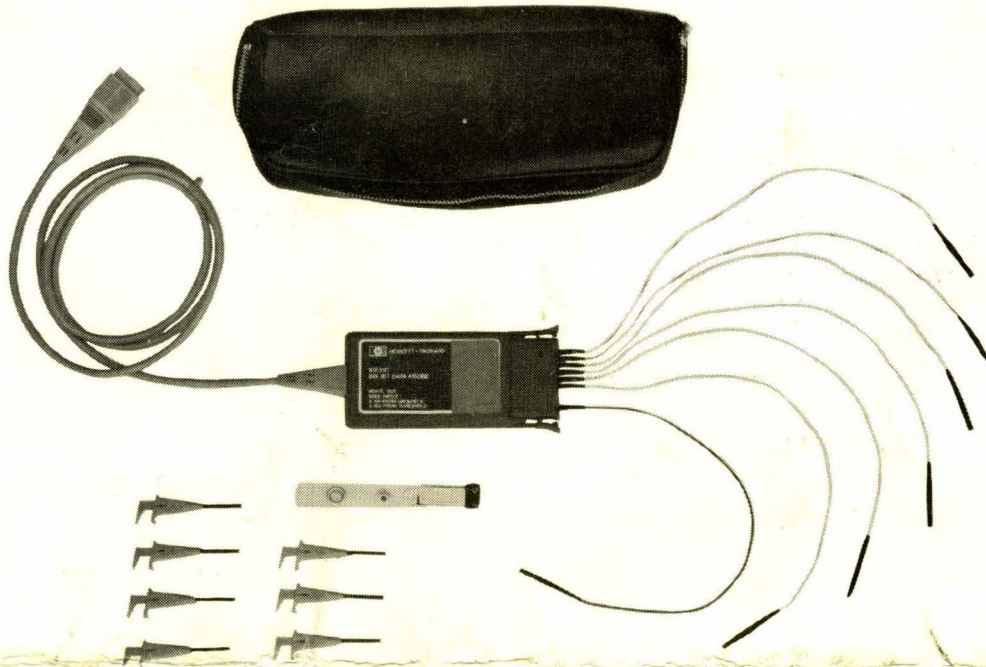


OPERATING NOTE/JULY 1978



10231C-001-4-76

Figure 1. Model 10231C Six Bit Data Probe

1. DESCRIPTION.

2. The HP Model 10231C Six Bit Data Probe (figure 1) is an active probe providing six channels of digital data to an HP Logic State Analyzer without significant loading of the circuitry under test. Minimal loading is maintained by placing active circuitry in a compact pod located near the point of test. Signal shaping and amplification is accomplished by comparators in series with each input. +5 V and -12 V probe operating power is supplied by the logic analyzer through the interconnecting cable. The 10231C connects to a logic analyzer front panel by means of a 17-pin connector. Refer to table 1 for complete specifications and instrument compatibility for the Model 10231C.

3. ACCESSORIES SUPPLIED.

4. The 10231C is supplied with seven 12-inch color coded connection leads (plus one spare), seven detachable hook-type circuit probes, and a vinyl carrying case. Each connection lead has a female square-pin tip on the end for back-plane pin connections. The hook-

type circuit probes have recessed male pins which can be attached to the lead ends. The other ends of the leads are attached to a connector clip that snaps onto the circuit pod for quick connection. Additional labels are supplied so that probe signal designations can be matched to the logic analyzer being used.

5. A pod clip is also supplied with the data probe. It is intended to be snapped to the cable behind the circuit pod. The clip can be attached to any secure fixture to support the circuit pod and remove the weight from the hook-type probes.

6. ACCESSORIES AVAILABLE.

7. A replacement cable kit (HP Part No. 10231-68703) is available for the 10231C. The kit consists of the 10231C connector clip, eight 12-inch color-coded connection leads, and a ground lead.

Operating Note Part No. 10231-90908
Microfiche Part No. 10231-90808



Table 1. Specifications

PROBE INPUTS

INPUT RC: 40 \pm 3K Ω shunted by \leq 14 pF.

INPUT BIAS CURRENT: \leq 20 μ A.

