

# ACCESSORIES

for Models 4274/4275A LCR Meters

16047A ✓

16047B

16047C

16048A ✓

16048B

16048C ✓

16034B

16023B



## 1. INTRODUCTION.

This operating note provides information on each of the available accessories for Hewlett-Packard Models 4274A and 4275A Multi-Frequency LCR Meters. These accessories include; four test fixtures (HP Models 16047A/B/C and 16034B), three test leads (HP Models 16048A/B/C), and one dc bias controller (HP Model 16023B). Each accessory is pictorially shown, along with a description, in Table 2. Typical characteristics for the test fixtures and leads are listed in Table 1. To order additional copies of this operating note, use the part number listed on the rear cover.

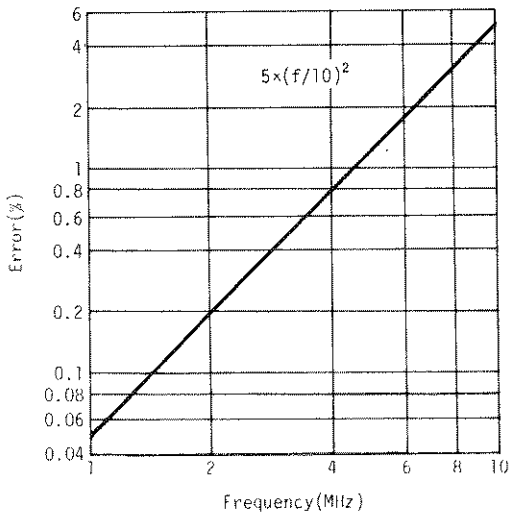
## 2. MAINTENANCE.

An exploded view of each accessory is shown in Figures 1 thru 8. Do not disassemble any further than shown. Maintenance consists principally of cleaning and replacing damaged or worn parts. Figures 9 and 10 show the internal wiring for the 16047A and 16023B respectively. Take special care when cleaning contacts. Figures 1 thru 8 also include a replaceable parts list. To order these parts, identify them by their Hewlett-Packard part number. If a faulty part is located in a part that cannot be disassembled, order the next higher assembly or return the whole device to the nearest Hewlett-Packard Sales/Service Office for repair or replacement.

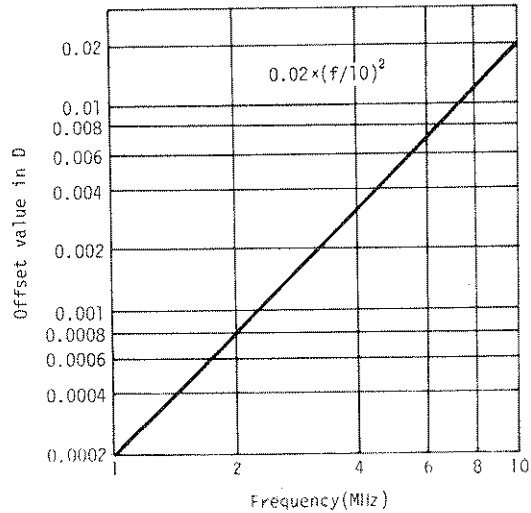
Table 1. Typical Characteristics of Test Fixtures and Leads.

Model	Applicable measurement ranges		Incremental error at freq. $\geq 1$ MHz	
	Parameter value	Measurement frequency	Parameter reading error	Offset value in D
16047A	Full range	Full range	$\pm 5 \times \left(\frac{f}{10}\right)^2 \%$	$\pm 0.02 \times \left(\frac{f}{10}\right)^2$
16047B	Full range	below 2MHz	—	—
16047C	Full range	Full range	$\pm 1 \times \left(\frac{f}{10}\right)^2 \%$	$\pm 0.01 \times \left(\frac{f}{10}\right)^2$
16048A 16048B	Full range	Full range	$\pm 5 \times \left(\frac{f}{10}\right)^2 \%$	$\pm 0.02 \times \left(\frac{f}{10}\right)^2$
16048C	C > 1000pF L > 100 $\mu$ H	below 100kHz	Residual parameter values : C < 5pF, L < 200nH, R < 10m $\Omega$	
16034B	Ranges satisfied $ Z  > 50\Omega$	Full range	$\pm 5 \times \left(\frac{f}{10}\right)^2 \%$	$\pm 0.02 \times \left(\frac{f}{10}\right)^2$
			Residual parameter values : C < 0.02pF, L < 30nH, R < 50m $\Omega$	

Note: f is measurement frequency in megahertz.  
The incremental errors calculated from the equations in the table for measurements at frequencies above 1MHz are additive.



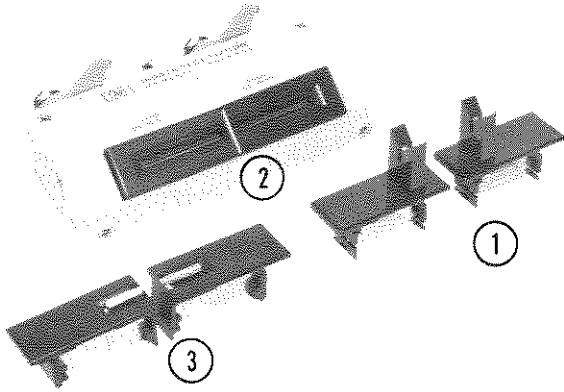
Parameter reading error vs frequency.



Offset value in D vs frequency.

Table 2. Descriptions (Sheet 1 of 4).

## 16047A



### TEST FIXTURE - direct attachment type

This test fixture 16047A is available for general measurement of both axial and radial lead components. For axial lead component measurement, contact ① is used. For radial lead component measurement, two kinds of contacts, ② and ③, are applied.

16047A Test Fixture is directly coupled to 4274A or 4275A with 4-terminal pair configuration.

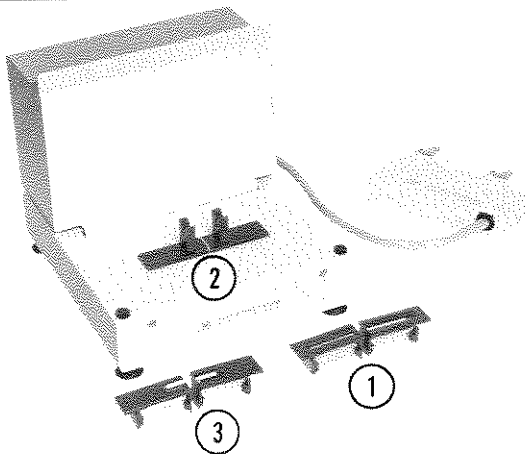
16047A is useable on all 4274A and 4275A ranges.

A DC bias up to  $\pm 35V$  can be applied.

- ①: Contact for axial lead components  
(HP P/N 16061-70022)
- ②: Contact for general radial lead components  
(HP P/N 16061-70021)
- ③: Contact for radial short lead components  
(HP P/N 16047-65001)

## 16047B

\$580.-  
FEB '81



### TEST FIXTURE - cable connection type

This test fixture 16047B is available for general measurement of both axial and radial lead components. The same contact electrode modules as those furnished with the 16047A are furnished with the 16047B.

The main chassis is coupled to 4274A or 4275A with a 4-terminal pair cable.

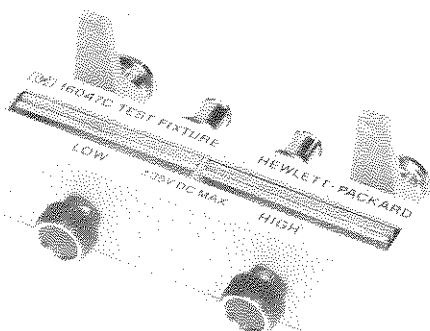
16047B is useable on all ranges below 2MHz.

A DC bias up to  $\pm 200V$  can be applied (a protect cover is provided for operator safety).

- ①: Contact for general radial lead components  
(HP P/N 16061-70021)
- ②: Contact for axial lead components  
(HP P/N 16061-70022)
- ③: Contact for radial short lead components  
(HP P/N 16047-65001)

Table 2. Descriptions (Sheet 2 of 4).

## 16047C



TEST FIXTURE - direct attachment type

This test fixture is appropriate for high frequency measurements requiring high accuracy.

16047C Test Fixture is directly coupled to 4274A or 4275A in 2-terminal configuration.

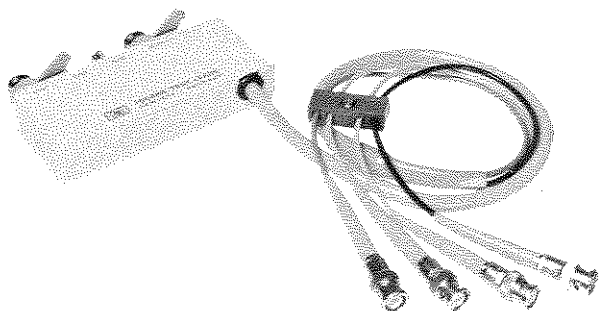
Two screw knobs facilitate and ensure optimum contact of electrodes and sample leads.

16047C is useable on all 4274A and 4275A ranges.

A DC bias voltage up to  $\pm 35V$  can be applied.

