

**BK PRECISION®**

**MODEL 575 HANDHELD  
DIGITAL IC TESTER**

**OPERATOR'S MANUAL**

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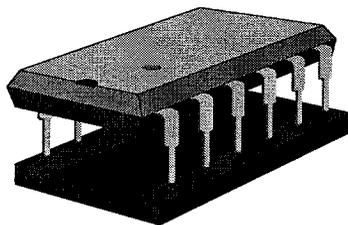
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## 1. Introduction

Thank you for purchasing the B&K Precision Model 575 Handheld Digital IC Tester.

The basic function of the Model 575 Handheld Digital IC Tester is to test a digital IC for correct logical functioning as described in the truth table and/or function table. The Model 575 Handheld Digital IC Tester applies the necessary signals to the inputs of the IC, monitoring the outputs at each stage and comparing them with the expected states. Any discrepancy results in a FAIL indication and the faulty pins are shown on the integral LCD display. Additional facilities are also provided, among them test loops that can be used for goods inwards inspection, detecting intermittent faults or simply providing a rapid method of exercising any IC for demonstration or educational purposes. Since the Model 575 Handheld Digital IC Tester contains an extensive IC library, it is not necessary to program the unit yourself other than to key in the IC number. It is also capable of identifying an unknown IC using the SEARCH mode - this is a feature that many users will find extremely valuable.



## 2. DC input

The Model 575 Handheld Digital IC Tester is powered by four AA batteries or by use of the battery eliminator input at the rear of the case. Nickel-Cadmium batteries have a terminal voltage that is too low and they should not be used. To insert the batteries, turn the unit upside down and remove the battery cover by removing the two cross head screws holding it in place. The batteries must be inserted in the correct orientation, as indicated by the drawing within the battery compartment. Incorrect insertion of batteries may cause damage to the unit. Replace the battery cover and insert the screws. If the battery voltage falls below 5.1 volts, a low battery warning symbol will be displayed at the top left hand cell of the display in normal operating mode. A low battery warning will also be displayed during a result display. Test results may be inconsistent under these conditions.

### 3. Battery eliminator

An external regulated battery eliminator is available for prolonged use of the Model 575 Handheld Digital IC Tester. Many bipolar LSI ICs consume a large amount of current when powered up, and battery life can be conserved by using the eliminator. There is no need to remove the batteries prior to inserting the battery eliminator. However, please note that during prolonged periods of non-use batteries are prone to leakage and should be removed. Note that to avoid damage to the unit we strongly advise that you only use the recommended battery eliminator that is available by contacting your distributor.

### 4. Switching on

To switch the unit on, simply press the 'ON' key. To preserve battery life, the unit powers itself off after approximately three minutes of non-use. When the unit is switched on it first of all performs a self diagnosis test. Therefore, before switching on, check that the test socket is empty to prevent interference with the diagnostics. If the unit passes the self test the display will be as follows:-



```
NO:      :  
MODE: SINGLE :RDY
```

When this initial display is obtained the Model 575 Handheld Digital IC Tester is ready for use. If, however, the message SELF TEST FAIL:- is displayed along with a fault message, this indicates that a self test diagnostic fault has been detected. Pressing the EXEC key will display all the faults diagnosed before reverting to the opening menu as above, but of course operation of the unit will then be suspect. Before contacting your distributor, check that the test socket is completely empty.

## 5. Operating modes

The Model 575 Handheld Digital IC Tester has a number of test modes that are selected using the MODE/CLEAR key from the initial screen. The test modes are as follows:-

- SINGLE - execute a single test on the IC in the socket.
- LOOP - execute a test repeatedly, regardless of the result.
- P LOOP - execute a test repeatedly, provided the result was PASS.
- F LOOP - execute a test repeatedly, provided the result was FAIL.
- SEARCH - identify the number of the IC in the socket.
- DIAGS - execute the diagnostic self test.

## 6. Entering test numbers

Press the MODE/CLEAR key until the desired test mode is displayed. Enter the number of the IC you wish to test. Pressing the MODE/CLEAR key will clear these digits from the display if a mistake is made.