INPUT THRESHOLD: TTL, fixed at +1.45 \pm 0.05 Vdc. Variable to \pm 10 Vdc.

MINIMUM INPUT SWING: 0.5 V p-p +5% of threshold voltage.

MAXIMUM INPUT: Level, \pm 15 Vdc max. Swing, 15 V peak from threshold.

INSTRUMENT COMPATIBILITY

HP Model 1600A, Logic State Analyzer.

HP Model 1601A, Logic State Analyzer.

HP Model 1607A, Logic State Analyzer.

HP Model 1620A, Pattern Analyzer.

8. PRINCIPLES OF OPERATION.

9. Model 10231C circuitry (figure 2) consists of a -6.2-volt supply, six identical comparators, and six inverting line drivers which buffer, amplify, and convert input data to a TTL compatible output.

10. The -6.2-volt supply consists of R19, VR1, C17, C18, C19. R19 and VR1 form a voltage divider and regulator which reduces the -12-volt input from the logic analyzer to -6.2-volts. C17, C18 and C19 bypass voltage variations to ground.

11. The Model 10231C accepts positive or negative input data up to 15 volts peak in amplitude with threshold levels up to \pm 10 Vdc. U8 and U9 are resistor networks which form voltage dividers at the data inputs to each comparator. The 26.1-kilohm and 13-kilohm resistors form voltage dividers which scale input data voltage swings to levels compatible with the comparator inputs. The reference threshold voltage supplied by the logic analyzer has also been scaled by a factor of three. For example, the threshold for transistor-transistor logic is typically +1.5 Vdc. The reference TTL threshold supplied by the logic analyzer is approximately +0.5 Vdc. The 8.68 kilohm resistor on the threshold input line matches the threshold input impedance of the comparator to the data input impedance.

12. In a static condition, the outputs of comparators U1 through U6 are LO (approximately +0.5 Vdc). When the input data voltage level exceeds the threshold level, the output will go HI (approximately +3 V). The comparator outputs are inverted by U7A through U7F and applied to the logic analyzer.

13. Each comparator has positive feedback through two 1-megohm resistors which form a hysteresis band that prevents comparator oscillation if the data input voltage level occurs near the threshold of the comparator. This supplies a sharp decision point for slow logic families.

14. MAINTENANCE.

15. PERFORMANCE TEST. The Model 10231C must be tested with the logic analyzer that the probe is used with. Refer to the following performance tests in the Logic Analyzer Operating and Service Manual:

- INPUT THRESHOLD TEST
- INPUT LOGIC SWING TEST
- INPUT RC TEST
- INPUT BIAS CURRENT TEST

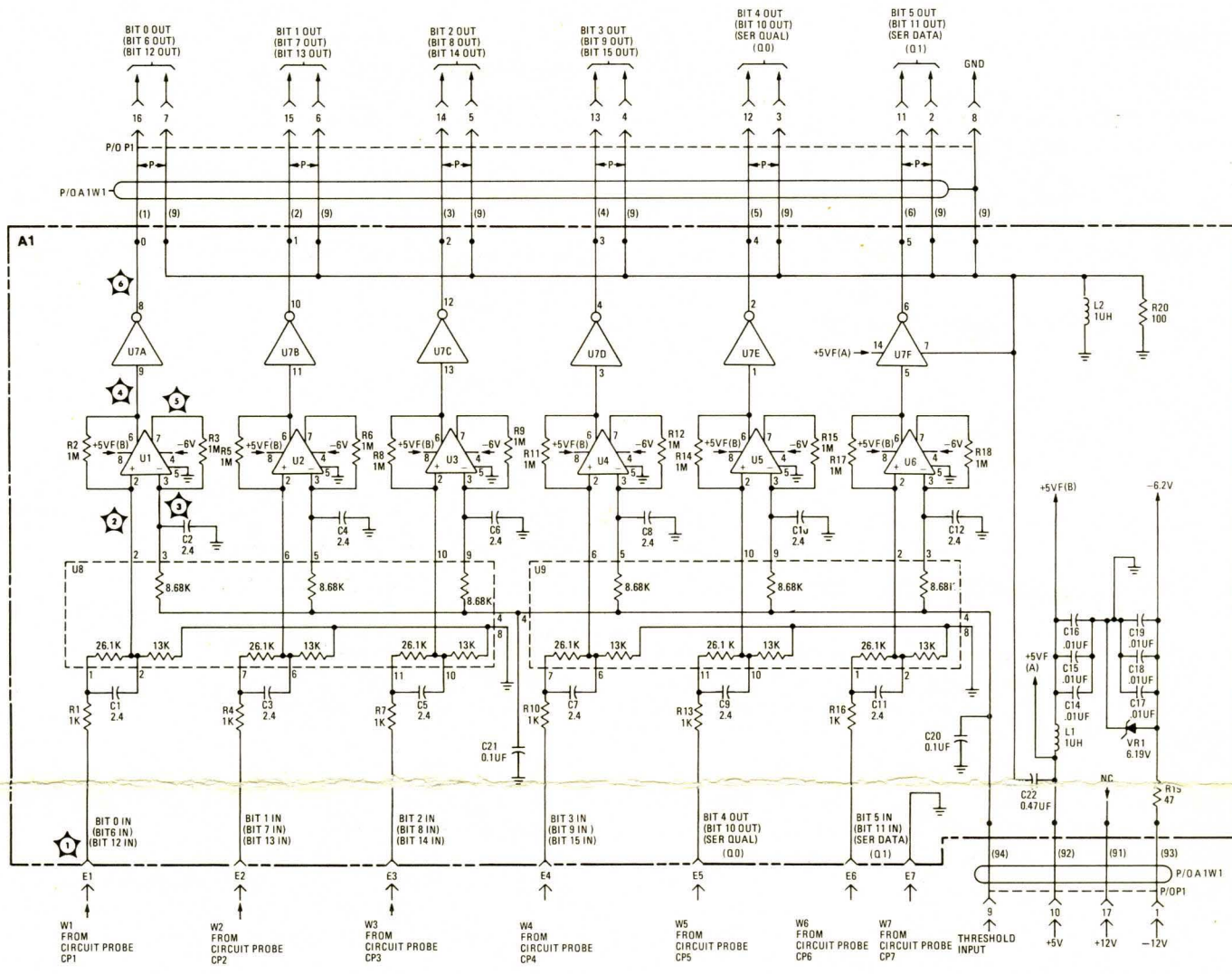
16. REPAIR. When repairing PC Board A1, be careful to prevent breakage of small wires where W1 is soldered to A1.

17. REPLACEABLE PARTS. Table 2 lists the replaceable parts and the HP part number of each item. Figure 3 shows the location of each part.

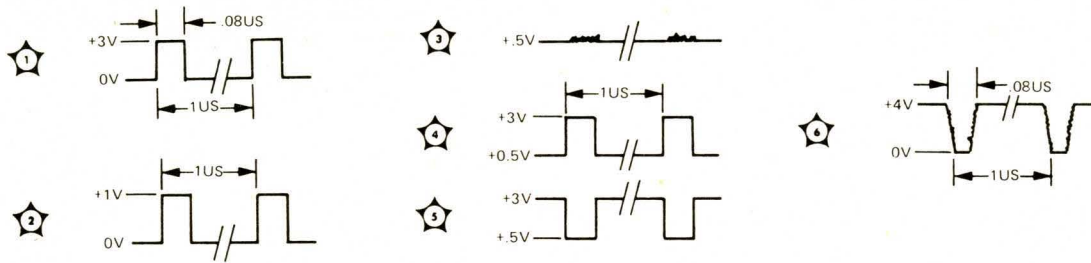
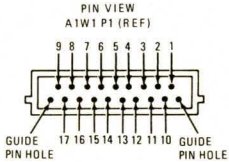
18. To order a replaceable part from Hewlett-Packard, address the order to the nearest HP Sales/Service Office. Include the probe model number, reference designation of the part, and the HP part number. If a part is not listed, provide a complete description of the part, including function and location.

NOTE

Board assembly A1 is not sold separately. To obtain a replacement, the entire probe unit (Model 10231C) must be ordered.