## 16048A

\$250.--



TEST LEADS - BNC four terminal pair type

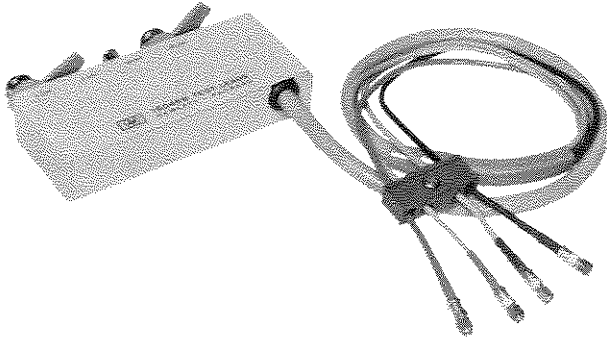
These test leads with BNC-BNC connectors are available for connecting user-supplied test fixture with 4274A or 4275A.

A DC bias up to  $\pm 300V$  can be supplied.

The cable length is 1 meter.

Table 2. Descriptions (Sheet 3 of 4).

### 16048B



TEST LEADS - BNC four terminal pair type

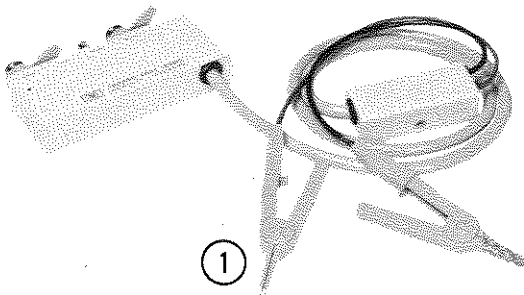
These test leads with miniature RF connectors are suitable for connecting user-supplied test fixture in system applications.

Maximum DC voltage  $\pm 300V$  can be applied.

The cable length is 1 meter.

### 16048C

\$ 325. -



TEST LEADS - dual alligator clip type

These test leads with dual alligator clips are available for conveniently testing components of various shapes at frequencies below 100kHz.

Applicable measurement ranges:

Capacitance  $> 1000pF$

Inductance  $> 100\mu H$

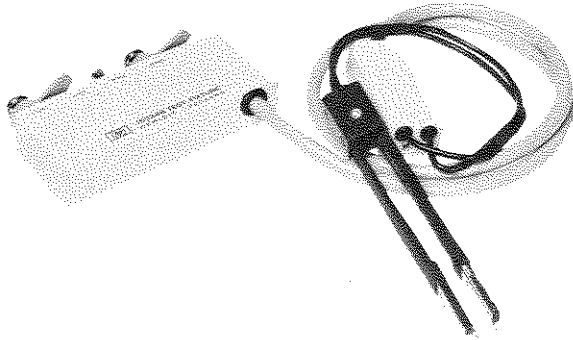
Maximum applied DC bias voltage is  $\pm 35V$ .

The cable length is 1 meter.

①: Probe ass'y  
(HP P/N 16036-7511)

Table 2. Descriptions (Sheet 4 of 4).

**16034B**



TEST FIXTURE - tweezer type

This test fixture is suitable for measurement of miniature lead-less components such as chip capacitors.

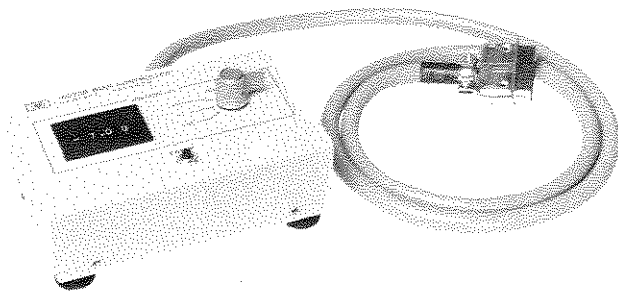
16034B employs a three terminal configuration tweezer probe fitting for high impedance component measurements (above  $50\Omega$ ) on all 4274A and 4275A frequency ranges.

Maximum applied DC bias voltage is  $\pm 35V$ .

The cable length is 1 meter.

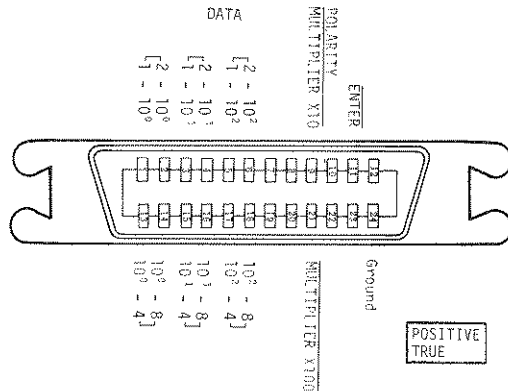
**16023B**

\$ 300.-  
Feb 81



DC BIAS CONTROLLER - option 001 or 002 units

This controller is used to set the value of the internal dc bias voltage. Internal dc bias voltages of  $\pm 0$  to  $\pm 35V$  for Option 001 and  $\pm 0$  to  $\pm 99.9V$  for Option 002 can be selected using the four thumbwheel switches. A detailed description of the procedure to be followed for setting the internal dc bias can be found in Section III of the Operating Manual. The pin assignments for the connector are given in the figure below.