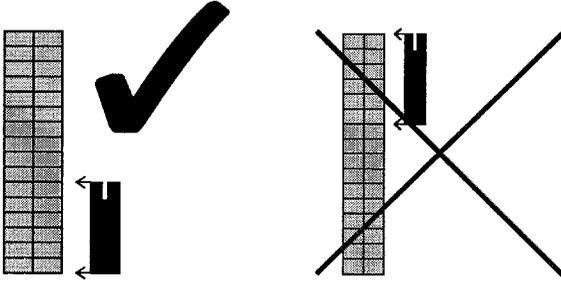
**Note:** The NUMERIC information only is entered, leaving out the manufacturers prefixes, suffixes, and IC family information. As an example, all the following TTL ICs should be entered as 7, 4, 0, 0 on the keypad:-

**DM74LS00J, N74LS00N, N74S00N, N7400N, 74ALS00N etc**

A very small number of ICs have differing pin-outs for different IC families - in these cases the most popular pin-out only is supported. The CMOS 4000 series is also supported and the IC numbers for this family should all begin with "4", so that with for example Motorola ICs beginning MC14... the initial "1" should be omitted. The same principles apply also to memory ICs, which are mostly four digit numbers. With interface ICs of the 8T series the "T" should be omitted. A complete list of all ICs supported by the Model 575 Handheld Digital IC Tester is contained in the IC SUPPORT LIST at the end of this manual together with notes on any special requirements for certain ICs.

## 7. Testing the IC

Insert the IC to be tested in the front of the 40 pin Zero Insertion Force socket with pin 1 towards the display as below:-



Ensure that the operating lever on the socket is in the open (i.e. up) position before inserting the IC. Close the socket by lowering the lever, making sure that the IC is firmly seated in the socket and making good contact. Press the TEST/EXEC key to activate the test sequence for the IC. If an invalid IC type number was entered, or if the IC you have requested is not supported the message "Unknown" will be displayed. Simply entering another IC type number will automatically clear this error message. If a valid type number was entered, the IC test will begin and the message "BUSY" will be displayed while the test proceeds. Many of the tests, however, execute so quickly that this message is not noticeable.

## 8. Test results

A pre-determined sequence of signals is applied to the inputs of the IC and the IC outputs are monitored for the correct logic levels. The unit uses TTL logic levels when evaluating the response of the IC outputs. If all the outputs respond correctly result PASS will be displayed at the top right of the display. A scrolling message will contain the IC function and power pin information.

If the IC under test takes an excessive amount of current when power is applied, a warning 'ICC!' will appear on the top right of the display. Press the TEST/EXEC key to continue with the test, or CLEAR to abandon. Depending on the condition of the batteries there may also

be a BAT! warning which indicates that the batteries are incapable of supplying the current required by the IC under test. You can continue with the test by pressing the TEST/EXEC key, but the unit may malfunction because of a drop in battery voltage. To avoid this change the batteries or use a battery eliminator. Note that a faulty IC may demand more operating current and therefore will quickly drain the batteries.

In the case of a FAIL result the error conditions at all the non-functional pins of the IC will be scrolled on the display, and also the IC function will be shown. The various failure conditions that can be displayed are as follows:-

- LOW - the output shown was LOW when a HIGH was expected
- HIGH - the output shown was HIGH when a LOW was expected
- LOAD 0V - the input shown cannot be driven high by the unit
- LOAD 5 - the input shown cannot be driven low by the unit

In some cases the scrolling test results may include one or more WARNING indications. These warnings indicate conditions that may result in an incorrect test result, and are as follows:-

- D/F - Result may be invalid because last self test failed.
- Bat - Battery voltage below 5.1V during test
- ICC - Large current taken by IC under test

Before discarding a failed IC check that the correct IC type number was entered and also check that the IC pins are clean and making good contact with the test socket. Note that there is no way of stopping a test once it has commenced, but see the description of loop functions later in this manual.

## 9. Testing further ICs

After a test is completed the test result will be displayed. To test another IC of the same type, simply insert the next IC and press the TEST/EXEC key again. To test a different IC, enter the new IC type number in the usual way, noticing that pressing the first digit of the new number automatically clears the previous number from the display.

Remember that the CLEAR key can be used if an error is made during the entry of the IC type number.

## 10. Continuous testing

It is possible to test the same IC repeatedly to detect intermittent or temperature related faults, or to rapidly test a batch of identical ICs. There are three types of test loop modes:-

- LOOP - execute a test repeatedly, regardless of the result.
- P LOOP - execute a test repeatedly, provided the result was PASS.
- F LOOP - execute a test repeatedly, provided the result was FAIL.

