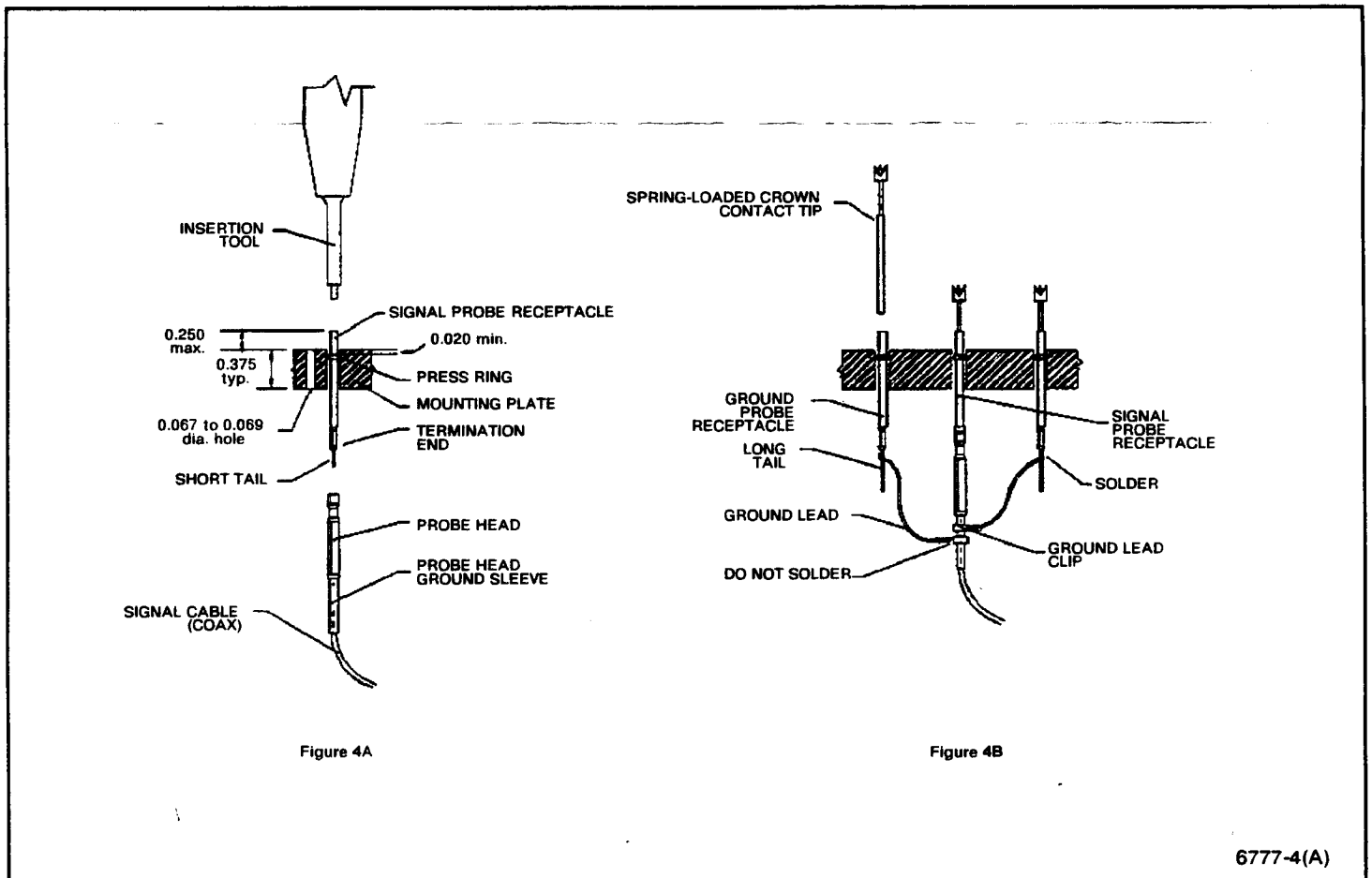


Figure 4. Inserting Probe Receptacles.

# REPLACEABLE PARTS

## CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

| Mfr.  |                                       |                        |                         |
|-------|---------------------------------------|------------------------|-------------------------|
| 24931 | SPECIALTY CONNECTOR CO INC            | 2100 EARLYWOOD DR      | FRANKLIN IN 46131       |
|       |                                       | PO BOX 547             |                         |
| 80009 | TEKTRONIX INC                         | 14150 SW KARL BRAUN DR | BEAVERTON OR 97707-0001 |
|       |                                       | PO BOX 500             |                         |
| 82389 | SWITCHCRAFT INC<br>SUB OF RAYTHEON CO | 5555 N ELSTRON AVE     | CHICAGO IL 60630-1314   |

