GUT-6000B

Digital IC Tester

USER MANUAL

GW INSTEK

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INTRODUCTION

GOOD WILL INSTRUMENT CO., LTD., accumulated over 30 years experiences in electronic products' research and development, is a pioneering manufacturer in IC testers industry. The GUT-6000B, desktop design, is a newly launched and best quality possible and multi-functions equipped product.

User's friendly sets up by replacing another IC; the GUT-6000B continues to undertake the task. The hard ware design of ''black-light'' function extends user's convenience for testing ICs in an inadequate light environment. The Buzzer key built in various tones can easily identify the testing result. The unique capability in identifying over 1800 CMOS/TTL digital ICs (up to 24 pins) surpasses the other major digital IC testers.

The GUT-6000B feature such as built in ''auto search & test'' speeds to identify and test IC. In addition, the ''loop'' design for continuously testing function is intelligently applied to detect defective ICs and their stability. All these strengths provide significantly conveniences for digital IC testers.

All the GUT-6000B accumulated incalculable benefits are to be discovered as users utilize the value-added, multi-functions equipped tester. This is a best choice for the factories, R&D sections, maintenance departments, laboratories as well as academics because it really creates future with your business.

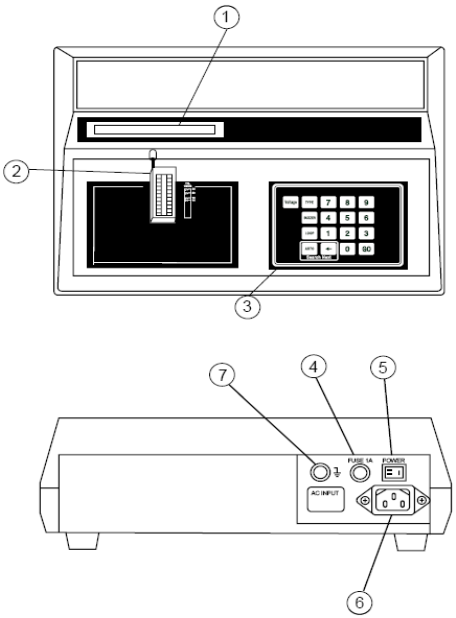
FEATURES

1. Reliable desktop design.
2. User's friendly set up and operates.
3. 16 X 1 character LCD display.
4. Built in 6 functions and 10 numerical keys.
5. Identifier over 1800 CMOS/TTL digital ICs (up to 24 pins).
6. High test speed at an average 0.6 second for one IC test.
7. The following IC series can be tested under 5V, 3.3V, 3.0V, 2.5V.
   (1) 54/74 TTL series.
   (2)40/45 CMOS series.
   (3) Driver series.
   (4)Other compatible ICs with the above mentioned devices.
8. "AUTO" function key supports "auto search and test" function. User only to put the IC into the socket, no need to press any key, no need to process any other movement, the "auto search and test' will continue processing.
9. "LOOP" function key supports "continue examining", able to make sure reliability of the IC.
10. Various "BUZZER" sounds to presents the test results "FAIL", or "PASS".

SPECIFICATIONS

Display	16*1 character dot matrix LCD display
TEST SOCKET	One position for 28 Pin IC socket
OPERATIONAL KEY	(1) TYPE, BUZZER, VOLTAGE, LOOP, AUTO, GO, BACK SPACE
	(2) 10 numerical keys (0 – 9)
TEST VOLTAGE	5V, 3.3V, 3.0V, 2.5V VDC
ALARM	Various tones for the test result
POWER SUPPLY	110/220VAC, 50/60 Hz (Auto range)
OPERATING TEMPERATURE	10℃ to 40 ℃
STORAGE TEMPERATURE	0℃ to 50 ℃
MEASURENENT	13”(W) x 11.8”(D) x 4.3”(H)
WEIGHT	3.3 LB (1.5kg)