The Model 575 Handheld Digital IC Tester is configured into one of the loop modes using the MODE/CLEAR key as described earlier. Insert the IC and press TEST/EXEC in the usual way to start the continuous test process. The result of each test is displayed as PASS or FAIL on the top right of the display. In LOOP mode this allows a large batch of identical ICs to be tested, without any action on the part of the operator other than inserting the IC. When the IC is inserted, sufficient time must be allowed for the test to take place before the result status is updated, so if in doubt the IC should be tested in single mode so that the approximate test time can be determined. It will be found that high throughput can be obtained using this mode.

To stop any of the test loops, press CLEAR, but note that the test in progress is completed before the command is obeyed. The effect of this is usually unnoticeable, but where the test takes a reasonable time to execute there will be a delay before the instrument responds to the CLEAR key.

**Note:** Testing high current ICs in loop mode will drain the batteries quickly, and it is recommended that a battery eliminator is used if you wish to perform loop tests. If the ICC! warning appears, the Compact will reconfigure itself to SINGLE mode to avoid draining the batteries.

## 11. Search mode

This feature allows the type number of an unknown IC to be determined, provided the IC is actually contained in the Model 575 Handheld Digital IC Tester library, and it is a functional IC. This facility is useful when the IC type number is illegible or has been removed.

Use the MODE/CLEAR key to choose SEARCH mode, insert the unknown IC into the socket and press the TEST/EXEC key. The user will be prompted to choose the number of pins of the IC you wish to identify - use the MODE/CLEAR key to select from 8 to 40 pins or 'QUIT' to abandon this mode. Press the TEST/EXEC key again to start the SEARCH or to quit as required.

During the identification process the display will now indicate the number of ICs identified (IDENT:) and will also show graphically how far through the library the SEARCH has progressed. At the end of the SEARCH a list of all the similar ICs will be scrolled onto the display. The list may be viewed again by pressing the TEST/EXEC key.

If the IC cannot be identified the message "Not in Library" will be displayed. This either means that the IC is not in the library or it is non-functional. Note that if the Compact detects excessive supply current (ICC! or BAT! warnings), the IC will not be identified during the SEARCH, but can still be tested in SINGLE mode.

## 12. Self test mode

This feature allows you to check the integrity of the unit, including the pin drivers and receivers, power supplies and other internal hardware. The test executes automatically at switch on, but you can if you wish perform a self test at any time by selecting Self Test (DIAGS) mode using the MODE/CLEAR key and pressing TEST/EXEC.

If a fault is discovered an alphanumeric code will be displayed which will help our engineers to locate and rectify the fault. This code should be noted and quoted in any correspondence relating to a unit fault. Contact your distributor in the event of a self test fail, but first of all ensure that the socket was empty when the diagnostics were run.

**Note:- The self test run when "Diags" is selected includes a check of the internal program ROM which is not done during the power up self test.**

**SPECIFICATION**

Batteries:	4 X 1.5V AA size (not Ni-Cd)		
DC input:	6V, 300mA max, Regulated.		
Power consumption:	Power off	10 $\mu$ A	
	Standby	10mA	
Test thresholds:	Logic High	2.2V Min	
	Logic Low	0.8V Max	
Dimensions:	200mm X 100mm X 55mm approx.		
Library ICs:	TTL, CMOS, VLSI, Interface, Memory		

**13. IC Support List**

Software Version No.

**2.01****13.1. Introduction**

This section is a complete list of the ICs supported by the Model 575 Handheld IC Tester. If there are any special requirements necessary for a particular IC, there will be a number in brackets referring to the notes at the end of this manual. Always consult this list before testing an IC you have not tested before, particularly when there is a note to refer to.

**13.2. Series 54/74 TTL ICs**

7400	7420	7445	7476
7401	7421	7446	7477
7402	7422	7447	7478
7403	7423	7448	7480
7404	7424	7449	7482
7405	7425	7450(1)	7483
7406	7426	7451(2)	7485
7407	7427	7453(1)	7486(2)
7408	7428	7454(2)	7489
7409	7430	7455	7490
7410	7431	7456	7491
7411	7432	7457	7492
7412	7433	7460	7493
7413	7437	7464	7494
7414	7438	7465	7495
7415	7439	7470	7496
7416	7440	7472	7497
7417	7442	7473	74100(3a)
7418	7443	7474	74104
7419	7444	7475	74105