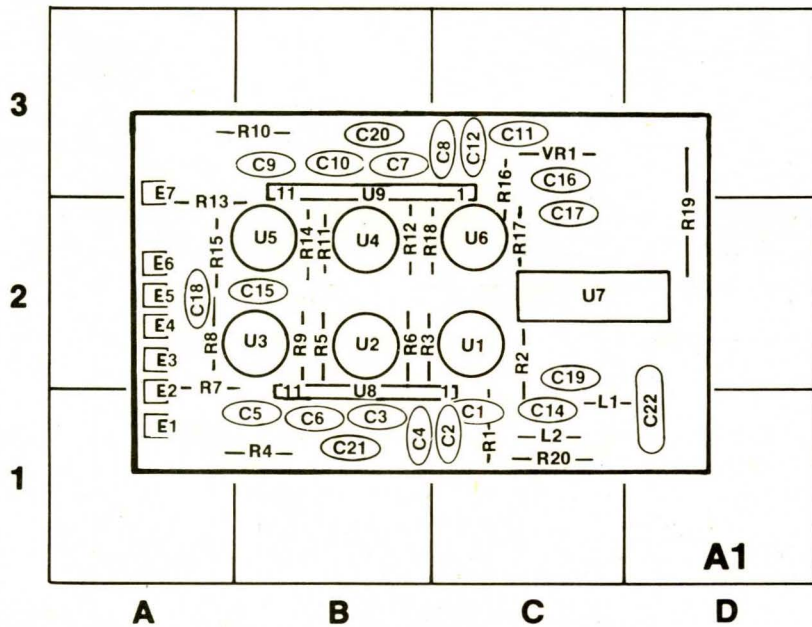


NOTE: NUMBERS IN PARENTHESES (1) INDICATE WIRE COLOR USING RESISTOR WIRE COLOR CODE.



10231C-006-02-77

Figure 2. Model 10231C Schematic



REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC	REF DESIG	GRID LOC
C1	C-1	C11	C-3	C21	B-1	L2	C-1	R10	A-3	R20	C-1
C2	C-1	C12	C-3	C22	D-1	R1	C-1	R11	B-2	U1	C-2
C3	B-1	C13	C-1	E1	A-1	R2	C-2	R12	B-2	U2	B-2
C4	B-1	C14	C-1	E2	A-1	R3	B-2	R13	A-2	U3	B-2
C5	B-1	C15	B-2	E3	A-2	R4	B-1	R14	B-2	U4	B-2
C6	B-1	C16	C-3	E4	A-2	R5	B-2	R15	A-2	U5	B-2
C7	B-3	C17	C-2	E5	A-2	R6	B-2	R16	C-3	U6	C-2
C8	C-3	C18	A-2	E6	A-2	R7	A-2	R17	C-2	U7	C-2
C9	B-3	C19	C-1	E7	A-3	R8	A-2	R18	B-2	U8	B-1
C10	B-3	C20	B-3	L1	C-1	R9	B-2	R19	D-2	U9	B-3
										VR1	C-3