# 16047A

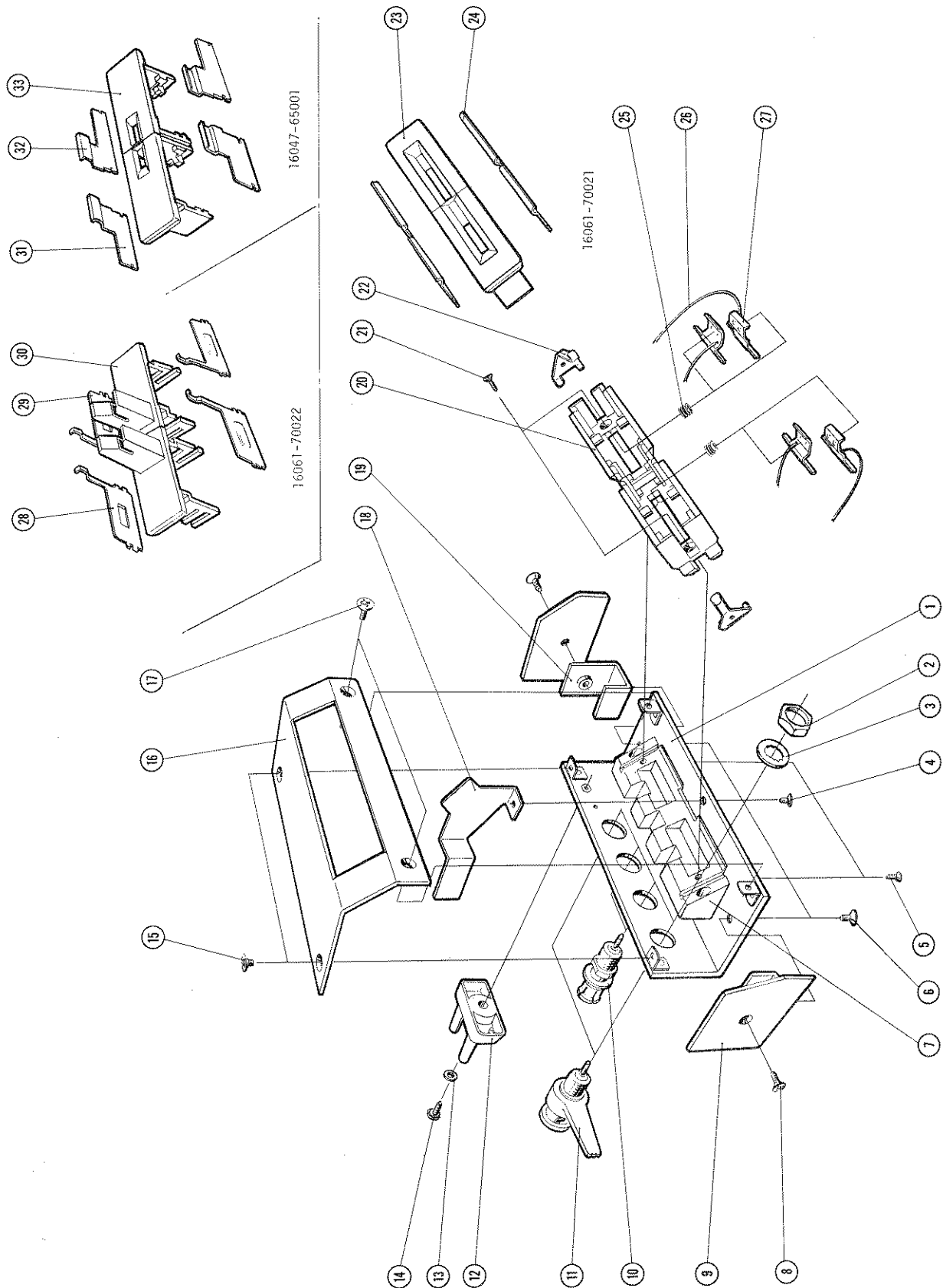


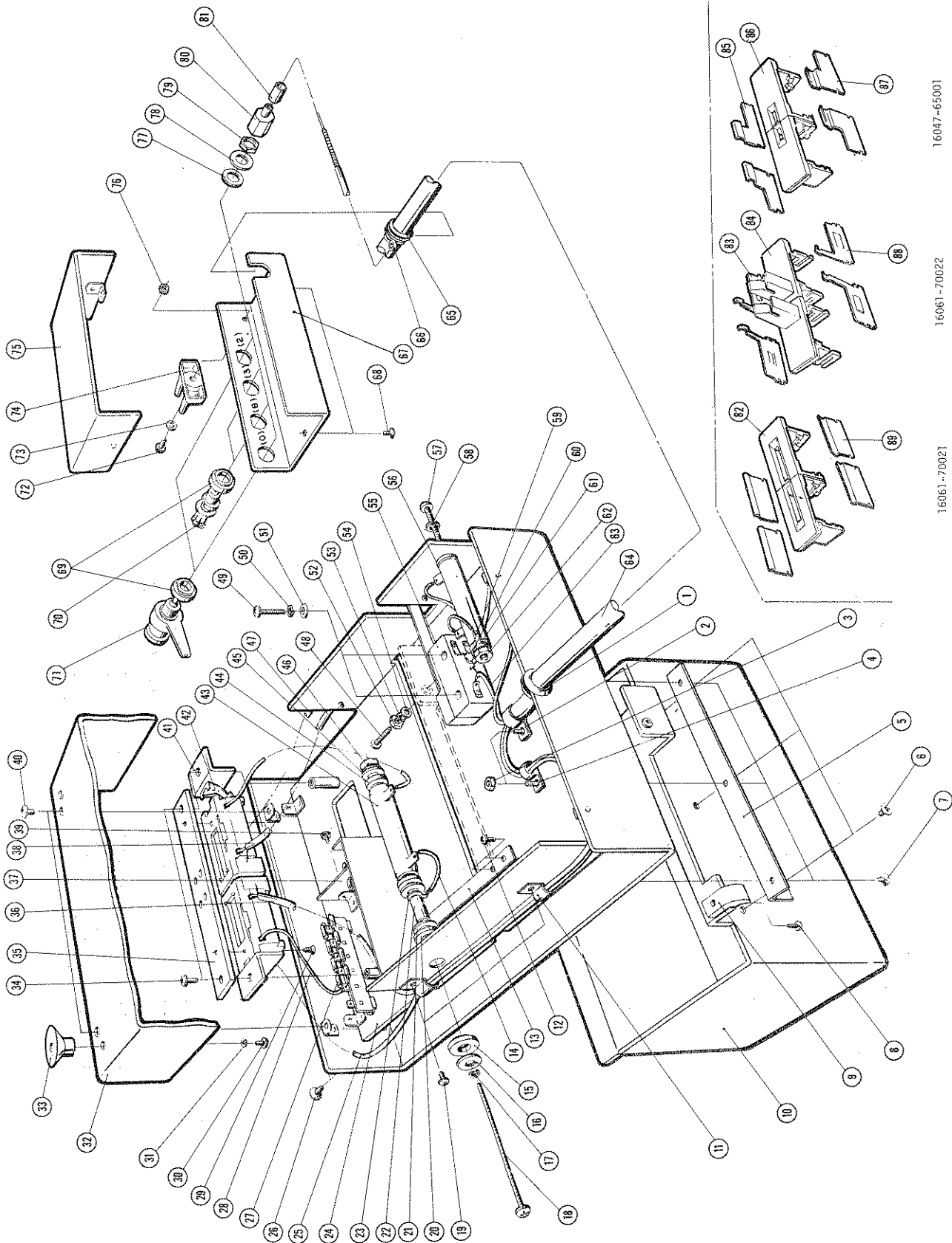
Figure 1. Parts Identification for 16047A (Sheet 1 of 2).



Item No.	Part No.	Q'ty	Description	Note
1	16047-04001	1	COVER-BOTTOM	
2	2950-0043	4	NUT	
3	2190-0016	4	WASHER	
4	2200-0140	1	SCREW	
5	0624-0203	2	SCREW	
6	2360-0192	2	SCREW	
7	16061-50022	1	BASE	
8	2360-0192	2	SCREW	
9	16047-00603	2	SIDE PLATE	
10	16038-30021	2	CONNECTOR-BNC	
11	16012-7122	2	CONNECTOR-BNC	
12	16047-40000	1	STOPPER	
13	3050-0229	1	WASHER	
14	2200-0105	1	SCREW	
15	2360-0192	2	SCREW	
16	16047-04000	1	COVER-TOP	
17	2360-0192	2	SCREW	
18	16047-00600	1	SHIELD PLATE	
19	16047-01200	2	ANGLE	
20	16061-50023	1	SOCKET	
21	0624-0202	2	SCREW	
22	16061-10027	2	SPRING	
23	16061-50031	1	SOCKET-RADIAL	
24	16061-10031	4	CONTACT-RADIAL	
25	1460-0343	2	SPRING	
26	8150-0447	4	WIRE	
27	16061-10026	4	CONTACT	
28	16061-10033	2	CONTACT-AXIAL	
29	16061-10032	2	CONTACT-AXIAL	
30	16061-50032	1	SOCKET-AXIAL	
31	16047-00604	2	CONTACT	
32	16047-00605	2	CONTACT	
33	16047-40001	2	SOCKET	

Figure 1. Parts Identification for 16047A (Sheet 2 of 2).

# I 6047B



16047-65001

16061-70022

16061-70021

Figure 2. Parts Identification for 16047B (Sheet 1 of 2).

Item No.	Part No.	Q'ty	Description	Note
1	0400-0011	1	GROMMET	
2	1400-0017	1	CABLE CRAMP	
3	2420-0001	2	NUT	
4	1400-0053	1	CABLE CRAMP	
5	16047-09000	1	HINGE	
6	2360-0192	3	SCREW	
7	2360-0190	3	SCREW	
8	0624-0097	1	SCREW	
9	16047-40003	1	CAM	
10	16047-60000	1	COVER	
11	1400-0015	2	CABLE CRAMP	
12	2360-0113	2	SCREW	
13	16047-00606	1	SPRING	
14	0890-0004	2	TUBE	
15	0340-0100	1	INSULATOR	
16	2190-0779	1	FLAT WASHER	
17	2190-0017	1	SPRING WASHER	
18	2510-0270	1	SCREW	
19	2360-0113	2	SCREW	
20	0340-0100	2	INSULATOR	
21	2190-0779	2	FLAT WASHER	
22	0380-0009	1	SPACER	
23	0360-0007	1	LUG	
24	16047-00100	1	CHASIS	
25		1	WIRE-GRAY	
26	2360-0192	2	SCREW	
27	1901-0028	8	DIODE	
28	8150-0022	3	WIRE	
29	2200-0165	2	SCREW	
30	0570-0394	4	SCREW	
31	2190-0226	4	WASHER	
32	16047-04005	1	COVER-BOTTOM	
33	16015-8522	4	FOOT	
34	2200-0109	2	SCREW	
35	16047-25000	1	PLATE	
36		1	WIRE-BLACK	
37	16047-00608	1	SHIELD PLATE	
38		1	WIRE-RED	
39	2360-0113	1	SCREW	
40	2360-0113	4	SCREW	
41	16047-01201	1	ANGLE	
42	16061-10027	2	SPRING	
43	0811-1656	1	RESISTOR-FXD .27Ω±5%	
44	3050-0152	1	WASHER	
45	2190-0779	1	FLAT WASHER	
46	2580-0006	1	NUT	
47		1	WIRE, ORANGE	
48	2200-0147	1	SCREW	
49	2360-0209	2	SCREW	
50	2190-0918	2	WASHER	

Item No.	Part No.	Q'ty	Description	Note
51	3050-0228	2	WASHER	
52	2260-0001	1	NUT	
53	2190-0226	1	SPRING WASHER	
54	3050-0229	1	WASHER	
55	3101-0301	1	MICRO SWITCH	
56	0811-1656	1	RESISTOR-FXD .27Ω±5%	
57	2510-0136	1	SCREW	
58	2190-0017	1	SPRING WASHER	
59	3050-0152	1	WASHER	
60	2190-0779	1	FLAT WASHER	
61	0360-0007	1	LUG	
62	2580-0006	1	NUT	
63		1	WIRE, RED	
64	8120-0367	1	CABLE	
65	0400-0011	1	GROMMET	
66	1400-0719	2	TIE RAP	
67	16047-04002	1	COVER-BOTTOM	
68	2360-0192	2	SCREW	
69	16047-40002	4	INSULATOR	
70	16038-30021	2	CONNECTOR-BNC	
71	16012-7122	2	CONNECTOR-BNC	
72	2200-0105	1	SCREW	
73	3050-0229	1	WASHER	
74	16047-40000	1	STOPPER	
75	16047-04003	1	COVER-TOP	
76	2260-0009	1	NUT	
77	3050-0789	4	WASHER	
78	2190-0878	4	WASHER	
79	2950-0043	4	NUT	
80	16047-24000	4	NUT	
81	0362-0007	4	SLEEVE	
82	16061-50031	2	SOCKET-RADIAL	
83	16061-10032	2	CONTACT-AXIAL	
84	16061-50032	2	SOCKET-AXIAL	
85	16047-00605	2	CONTACT-RADIAL	
86	16047-40001	2	SOCKET-RADIAL	
87	16047-00604	2	CONTACT-RADIAL	
88	16061-10033	2	CONTACT-AXIAL	
89	16061-10031	4	CONTACT-RADIAL	

Figure 2. Parts Identification for 16047B (Sheet 2 of 2).