CONTROLS & INDICATORS



(1) Liquid Crystal Display .....16x1 character 9x7 dot matrix LCD display.
(2) 28Pin Test IC Socket
(3) Keyboard
(4) Fuse .....1A, protects tester from damage.
(5) Power Switch .....Power On or Off.
(6) AC Receptacle .....Plug power cord.
(7) GND .....Ground

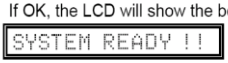
KEYS' INSTRUCTION

Key	Instruction
0 ~ 9	Numerical Keys Input IC numbers for test.
GO	Execution key 1.Executes testing work as inputting a device number. 2.Repeats test.
TYPE	IC series selection key Switches selection "TTL74", "CMOS40", "CMOS45", "DRIVER".
Voltage	Voltage selection function key. For switching different voltage.
AUTO	Auto search and test key. If change into new IC, the "auto search & test" will auto detect the IC, and continue to test.
LOOP	Loop test key 1.Test IC stability. 2.Stops and shows errors as a defective IC is found. 3.Press any key to stop running. 4.If take the IC away, the LCD will show "EMPTY. Then, if put any IC into socket, the "LOOP" function will continue. 5.Use numerical key of 0 to 9, key in the IC number, and press "LOOP" to test.
← 	Back space Key 1.Erases wrong number in the left side of ← 2.if on the AUTO mode, press this key for searching next same function IC no.
BUZZER	BUZZERING switching key Switches BUZZER on/off

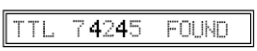
Operational Instructions

STEP1. Plug in AC power cord, then switch power on. The black light of LCD is on and presents software version. It starts self-test.

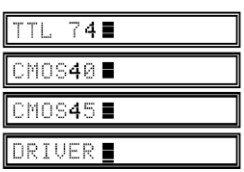
If OK, the LCD will show the below.



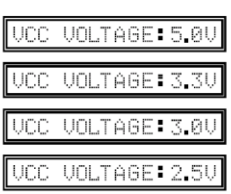
STEP2. Auto search the IC number and test if an IC is on the socket.



STEP3. Use [TYPE] key to switch "TTL 74", "CMOS40", "CMOS45" ,"DRIVER" series.



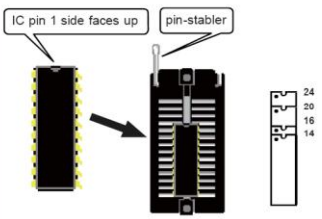
Step 4. Use [Voltage] key to switch 5V, 3.3V, 3.0V, 2.5V voltage.



Note: voltage switch is only for the same IC part. If change IC family or part no, the voltage will automatic come back to the default 5.0V.

Testing Procedures

STEP1. Put IC on the socket and IC's bottom line up with socket. Pin 1 side faces up.



STEP 2. Use [TYPE] key to switch "TTL 74", "CMOS40", "CMOS45" ,"DRIVER" families.

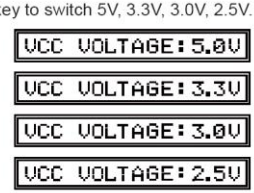
Step 3. key in the IC no, eg, TTL 74LS244, key in orderly 2, 4, 4.

LCD display

Input key

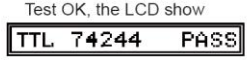
[2] [4] [4]

STEP4. Use [Voltage] key to switch 5V, 3.3V, 3.0V, 2.5V.



STEP 5. Press [GO] key, the system will start testing IC, the result is as below.

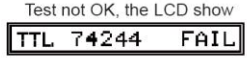
Test OK, the LCD show



Press key

[GO]

Test not OK, the LCD show



STEP 6. Change the next IC, press GO for repeat the testing.

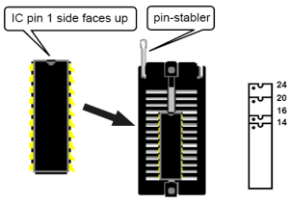
STEP 7. If would like to test anther part number , key in the part number.