74107	74170	74260	74384
74109	74171	74261	74385
74110	74173	74265	74386
74111	74174	74266	74387
74112	74175	74273	74390
74113	74176	74276	74393
74114	74177	74278	74395
74116	74178	74279	74398
74118	74179	74280	74399
74119	74180	74281	74408
74120	74181	74283	74412
74122(3)	74182	74284	74415
74123(3)	74183	74285	74422(3)
74125	74184	74287	74423(3)
74126	74185	74288	74425
74128	74188	74289	74426
74132	74189	74290	74436
74133	74190	74293	74437
74134	74191	74295	74440
74135	74192	74298	74441
74136	74193	74299	74442
74137	74194	74300	74443
74138	74195	74301	74444
74139	74196	74322	74445
74140	74197	74323	74446
74143	74198	74347	74447
74144	74199	74348	74448
74145	74200	74350	74449
74147	74201	74351	74465
74148	74224	74352	74466
74150	74225	74353	74467
74151	74230	74354	74468
74152	74231	74355	74470
74153	74237	74356	74471
74154	74238	74357	74472
74155	74240	74363	74473
74156	74241	74364	74474
74157	74242	74365	74475
74158	74243	74366	74490
74159	74244	74367	74518
74160	74245	74368	74519
74161	74246	74373	74520
74162	74247	74374	74521
74163	74248	74375	74522
74164	74249	74376	74533
74165	74251	74377	74534
74166	74253	74378	74540
74167	74257	74379	74541
74168	74258	74381	74543
74169	74259	74382	74560

74561	74641	74691	741005
74563	74642	74692	741008
74564	74643	74693	741010
74568	74644	74696	741011
74569	74645	74697	741020
74573	74646	74698	741032
74574	74647	74699	741035
74576	74648	74760	741240
74580	74649	74804	741241
74590	74651	74805	741242
74591	74652	74808	741243
74592	74653	74832	741244
74593	74654	74867	741245
74595	74666	75869	741620
74596	74667	74873	741621
74597	74668	74874	741622
74604	74669	74876	741623
74605	74670	74878	741638
74606	74671	74879	741639
74607	74672	74880	741640
74620	74682	74906	741641
74621	74683	74907	741642
74622	74684	74929	741643
74623	74685	741000	741644
74638	74688	741002	741645
74639	74689	741003	
74640	74690	741004	

### 13.3. CMOS ICs

Note: 74C and 74HC ICs are listed in the TTL section

4000	4020	4042	4072
4001	4021	4043	4073
4002	4022	4044	4075
4006	4023	4049	4076
4007	4024	4050	4077
4008	4025	4051	4078
4009	4026	4052	4081
4010	4027	4053	4082
4011	4028	4056	4085
4012	4029	4060	4086
4013	4030	4063	4089
4014	4031	4066	4093
4015	4032	4067	4094
4016	4035	4068	4098 (3)
4017	4038	4069	4099
4018	4040	4070	4104
4019	4041	4071	4106

4160	4511	4555	40109
4161	4512	4556	40160
4162	4514	4557	40161
4163	4515	4558	40162
4174	4516	4559	40163
4175	4517	4560	40174
4192	4518	4561	40175
4193	4519	4572	40181
4194	4520	4583	40192
4195	4522	4584	40193
4240	4526	4585 (4)	40194
4244	4527	4599	40195
4245	4528 (3)	4724	40240
4373	4530	4731	40244
4374	4531	40085	40245
4501	4532	40097	40373
4502	4538 (3)	40098	40374
4503	4539	40102	5029
4506	4541	40103	22100
4507	4543	40104	(use 2210)
4508	4544	40106	
4510	4547	40107	

### 13.4. Memory ICs

1220	2k * 8	4816	16k * 1
1403	16k * 1	5110	1024k * 1
2015	2k * 8	5256	256k * 4
2016	2k * 8	5516	2k * 8
2102	1k * 1	5517	2k * 8
2112	256 * 4	5518	2k * 8
2114	1k * 4	6104	4K * 1
2141	4k * 1	6116	2k * 8
2142	1k * 4	6167	16k * 1
2147	4k * 1	62256	32k * 8 use 6256
2148	1k * 4	6264	8k * 8
2149	1k * 4	6810	128 * 8
2600	64K * 1	7164	16k * 4
2700	256 * 1	7185	8k * 8
2703	16 * 4	7186	8k * 8
3101	16 * 4	7489	16 * 4
4164	64k * 1	74189	16 * 4
41256	256k * 1	74200	256 * 1
41257	256k * 1	74201	256 * 1
41464	64k * 4	74289	16 * 4
4256	256k * 1	74300	256 * 1
4416	16k * 4	74301	256 * 1
4464	8k * 8	74929	1k * 1
4532	32K * 1 (5)	8225	16 * 4