# 16047C

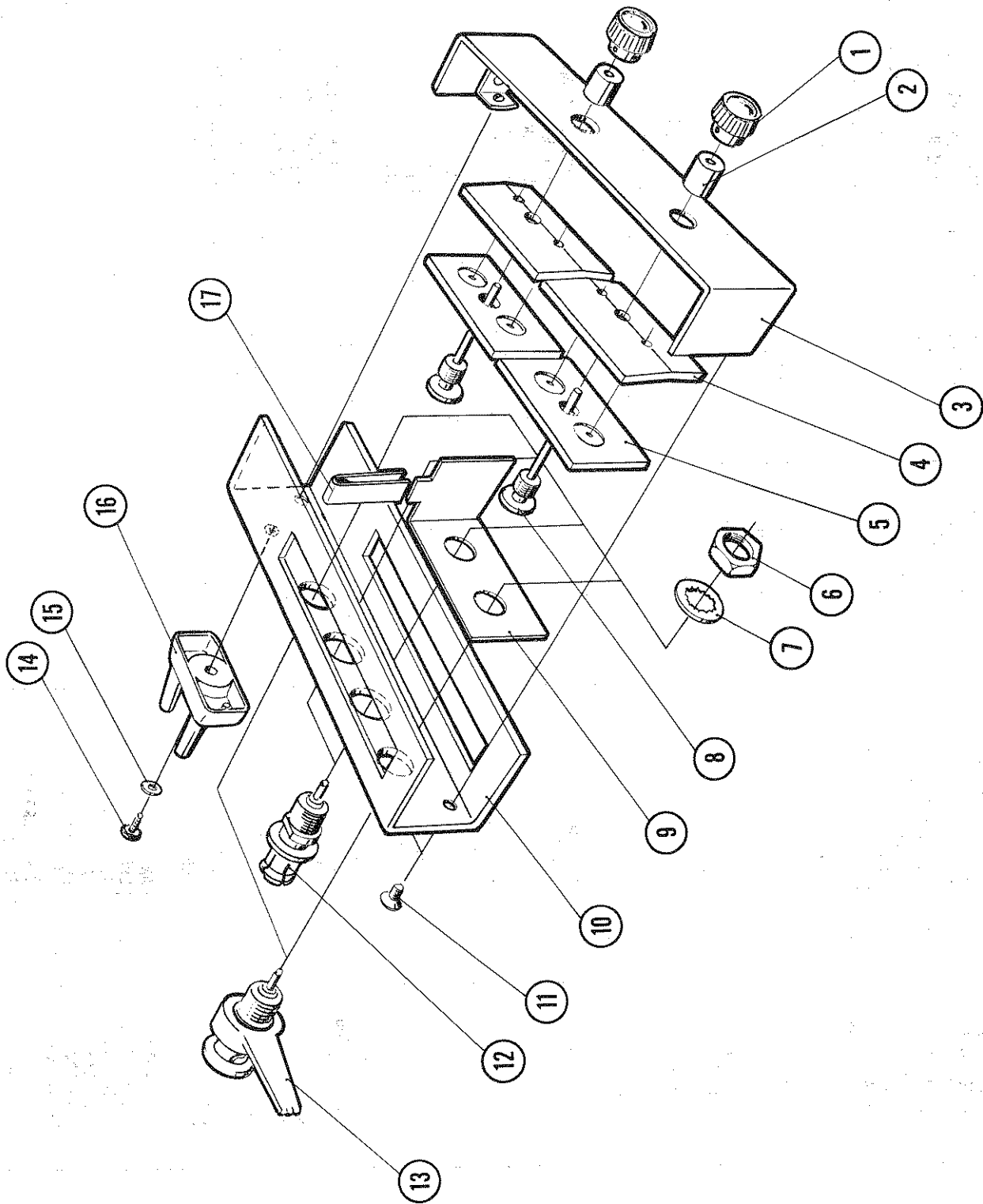


Figure 3. Parts Identification for 16047C (Sheet 1 of 2).

Item No.	Part No.	Q'ty	Description	Note
1	0370-2446	2	KNOB	
2	16047-25001	2	INSULATOR	
3	16047-04008	1	COVER-BOTTOM	
4	16047-00610	2	CONTACT	
5	16047-00609	2	CONTACT	
6	2950-0043	4	NUT	
7	2190-0016	4	WASHER	
8	16047-23001	2	SHAFT	
9	16047-00611	1	SHIELD PLATE	
10	16047-04007	1	COVER-TOP	
11	2360-0192	2	SCREW	
12	16038-30021	2	CONNECTOR-BNC	
13	16012-7122	2	CONNECTOR-BNC	
14	2200-0105	1	SCREW	
15	3050-0229	1	WASHER	
16	16047-40000	1	STOPPER	
17	16047-09001	1	INSULATOR	

Figure 3. Parts Identification for 16047C (Sheet 2 of 2).

# 16048A

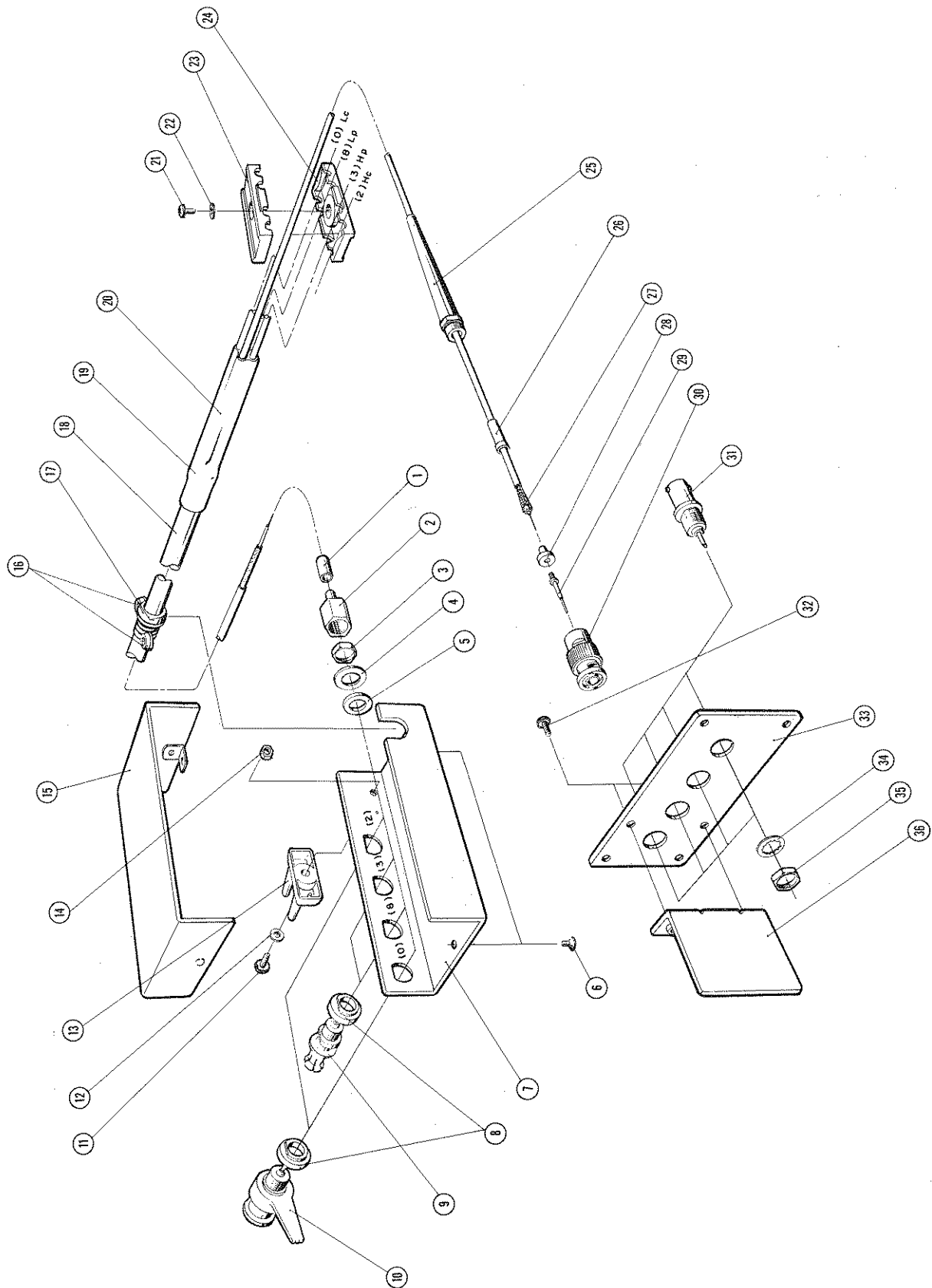


Figure 4. Parts Identification for 16048A (Sheet 1 of 2).

Item No.	Part No.	Q'ty	Description	Note
1	0362-0007	4	SLEEVE	
2	16047-24000	4	NUT	
3	2950-0043	4	NUT	
4	2190-0878	4	WASHER	
5	3050-0789	4	WASHER	
6	2360-0192	2	SCREW	
7	16047-04002	1	COVER-BOTTOM	
8	16047-40002	4	INSULATOR	
9	16038-30021	2	CONNECTOR-BNC	
10	16012-7122	2	CONNECTOR-BNC	
11	2200-0105	1	SCREW	
12	3050-0229	1	WASHER	
13	16047-40000	1	STOPPER	
14	2260-0009	1	NUT	
15	16048-04000	1	COVER-TOP	
16	1400-0719	2	TIE RAP	
17	0400-0011	1	GROMMET	
18	8120-0367	1	CABLE	
19	1251-0754	1	BUSHING	
20	16048-61600	1	ASS'Y-CABLE	
21	2360-0113	1	SCREW	
22	3050-0010	1	WASHER	
23	16021-50021	1	CABLE CRAMP	
24	16021-50022	1	CABLE CRAMP	
25	5041-3041	4	BOOT-BNC	
26	16021-30033	4	SLEEVE	
27	0890-0009	4	SLEEVE	
28	16021-30034	4	INSULATOR	
29	1250-0089	4	CONTACT	
30	1250-0052	4	CONNECTOR-BNC	
31	1250-0118	4	CONNECTOR-BNC FEMALE	
32	2360-0115	2	SCREW	
33	16032-10021	1	PLATE	
34	2190-0016	4	WASHER	
35	2950-0043	4	NUT	
36	16032-10022	1	PLATE	

Figure 4. Parts Identification for 16048A (Sheet 2 of 2).