Note: Some of ICs, the function is same but part number is different. The test result is pass.

Auto Loop Test

1.When an IC is tested, the test results appear unstable such as sometimes good and sometimes not. The auto loop test is designed to detect this kind of problem.
2.When a big quantity of same number IC need to be tested, the auto loop test is speeding the process.

STEP1. Put IC on the socket and IC's bottom line up with socket. Pin 1 side faces up.



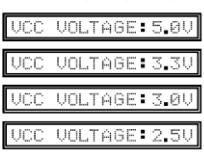
STEP2. Use [TYPE] to switch "TTL 74", "CMOS40", "CMOS45", "DRIVER" families.

STEP3. Key in the IC part no. eg, TTL 74LS244, press 2, 4, 4 orderly.

LCD display: TTL 74244

Input key: [2] [4] [4]

STEP4. Use [Voltage] to switch 5V, 3.3V, 3.0V, 2.5V voltage.



STEP5. Press [LOOP]. The system will star testing IC and show the numbers of times.

LCD Display: TTL 74244 10

Input Key: [LOOP]

Error found was displayed on the LCD,
"Error in: nnnnn" nnnnn = the number of the error times.

STEP6. If take the IC away from the socket, the system will back to the waiting IC put in situation.

STEP7. Put IC into the socket, tight down the pin-stabler. The system will star the "AUTO LOOP TEST"

STEP8. Press any key to stop the "AUTO LOOP TEST"

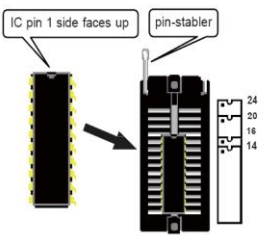
Note: The biggest number for counter is 65535. If over this number, the counter will star from 0.

Auto Search

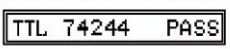
1.This test aims to search the unknown IC number.
2. When a big quantity of different number IC need to be tested, the auto loop test is speeding the process.

STEP1. Press [AUTO] . The LCD will show "- AUTO SEARCH - "

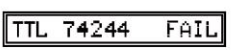
STEP2. Put IC into the socket and tight down the pin-stabler, The system will begin to process. If the test is correct, the LCD will show "PASS". If the test is incorrect, the LCD will show "FAIL"



If the test is correct, the LCD will show "PASS"



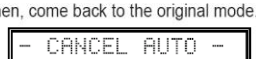
If the tests is incorrect, the LCD will show "FAIL"



STEP3. Take the IC away the socket. The system will back to the waiting IC situation. Repeat the above steps, the auto search function will continue.

STEP4. If the system search for new IC number, not the number which you press in, but the compatible IC. In this situation, no need to take the IC away, just press [←] key. It will switch to the next compatible IC. Repeat [←] key to the part number which you test.

STEP5. Press any key but not [←] key to quit this function. The LCD will show "CANCEL AUTO". Then, come back to the original mode.



Note: IC number search result is presented from a small number to a bigger one, eg, 7404 is found before 7414.