2716	2k * 8 EPROM (6)	1846	512 * 8 PROM (6)
2732	4K * 8 EPROM (6)	74188	32 * 8 PROM (6)
2764	8K * 8 EPROM (6)	74287	256 * 4 PROM (6)
27128	16K * 8 EPROM (6)	74288	32 * 8 PROM (6)
27256	32K * 8 EPROM (6)	74387	256 * 4 PROM (6)
27512	64K * 8 EPROM (6)	74470	256 * 8 PROM (6)
27101	128K * 8 EPROM (6)	74471	256 * 8 PROM (6)
271001	128K * 8 EPROM (6)	74472	512 * 8 PROM (6)
1410	256 * 4 PROM (6)	74473	512 * 8 PROM (6)
1822	256 * 8 PROM (6)	74474	512 * 8 PROM (6)
1830	32 * 8 PROM (6)	74475	512 * 8 PROM (6)
1842	512 * 8 PROM (6)		

### 13.5. Interface, Peripheral, Microprocessor & LSI ICs

<u>75... SERIES</u>	75417	8837
75113	75418	8838
75114	75419	8881
75121	75451	8885
75122	75452	
75123	75453	<u>8T SERIES</u>
75124	75454	8T13 use 813
75125	75465	8T14 use 814
75127	75466	8T23 etc
75128	75468	8T24
75129	75469	8T26
75136	75476	8T28
75138	75477	8T38
75146	75478	8T97
75151	75479	8T98
75153	75491	8T127
75158	75492	8T128
75159		8T129
75160	<u>ULN2... SERIES</u>	
75161	2001	<u>82... SERIES</u>
75163	2003	8234
75172	2004	8251 use 9251
75173	2005	8266
75174	2064	8273
75175	2065	
75183	2066	<u>25/26/29... SERIES</u>
75189	2067	2510
75192	2068	2514
75194	2069	2515
75195	2070	2518
75401		2522
75402	<u>DS88... SERIES</u>	2595
75403	8815	252517
75404	8830	252521
75416	8831	252536

252568	3446	8286
252569	3486	8287
2610	3487	8288
2611		8289
2631	<u>Z80... SERIES</u>	8755
2632	780 Z80 CPU	
2633	8400 Z80 CPU	<u>MISCELLANEOUS</u>
2901	8420 Z80 PIO	1005
2902	8430 Z80 CTC	1006
2907	8440 Z80 SIO	1489
2908	8442 Z80 SIO-2	384
2911	8470 Z80 DART	491
2918		492
2922	<u>MC65... SERIES</u>	5452
2924	6502	54563 use 75563
29821	6510	54564 use 75564
29822	6520	58167
29823	6522	6595
29824	6545	7641
29825	6551	8131
29826		8136
29841	<u>INTEL SERIES</u>	8160
29842	8031	8230
29843	8032	8252
29844	8039 (9)	8262
29845	8040 (9)	8277
29846	8042 (8)	8641
	8085	9014
<u>MC68... SERIES</u>	8088 (7)	9301
6800	8155	9309
6802 (13)	8156	9312
6805 (12)	8212	9314
6818	8216	9324
6820	8226	9328
6821	8228	9338
6845	8237	9347
6850	8243	9348
6880	8250	9614
6887	8253	9640
6888	8254	9641
6889	8255	9901
68681 use 6881	8259	9902 (10)
	8279	9995 (11)
<u>MC34... SERIES</u>	8282	
3438	8283	

### 13.6. Notes on TTL ICs

**Note 1:** The 7450 and 7453 ICs have non-TTL compatible expander inputs which are often not used in designs.

**Note 2:** The 74LS51 and 74LS54 have differing pin connections and functions from the standard 7451 and 7454 ICs. The test assumes that the 'LS version is being tested - to test the standard version use the numbers 7450 and 7453 respectively. In addition, the 74L86 IC has a different pin out to the standard 7486 ICs, but it can be tested using the 74386 test.

**Note 3:** When testing these ICs the warning "EXT" will appear on the LCD display. This means that external timing components are required to test the IC. The timing components should be inserted into the socket as given in following table:-

IC	COMPONENTS
74122/74422	2.2 $\mu$ F between pins 24 and 26 of the ZIF socket, +ve to pin 26
74123/74423	2.2 $\mu$ F between pins 18 and 19 of the ZIF socket, +ve to pin 19 2.2 $\mu$ F between pins 27 and 26 of the ZIF socket, +ve to pin 27
4528/4538/4098	0.22 $\mu$ F between pins 13 and 14 of the ZIF socket. 0.22 $\mu$ F between pins 27 and 26 of the ZIF socket.