# I 6048B

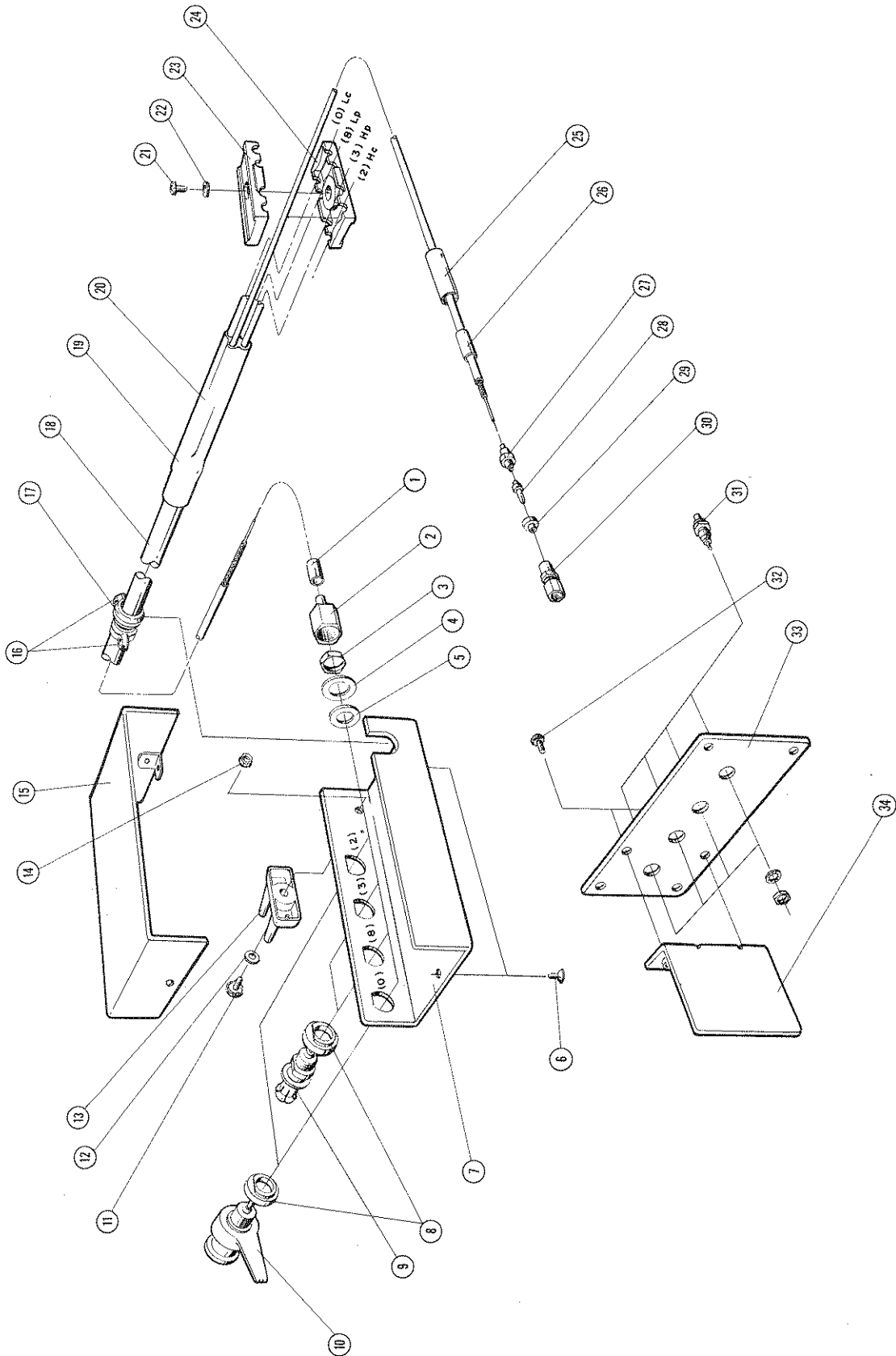


Figure 5. Parts Identification for 16048B (Sheet 1 of 2).



Item No.	Part No.	Q'ty	Description	Note
1	0362-0007	4	SLEEVE	
2	16047-24000	4	NUT	
3	2950-0043	4	NUT	
4	2190-0878	4	WASHER	
5	3050-0789	4	WASHER	
6	2360-0192	2	SCREW	
7	16047-04002	1	COVER-BOTTOM	
8	16047-40002	4	INSULATOR	
9	16038-30021	2	CONNECTOR-BNC	
10	16012-7122	2	CONNECTOR-BNC	
11	2200-0105	1	SCREW	
12	3050-0229	1	WASHER	
13	16047-40000	1	STOPPER	
14	2260-0009	1	NUT	
15	16048-04001	1	COVER-TOP	
16	1400-0719	2	TIE RAP	
17	0400-0011	1	GROMMET	
18	8120-0367	1	CABLE	
19		1	BUSHING	
20	16048-61601	1	ASS'Y-CABLE	
21	2360-0113	1	SCREW	
22	3050-0010	1	WASHER	
23	16021-50021	1	CABLE CRAMP	
24	16021-50022	1	CABLE CRAMP	
25	0890-0767	2	TUBE-RED	
25	0890-0029	2	TUBE-BLACK	
26	1250-1175	4	SLEEVE	
27	1250-1168	4	NUT CONNECTOR	
28	1250-1172	4	CONTACT	
29	1250-1173	4	INSULATOR	
30	1250-1164	4	CONNECTOR BODY	
31	1250-0829	4	CONNECTOR-RF	
32	2360-0115	2	SCREW	
33	16033-10021	1	PLATE	
34	16032-10022	1	PLATE	

Figure 5. Parts Identification for 16048B (Sheet 2 of 2).

# 16048C

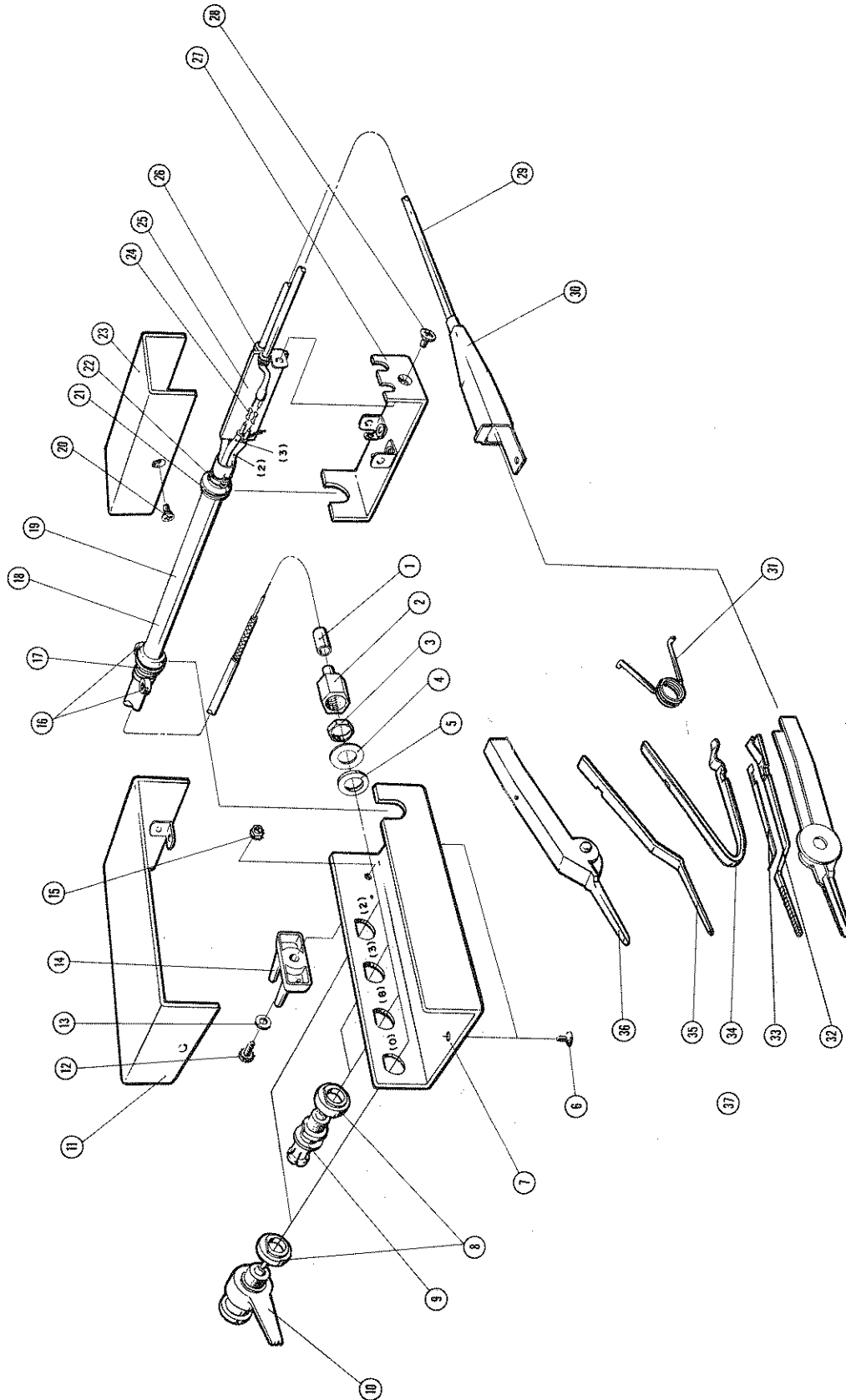


Figure 6. Parts Identification for 16048C (Sheet 1 of 2).