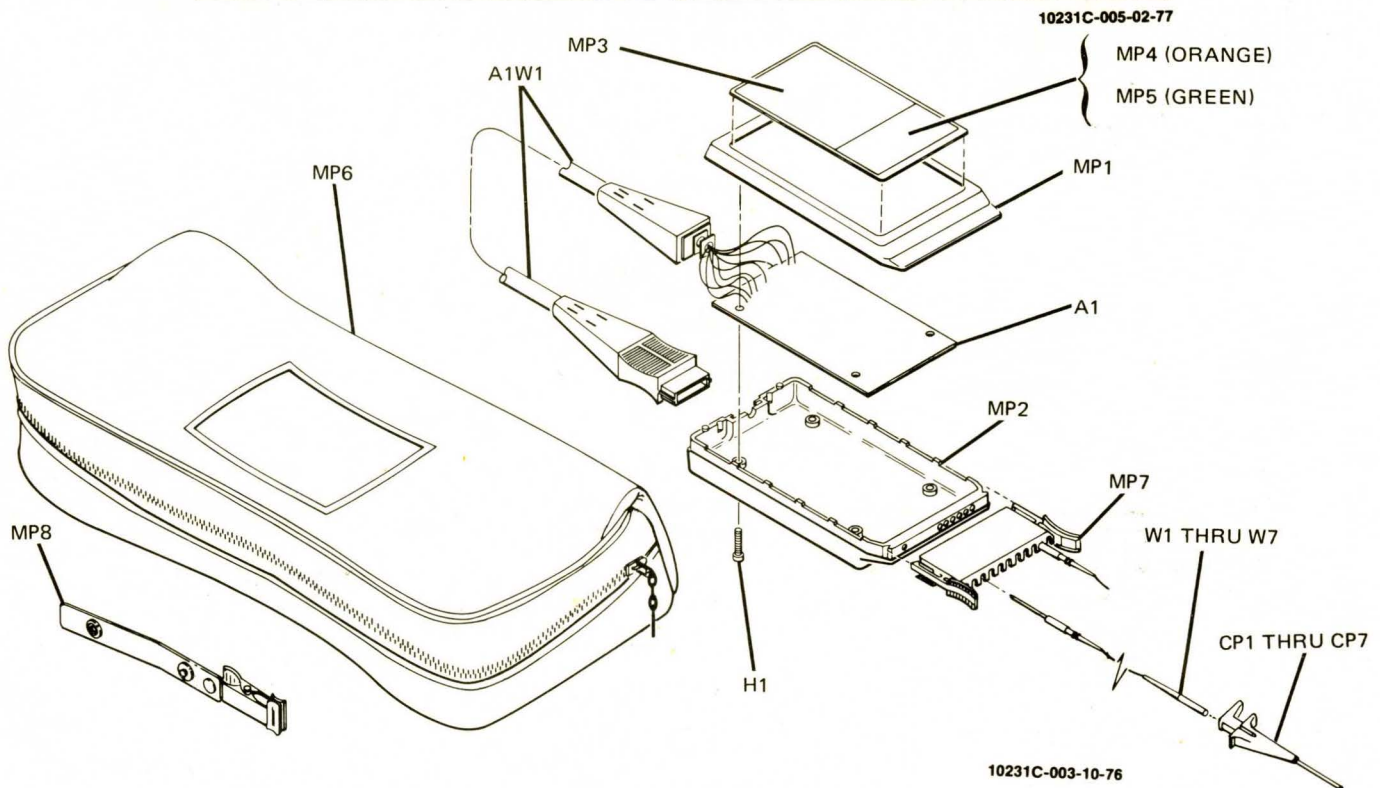


Figure 3. Replaceable Parts Identification

Table 2. Replaceable Parts

Reference Designation	HP Part No.	Qty	Description	Mfr Code	Mfr Part No.
A1 A1C1 thru A1C12 A1C13	0160-3592	12	NSR: See Paragraph 18 C: Fxd Cer 2.4 pF \pm 5 pF 200 Vdcw	02995	CV10NCZR4D
			Deleted		
A1C14 thru A1C19 A1C20	0160-3451	6	C: Fxd Cer 0.01 μ F +80—20% 100 Vdcw	56289	C023B101F103 ZS25-CD
A1C21	0160-3443	2	C: Fxd Cer 0.1 μ F +80—20% 50 Vdcw	04563	8131-N072-651 -104Z
A1C22	0160-0174		C: Fxd Cer 0.1 μ F +80—20% 50 Vdcw	04563	8131-N072-651 -104Z
A1E1 thru A1E7 A1L1	0160-3443		C: Fxd Cer 0.47 μ F +80—20% 25 Vdcw	56289	561187S-CML
A1E1 thru A1E7 A1L1	1460-1473	7	SPRING: Contact	28480	1460-1473
A1L2	9140-0158	2	L: Fxd RF Choke 1 UH 10%	24226	10/10
A1R1	9140-0158		L: Fxd RF Choke 1 UH 10%	24226	10/10
A1R1	0675-1021	6	R: Fxd 1 K 10% .125 W CC	01121	BB 1021
A1R2	0698-4073	12	R: Fxd 1 M 10% .125 W CC	01121	BB 1051
A1R3	0698-4073		R: Fxd 1 M 10% .125 W CC	01121	BB 1051
A1R4	0675-1021		R: Fxd 1 K 10% .125 W CC	01121	BB 1021
A1R5	0698-4073		R: Fxd 1 M 10% .125 W CC	01121	BB 1051
A1R6	0698-4073		R: Fxd 1 M 10% .125 W CC	01121	BB 1051
A1R7	0675-1021		R: Fxd 1 K 10% .125 W CC	01121	BB 1021
A1R8	0698-4073		R: Fxd 1 M 10% .125 W CC	01121	BB 1051
A1R9	0698-4073		R: Fxd 1 M 10% .125 W CC	01121	BB 1051
A1R10	0675-1021		R: Fxd 1 K 10% .125 W CC	01121	BB 1021
A1R11	0698-4073		R: Fxd 1 M 10% .125 W CC	01121	BB 1051
A1R12	0698-4073		R: Fxd 1 M 10% .125 W CC	01121	BB 1051
A1R13	0675-1021		R: Fxd 1 K 10% .125 W CC	01121	BB 1021
A1R14	0698-4073		R: Fxd 1 M 10% .125 W CC	01121	BB 1051
A1R15	0698-4073		R: Fxd 1 M 10% .125 W CC	01121	BB 1051
A1R16	0675-1021		R: Fxd 1 K 10% .125 W CC	01121	BB 1021