**Note 3a:** The 74100 IC can be tested by adding a wire link between pins 1 and 7 of the ZIF socket prior to the test.

### 13.7. Notes on CMOS ICs

**Note 4:** Certain differences exist between manufacturers parts with this IC which may cause a FAIL result with ICs other than (Motorola) MC14585 ICs. Consult the data sheets for full details.

### 13.8. Notes on memory ICs

**Note 5:** The 4532 32k DRAM is in fact a partially non-functional 64k DRAM, as used on the Spectrum computer. Four types are used on the Spectrum, manufactured by OKI and TI who each supply two types.

The type numbers 45321 and 45322 are used for OKI types, and 45323 and 45324 are used for TI types. The first number in each case is for the low array version, and the second number for the high array version. See the IC data sheets for further details.

**Note 6:** The EPROM tests perform a blank check and checksum on the IC, and also display the contents of the first 16 locations. These tests cannot confirm the integrity of an IC, or identify it in SEARCH mode, since they have no knowledge of the intended contents of the EPROM. Please be patient when testing EPROM's in this way - some of the larger ICs take a long time to read.

### **13.9. Notes on interface ICs**

**Note 7:** The MOS version of this IC is internally dynamic, and the test may FAIL after a prolonged in-circuit LOOP test. The CMOS version, however, is completely static.

**Note 8:** The 8742 EPROM version of this IC must have the erase window covered otherwise the test may FAIL.

**Note 9:** The 8039 and 8040 ICs should be tested in FAIL LOOP mode due to the power down mode of the ICs affecting tester synchronisation.

**Note 10:** This IC should only be tested in SINGLE MODE with a 1uF decoupling CAPACITOR connected across the supply and ground pins 18 and 9 of the ZIF socket due to its high supply current requirement.

**Note 11:** This IC requires a 1uF decoupling CAPACITOR to be connected across the supply & ground pins 10 & 31 of the ZIF socket due to its high supply current requirement.

**Note 12:** This IC may need to be tested in FAIL LOOP MODE.

**Note 13:** The V STBY pin (35) must be connected to the VCC pin (8) using a wire link in order to test this device.

## 14. Service Information

Contact B&K Precision to receive a repair Return Authorization tracking number. This number must be clearly written on the exterior of the shipping carton and will assist us with the processing of your return. Return all merchandise to B&K Precision Corp. with pre-paid shipping. The flat-rate repair charge includes return shipping to locations in North America. For overnight shipments and non-North America shipping fees contact B&K Precision Corp.

**Warranty Service:** Please return the product in the original packaging with proof of purchase to the below address. Clearly state in writing the performance problem and return any leads, connectors and accessories that you are using with the device.

**Non-Warranty Service:** Return the product in the original packaging to the below address. Clearly state in writing the performance problem and return any leads, connectors and accessories that you are using with the device. Customers not on open account must include payment in the form of a money order or credit card. For the most current repair charges contact the factory before shipping the product.

B&K Precision Corp.  
22820 Savi Ranch Parkway  
Yorba Linda  
CA 92887-4604

Phone: 714- 237-9220  
Facsimile: 714-237-9214

Include with the instrument your complete return shipping address, contact name, phone number and description of problem.

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## Limited One-Year Warranty

B&K Precision Corp. warrants to the original purchaser that its product and the component parts thereof, will be free from defects in workmanship and materials for a period of one year from the date of purchase. B&K Precision Corp. will, without charge, repair or replace, at its' option, defective product or component parts. Returned product must be accompanied by proof of the purchase date in the form a sales receipt.

To obtain warranty coverage in the U.S.A., this product must be registered by completing and mailing the enclosed warranty card to: B&K Precision Corp., 22820 Savi Ranch Parkway, Yorba Linda, CA 92887 - 4604 within fifteen (15) days from proof of purchase.

**Exclusions:** This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. It is void if the serial number is altered, defaced or removed.

B&K Precision Corp. shall not be liable for any consequential damages, including without limitation damages resulting from loss of use. Some states do not allow limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific rights and you may have other rights, which vary from state-to-state.

**Model Number:** \_\_\_\_\_

**Date Purchased:** \_\_\_\_\_

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