Item No.	Part No.	Q'ty	Description	Note
1	0362-0007	4	SLEEVE	
2	16047-24000	4	NUT	
3	2950-0043	4	NUT	
4	2190-0878	4	WASHER	
5	3050-0789	4	WASHER	
6	2360-0192	2	SCREW	
7	16047-04002	1	COVER-BOTTOM	
8	16047-40002	4	INSULATOR	
9	16038-30021	2	CONNECTOR-BNC	
10	16012-7122	2	CONNECTOR-BNC	
11	16048-04002	1	COVER-TOP	
12	2200-0105	1	SCREW	
13	3050-0229	1	WASHER	
14	16047-40000	1	STOPPER	
15	2260-0009	1	NUT	
16	1400-0719	2	TIE RAP	
17	0400-0011	1	GROMMET	
18	8120-0367	1	CABLE	
19	16048-61602	1	ASS'Y-CABLE	
20	2360-0190	2	SCREW	
21	0400-0010	1	GROMMET	
22	1400-0493	1	CABLE TIE	
23	16048-04004	1	COVER-TOP	
24	0362-0215	4	CONTACT	
25	16034-00600	1	SHIELD PLATE	
26	0400-0009	2	GROMMET	
27	16048-04003	1	COVER-BOTTOM	
28	2360-0190	1	SCREW	
29	8120-0041	4	WIRE	
30	4093-0120	1	MOLD	
31	16036-8521	1	SPRING	
32	16036-7021	1	ASS'Y-CLIP	
33	16036-8522	1	INSULATION FILM	
34	16036-1024	1	SPRING	
35	16036-1022	1	CLIP	
36	16036-5121	2	PROBE SHELL	
37	16036-7511	1	ASS'Y-PROBE	

Figure 6. Parts Identification for 16048C (Sheet 2 of 2).

# I6034B

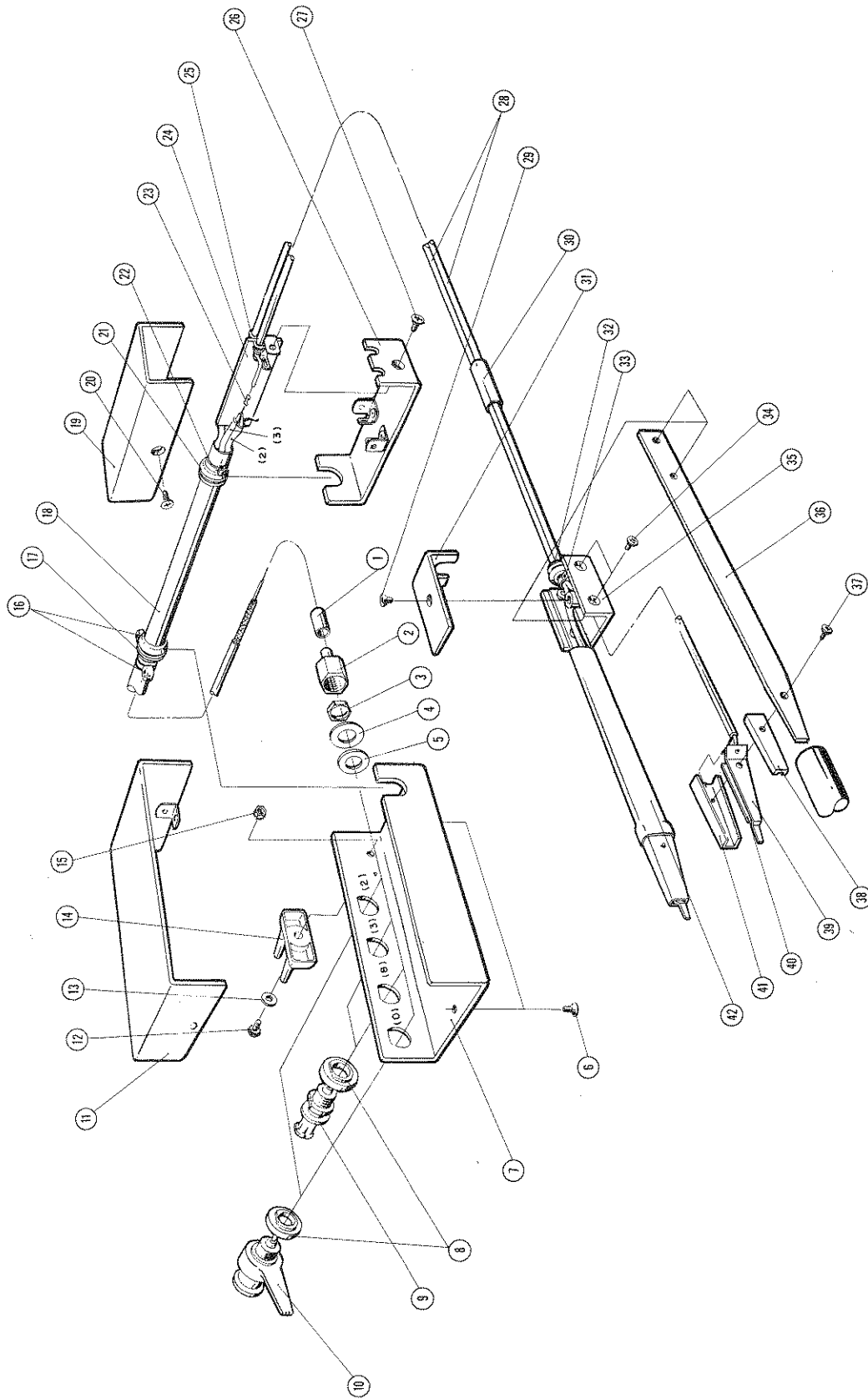


Figure 7. Parts Identification for 16034B (Sheet 1 of 2).

Item No.	Part No.	Q'ty	Description	Note
1	0362-0007	4	SLEEVE	
2	16047-24000	4	NUT	
3	2950-0043	4	NUT	
4	2190-0878	4	WASHER	
5	3050-0789	4	WASHER	
6	2360-0192	2	SCREW	
7	16047-04002	1	COVER-BOTTOM	
8	16047-40002	4	INSULATOR	
9	16038-30021	2	CONNECTOR-BNC	
10	16012-7122	2	CONNECTOR-BNC	
11	16034-04000	1	COVER-TOP	
12	2200-0105	1	SCREW	
13	3050-0229	1	WASHER	
14	16047-40000	1	STOPPER	
15	2260-0009	1	NUT	
16	1400-0719	2	TIE RAP	
17	0400-0011	1	GROMMET	
18	8120-0367	1	CABLE	
19	16048-04004	1	COVER-TOP	
20	2360-0190	2	SCREW	
21	0400-0010	1	GROMMET	
22	1400-0493	1	CABLE TIE	
23	0362-0215	2	CONTACT	
24	16034-00600	1	SHIELD PLATE	
25	0400-0009	2	GROMMET	
26	16048-04003	1	COVER-BOTTOM	
27	2360-0190	1	SCREW	
28	8120-0041	2	CABLE	
29	2200-0140	4	SCREW	
30	0890-0312	1	TUBE	
31	16034-01204	1	ANGLE	
32	0400-0010	1	GROMMET	
33	1400-0493	1	TIE RAP	
34	2200-0140	2	SCREW	
35	16034-01203	1	BRACKET	
36	16034-00603	2	ARM PLATE	
37	0520-0163	2	SCREW	
38	16034-40001	2	INSULATOR	
39	16034-09001	2	CONTACT	
40	16034-09002	2	SPACER	
41	16034-00602	2	SHIELD PLATE	
42	0890-0273	2	TUBE-BLACK	

Figure 7. Parts Identification for 16034B (Sheet 2 of 2).