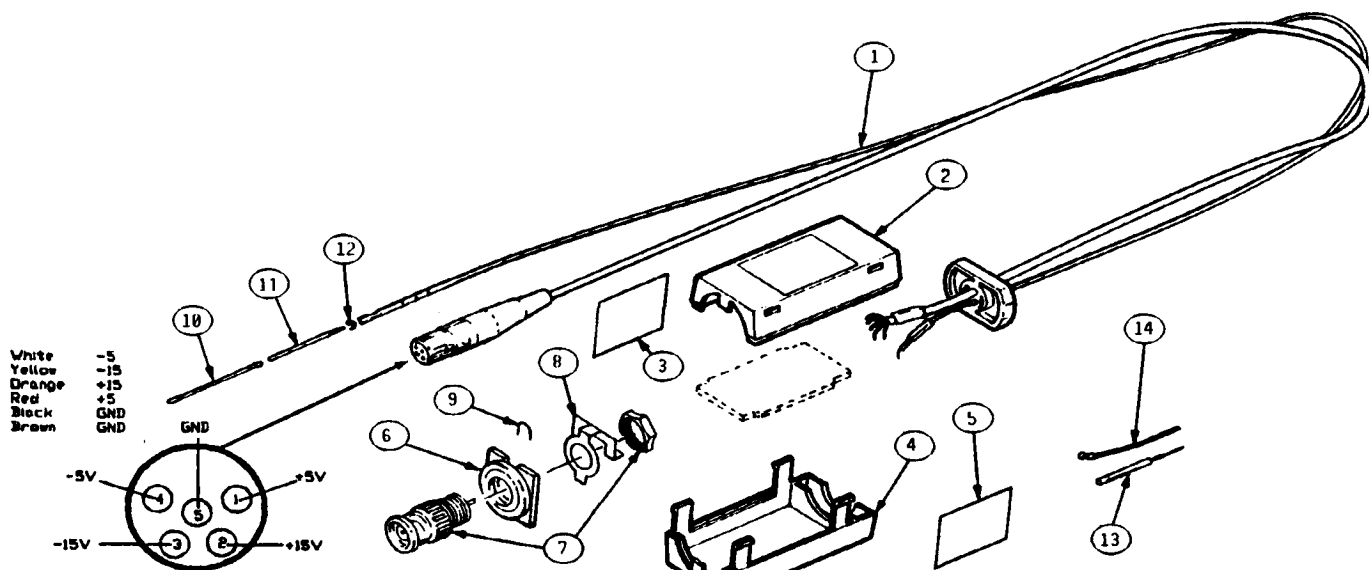
| Fig. & Index No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Qty | 12345 Name & Description                 | Mfr. Code | Mfr. Part No. |
|------------------|--------------------|--------------------------------------|-----|--|-----------|---------------|
| 1-1              | 174-1156-00        |                                      | 1   | CABLE ASSY,RF:150 OHM COAX,SIGNAL/PWR CA | 80009     | 174-1156-00   |
| -2               | 206-0357-00        |                                      | 1   | COMP BOX HALF:TOP                        | 80009     | 206-0357-00   |
| -3               | 334-7174-00        |                                      | 1   | MARKER,IDENT:MARKED P6511                | 80009     | 334-7174-00   |
| -4               | 206-0356-00        |                                      | 1   | COMP BOX HALF:BOTTOM                     | 80009     | 206-0356-00   |
| -5               | 334-7006-00        |                                      | 1   | MARKER,IDENT:MARKED SERIAL               | 80009     | 334-7006-00   |
| -6               | 214-4109-00        |                                      | 1   | BNC CARRIER:NYLON                        | 80009     | 214-4109-00   |
| -7               | 131-4354-00        |                                      | 1   | CONN,PLUG,ELEC:BNC PANEL PLUG            | 80009     | 28PR161-1     |
| -8               | 131-4429-00        |                                      | 1   | CONTACT,ELEC:GROUNDING,0.005 BE-CU FOIL  | 80009     | 131-4429-00   |
| -9               | 131-4428-00        |                                      | 1   | CONTACT,ELEC:SIGNAL,0.020 BRASS          | 80009     | 131-4428-00   |

### STANDARD ACCESSORIES

|     |             |      |   |   |       |             |
|-----|-------------|------|---|---|-------|-------------|
| -10 | -----       |      | 5 | CONTACT,ELEC:PROBE SPRING<br>(SEE OPTIONAL ACCESSORIES,016-0946-00 AND 016-0929-00) |       |             |
| -11 | -----       |      | 2 | SKT,PL-IN ELEK:SIGNAL RCPT,ELEC<br>(SEE OPTIONAL ACCESSORIES,016-0946-00)           |       |             |
| -12 | -----       | 8834 | 2 | SPACER,HYBRID:PC,BLACK<br>(SEE OPTIONAL ACCESSORIES,016-0946-00)                    |       |             |
| -13 | -----       |      | 4 | SKT,PL-IN ELEK:GROUND PROBE RECEPTACLE<br>(SEE OPTIONAL ACCESSORIES,016-0929-00)    |       |             |
| -14 | -----       |      | 4 | LEAD,ELECTRICAL:23 AWG,3.0 L,O-N<br>(SEE OPTIONAL ACCESSORIES)                      |       |             |
|     | 070-6777-00 |      | 1 | SHEET,TECHNICAL:INSTR,P6511   | 80009 | 070-6777-00 |

### OPTIONAL ACCESSORIES

|             |   |  |       |             |
|-------------|---|--|-------|-------------|
| 003-1383-00 | 1 | RLSE TOOL,COVER:COMP BOX,POLYCARBONATE   | 80009 | 003-1383-00 |
| 016-0929-00 | 1 | ACCESS KIT,GND:PROBE RCPT,SPRING PROBE   | 80009 | 016-0929-00 |
| 016-0946-00 | 1 | ACCESS KIT,SIG:PROBE RCPT,SPR,PROBE      | 80009 | 016-0946-00 |
| 067-0178-00 | 1 | FIXTURE,CAL:PERFORMANCE VERIFICATION     | 80009 | 067-0178-00 |
| 131-4408-00 | 1 | CONN,PLUG,ELEC:STRAIGHT,MALE,5 PIN       | 80009 | TA5M        |
| 174-1353-00 | 1 | CABLE ASSY,RF:316 OHM COAX,SIGNAL,23.0 L | 80009 | 174-1353-00 |
| 196-3208-10 | 1 | LEAD,ELECTRICAL:PKG OF 10                | 80009 | 196-3208-10 |
| 070-6776-00 | 1 | MANUAL,TECH:INSTR,P6511                  | 80009 | 070-6776-00 |



Replaceable Parts - P6511