A1R17	0698-4073		R: Fxd 1 M 10% .125 W CC	01121	BB 1051
A1R18	0698-4073		R: Fxd 1 M 10% .125 W CC	01121	BB 1051
A1R19	0698-3698	1	R: Fxd 47 5% 1 W Mo Tubular	16299	FP32-1-T0047R0-J
A1R20	0757-0401	1	R: Fxd 100 OHM 1% .125W F	24546	C4-1/8-T0-101-F
A1U1 thru A1U6	1826-0236	6	IC: DGTL, Comparator	18324	UA760

Table 2. Replaceable Parts (Cont'd)

Reference Designation	Mfr Part No.	Qty	Description	Mfr Code	HP Part No.
A1U7	1820-0683	1	IC; DGTL, Inverter	01295	SN74S04N
A1U8	1810-0211	2	CIRCUIT: Resistor Network	28480	1810-0211
A1U9	1810-0211		CIRCUIT: Resistor Network	28480	1810-0211
A1VR1	1902-0551	1	DIODE: Zener 6.19 V 5%, 1 W Max Pd	04713	SZ11213-80
A1W1	10231-61618	1	CABLE ASSY: 17 PIN	28480	10231-61618
CP1 thru CP7	10230-62101	7	PROBE ASSY: Hook-type	28480	10230-62101
H1	0624-0306	4	SCREW: TS 2-28 0.500 LG	28480	0624-0306
MP1	5040-7683	1	COVER: Top	28480	5040-7683
MP2	5040-8010	1	COVER: Bottom	28480	5040-8010
MP3	7120-5185	1	LABEL: Ident	28480	7120-5185
MP4	7120-5184	1	LABEL SET: Ident, Orange	28480	7120-5184
MP5	7120-5183	1	LABEL SET: Ident, Green	28480	7120-5183
MP6	1540-0320	1	CASE: Carrying	28480	1540-0320
MP7	5040-0563	1	CONNECTOR: Clip	28480	5040-0563
MP8	5040-0538	1	CLIP: Pod	28480	5040-0538
W1	5061-1217	1	CABLE: Pin Adapter; White/Black	28480	5061-1217
W2	5061-1218	1	CABLE: Pin Adapter; White/Brown	28480	5061-1218
W3	5061-1219	1	CABLE: Pin Adapter; White/Red	28480	5061-1219
W4	5061-1220	1	CABLE: Pin Adapter; White/Orange	28480	5061-1220
W5	5061-1221	1	CABLE: Pin Adapter; White/Yellow	28480	5061-1221
W6	5061-1222	1	CABLE: Pin Adapter; White/Green	28480	5061-1222
W7	5061-1251		CABLE: Pin Adapter; Black (Ground)	28480	5061-1251
W8	5061-1227	1	CABLE: Pin Adapter; Red (Spare)	28480	5061-1227