# I 6023B

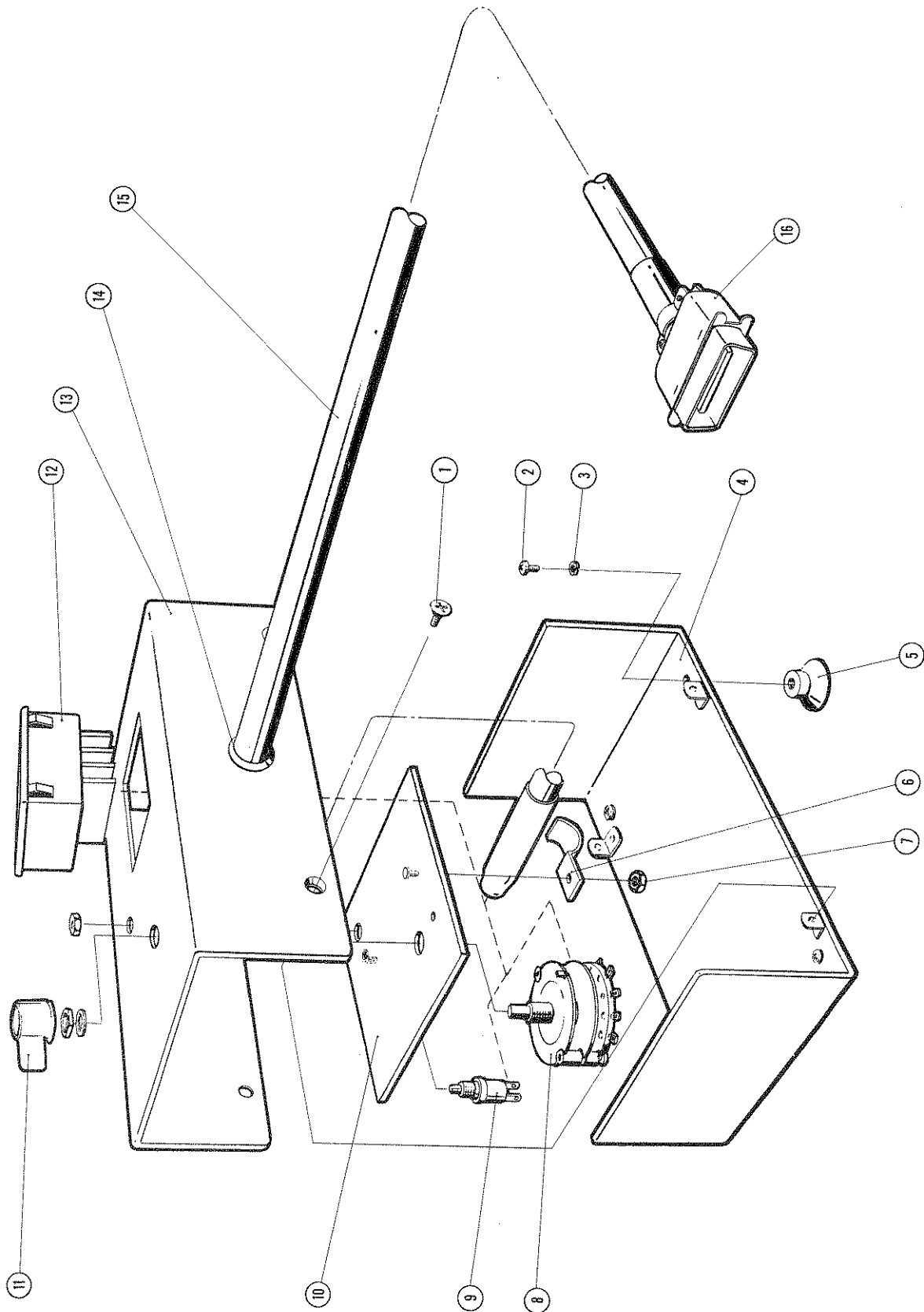


Figure 8. Parts Identification for 16023B (Sheet 1 of 2).

Item No.	Part No.	Q'ty	Description	Note
1	2360-0192	4	SCREW	
2	0570-0394	4	SCREW	
3	2190-0226	4	WASHER	
4	16023-04001	1	COVER-BOTTOM	
5	16015-8522	4	FOOT	
6	1400-0014	1	CABLE CRAMP	
7	2420-0001	1	NUT	
8	3100-1204	1	SWITCH-ROTARY	
9	3101-1074	1	SWITCH-PUSH BUTTON	
10	16023-00600	1	PLATE	
11	0370-2994	1	KNOB	
12	3100-1203	1	SWITCH	
13	16023-04000	1	COVER-TOP	
14	0400-0005	1	GROMMET	
15	16023-61600	1	ASS'Y-CABLE	
16	1251-0293	1	CONNECTOR	

Figure 8. Parts Identification for 16023B (Sheet 2 of 2).

16047A

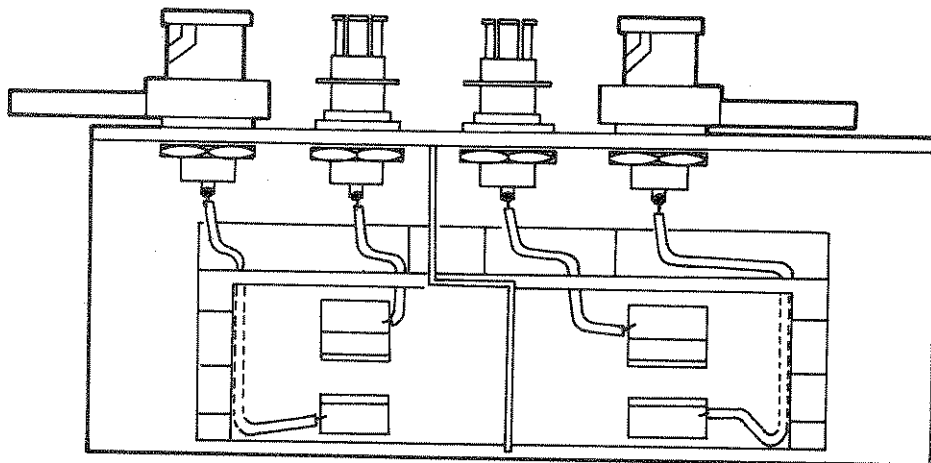
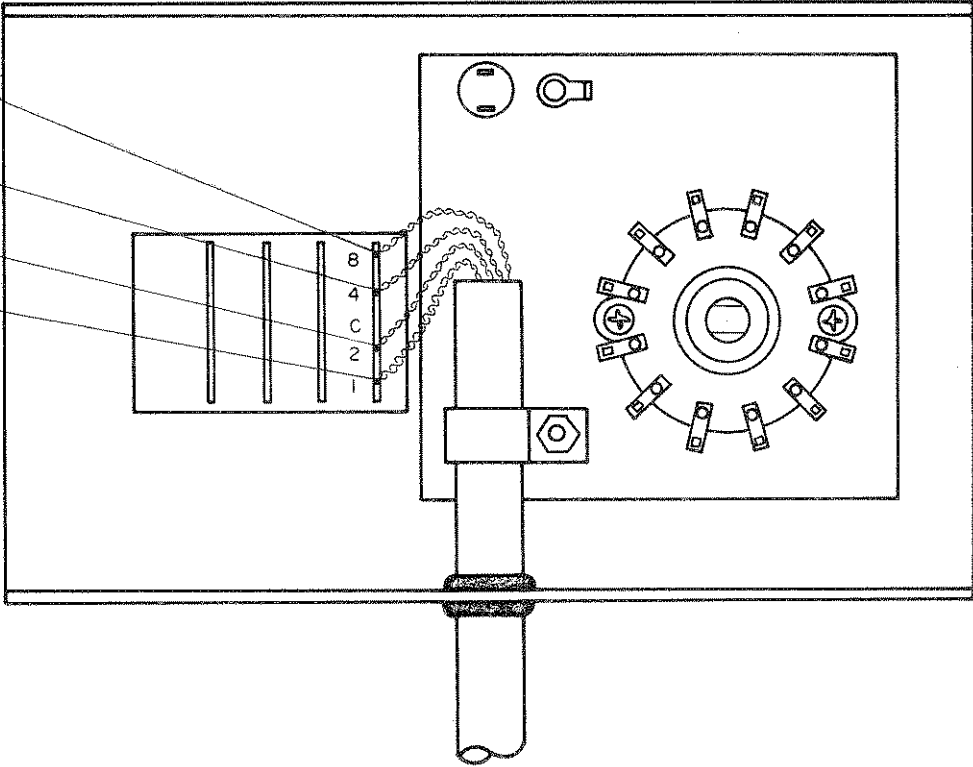


Figure 9. Internal Wiring for 16047A.



# 16023B

- yellow (4)
- orange (3)
- red (2)
- brown (1)



- gray (8)
- purple (7)
- blue (6)
- green (5)

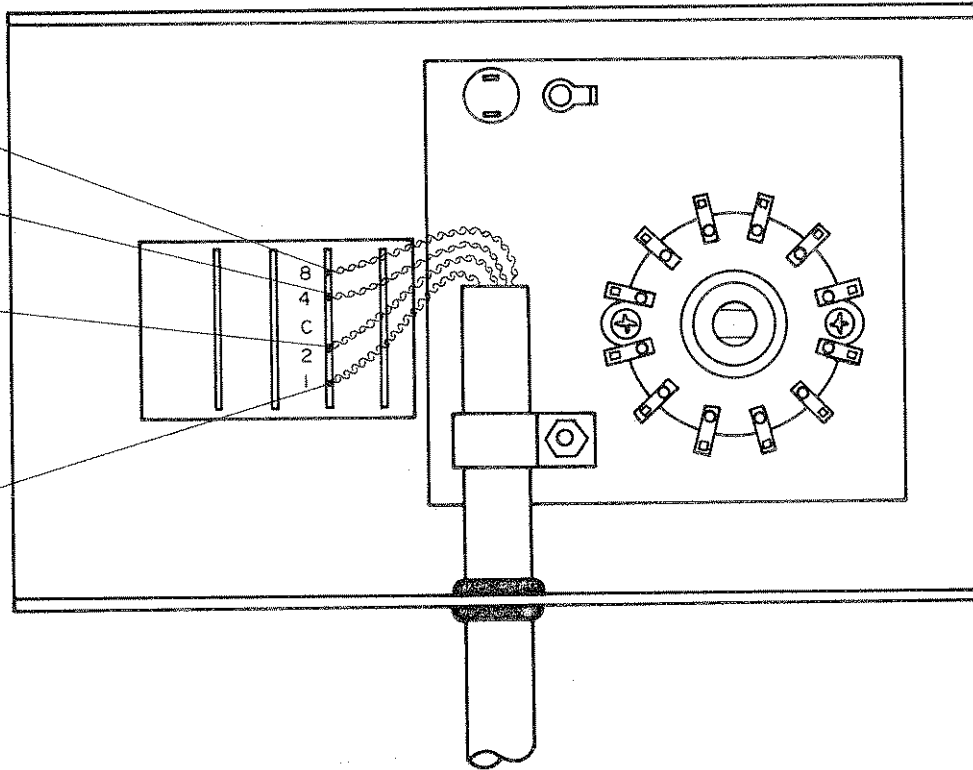


Figure 10. Internal Wiring for 16023B (Sheet 1 of 3).