Trouble Shooting

SITUATIONS	REASONS	HOW
˙LCD's dark backlight ˙No message on the LCD ˙BUZZER no sound ˙No response from key board	∴ Power off ∴ Loose AC power cord ∴ Burned fuse	∴ Reset Power ∴ Tighten AC power cord ∴ Replace fuse
	∴ Loose LCD connector ∴ Power supply damaged	∴ Tighten LCD connector & plug ∴ Contact regional distributor for assistance
˙BUZZER no sound. ˙LCD's back light is on. ˙LCD message appears ˙Response by any key on the key board	∴ BUZZER off ∴ BUZZER damaged ∴ Components Q1,R3 damaged	∴ Press BUZZER to switch ∴ Replace SP1 ∴ Replace Q1, R3
˙LCD appears irregular ˙LCD back light is dark. ˙Buzzer is no problem.	∴ Loose LCD flat cable ∴ Damaged LCD's unit	∴ Tighten LCD's flat cable ∴ Replace LCD's unit
˙IC test unstable	∴ Bad connection between IC and socket ∴ SOCKET unclear or damaged ∴ Defective IC	∴ Re-put IC, and pull down pin-stabler ∴ Replace a SOCKET ∴ Replace an IC
	∴ Unstable internal circuit	∴ Connect local distributor for assistance
˙Some keys no response	∴ Key board damaged	∴ Replace a keyboard
˙LCD's black light is on. ˙LCD shows unstable ˙No buzzer sound. ˙No response by pressing any key on the key board	∴ Loose CPU ∴ Loose Internal Connector ∴ Internal Circuit unstable	∴ Tighten internal connector & plug ∴ Check if Y1 frequency is 12MHz ∴ Connect local distributor for assistance

Message Description

1.< Version x.xx >	System version
2.SYSTEM CHECK...	Power on and self-test
3.SYSTEM READY !!	Pass self-test
4.POWER ON SEARCH	Power on and search IC number
5.TTL 74xxxx	TTL 54/74xxx family
6.CMOS40xxx	CMOS 40XX family
7.CMOS45xxx	CMOS 45XX family
8.Driver	DRIVER family
9.TTL 74xxx PASS	Test pass
10.TTL 74xxx FAIL	Test fail
11.TTL 74xxx nnnnn	Counter for the total test number
12.Error in: nnnnn	Counter for the error number
13.DEVICE ON SEARCH	Searching IC number
14.-PART NOT FOUND -	IC number not found
15.TTL 74xxx FIND	IC number find
16.- AUTO SEARCH -	Enter AUTO SEARCH mode
17.TTL 74xxx EMPTY	Waiting for IC be put into the socket
18.- CANCEL AUTO -	Quit from AUTO search and test mode
19.- CANCEL LOOP -	Quit from AUTO LOOP mode
20.-- BEEP ON --	Sound on
21.-- BEEP OFF --	Sound off

PARTS LIST			
Item	Quantity	Reference	Part
1	2	C21,C45	18P
2	4	C25,C26,C29,C30	0.1uF 50V
3	24	C2,C4,C6,C7,C8,C9~C11,C13~C18,C20,C23 ,C27,C31,C37,C41,C42,C44,C46,C49	0.1uF/50V
4	6	TCP7~TCP11,	4.7uF/16V
5	6	TCP1,TCP4,TCP5,TCP6,TCP12,TCP13,	10uF/16V
6	1	C47	100uF/25V
7	2	D1,D2	1N4148
8	1	R1	470 5% 1/4W
9	1	R2	3.3K
10	9	R3,R24,R37,R38,R39,R40,R44,R18,R23	1K
11	2	R5,R6	39R
12	10	R7,R17,R27,R28,R29,R30,R31,R32,R33,R34	10K
13	1	R8	6.8K
14	2	R9,R10	1R
15	3	R12,R14,R15	10R
16	2	R35,R36	470R
17	1	R41	47K
18	1	R42	68K
19	1	R49	8R
20	1	RN1	10K x 4 chip resistor array
21	3	RN2,RN3,RN6	1K x 4 chip resistor array
22	6	RN4,RN5,RN7~RN10	4.7K x 4 chip resistor array
23	1	RN11	100K x 4 chip resistor array
24	2	D1,D2	1N4148
25	2	L1,L2	ICB321611-300
26	5	Q1,Q10~Q13	2SD596
27	8	Q4~Q9,Q14,Q15	2SB624
28	1	SP1	KSS-1206 LP-U4 BUZZER
29	2	U1,U11	LM317
30	3	U2,U4,U7	74LS06
31	1	U10	AIC1117-33
32	1	U12	KA7805
33	1	Y1	12.000MHz XTAL
34	1	Y2	32.768KHz XTAL
35	1	U1	CPU UNIT
36	17	SW1 - SW17	KEY(12x12mm)DTSK-22
37	1	TEXTOOL1	28 Pin TEXTOOL
38	1	J2	2Pin 180' POWER CONNECTOR
39	1	J1	14 Pin 180' HEADER
40	1	LCD	16x1 LCD CM-1611S1LY
41	1	PCB	T6D PCB
42	1	CASE	T6D CASE
43	1	POWER	S/W POWER SUPPLY 9V 0.9A AC 90-230V