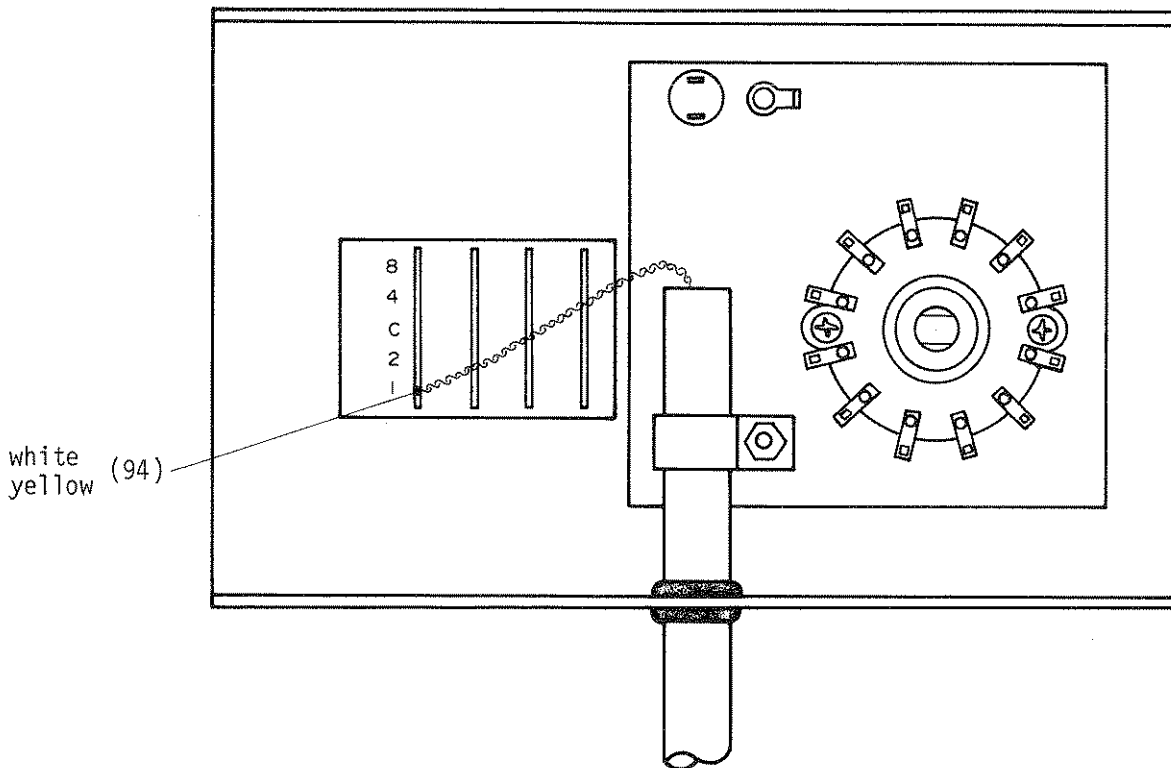
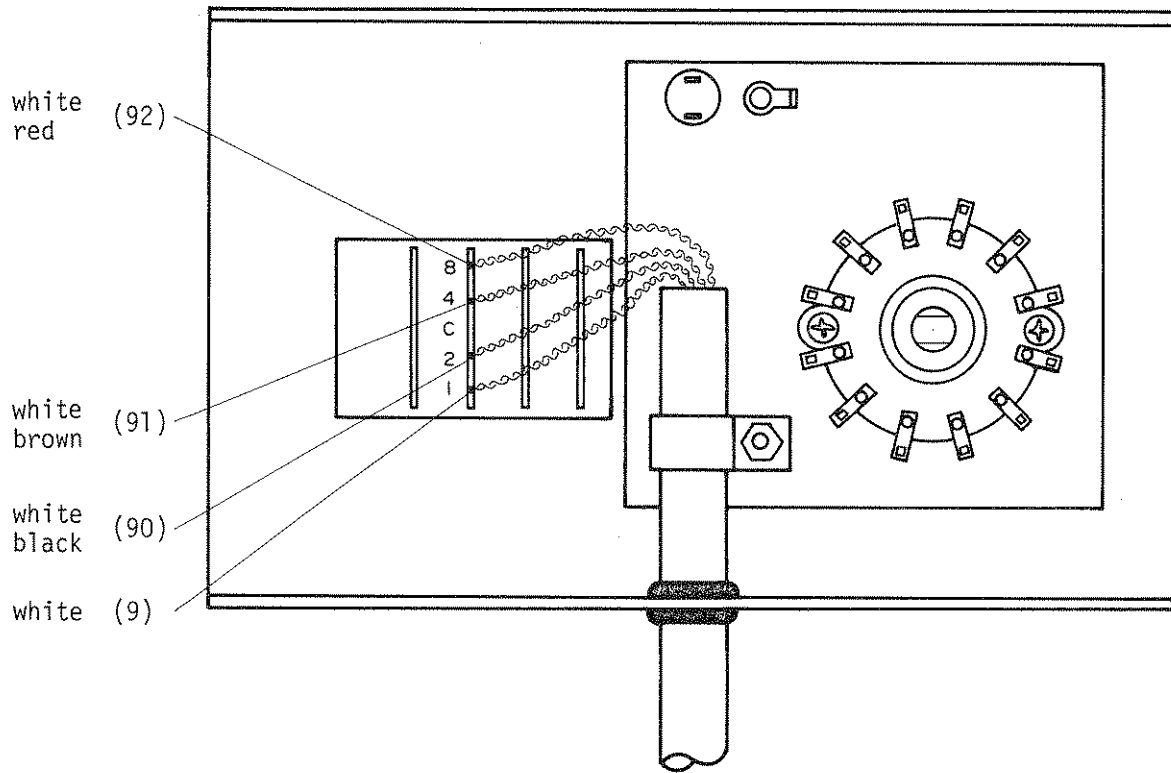


Figure 10. Internal Wiring for 16023B (Sheet 2 of 3).

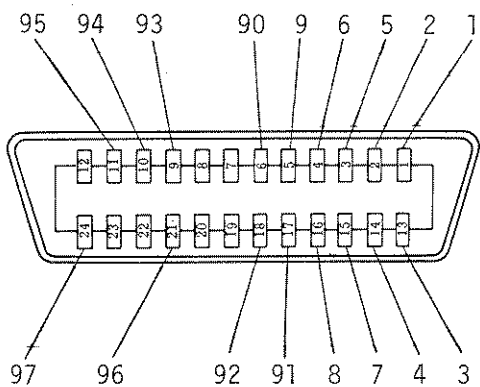
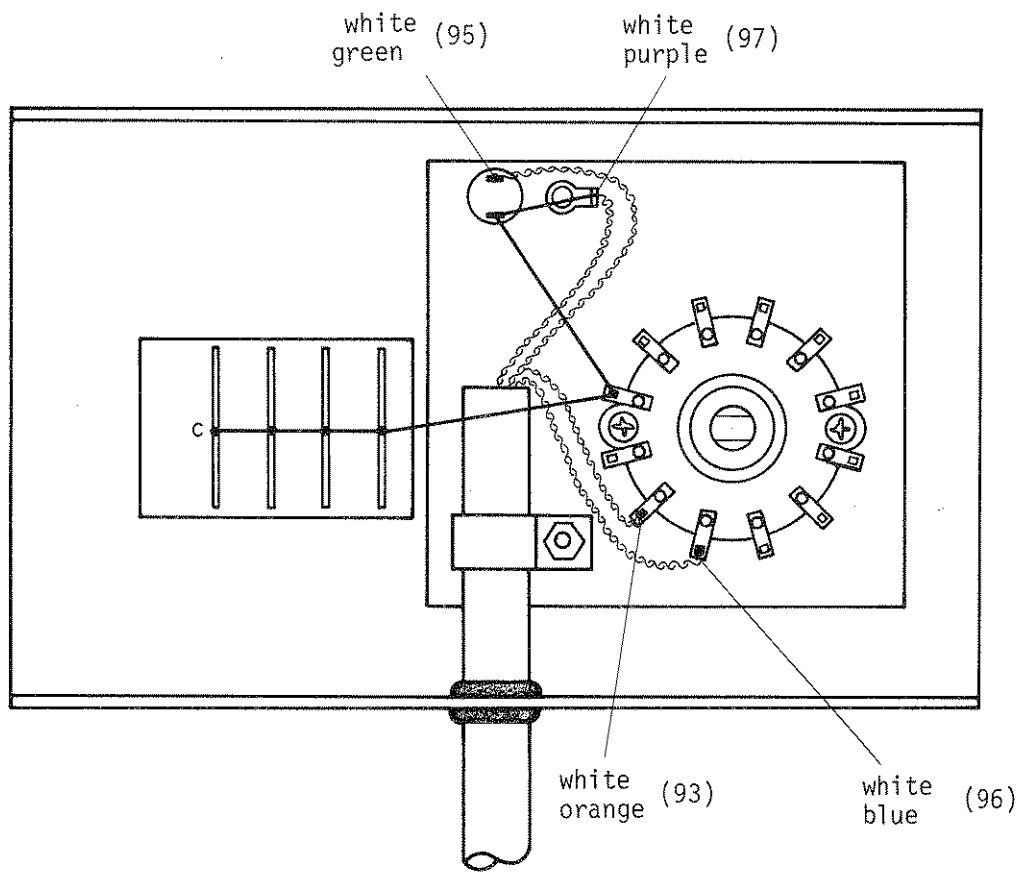


Figure 10. Internal Wiring for 16023B (Sheet 3 of 3).

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