Key Code Description

Input device number without series key code. It runs by switching TYPE selection
SAMPLE1. TTL74138 Press TYPE to switch to TTL 74. Then, key in 1, 3, 8.
SAMPLE2. CMOS 4020 Press TYPE to switch to CMOS40. Then, key in 2, 0.
SAMPLE3. CMOS 74HC4040 Press TYPE to switch to CMOS40. Then, key in 4, 0.
SAMPLE4. DRIVER ULN2003 Press TYPE to switch to DRIVER. Then, key in 2, 0, 0, 3.
Some ICs have different pin assignments despite that they have the same number. In this situation, various key codes information is supplemented for this group's IC. Please refer the appendixes.

Key Code Tables

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
0	X	X	X	X	X	X	X	X	X	X		X	X
1	X	X				X							
2	X	X	X	X	X		X	X				X	X
3	X	X		X	X	X		X					
4	X	X	X	X	X	X	X	X	X	X		X	X
5	X	X		X		X	X					X	X
6	X					X							
7	X					X							
8	X	X	X	X		X		X	X			X	X
9	X	X		X		X							
10	X	X	X	X	X	X	X	X	X			X	X
11	X	X	X	X			X	X					
12	X	X				X							
13	X					X							
14	X					X		X	X	X			
15	X	X		X			X						
16	X					X							
17	X					X							
18	X												
19	X												
20	X	X	X	X	X	X	X	X	X			X	X
21	X	X				X							
22	X	X		X		X	X						
23	X					X							
24	X					X							
25	X					X							
26	X					X							
27	X	X				X		X					
28	X	X				X							
30	X	X		X	X	X	X	X	X				
32	X	X	X	X		X		X	X			X	X
33	X	X				X							
34	X	X											
35	X	X											
36			X										
37	X	X				X							
38	X	X		X		X							
39	X												
40	X	X		X		X	X						
41													
42	X	X			X	X		X	X				
43	X				X	X							

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
44	X				X	X							
45	X					X							
46	X				X	X							
47	X				X	X							
48	X					X			X				
49	X												
50	X					X							
51	X				X								
53	X					X							
54	X				X		9054						
55	X				X								
60							X						
63	X												
64			X	X									
65				X									
70						X							
72					X	X	X						
73	X							X	X				
74	X	X	X	X	X	X	X	X	X				
75	X				X	X		X					
77	X					X							
H78							9078						
81													
82													
83	X					X			X				
84													
85	X			X		X		X	X				
86	X	X	X	X		X		X	X			X	X
87							X						
89													
90	X				X	X			X				
91	X				X	X							
92	X					X							
93	X					X			X				
94	X						X						
95	X					X			X				
96	X				X	X							
105													
107	X							X	X				
109	X	X	X			X		X			X	X	X
110													
111													

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
112	X	X	X	X				X			X	X	X
113	X	X	X	X				X			X		
114	X	X	X	X							X		
116													
125	X					X		X					
126	X					X		X					
128													
132	X			X		X		X					
134	X			X									
135				X									
136	X					X							
137	X	X						X		X			
138	X	X	X	X				X		X		X	X
139	X	X	X	X				X		X		X	X
140	X			X									
141	X					X							
142													
143	X												
144													
145	X					X							
147	X					X		X					
148	X		X			X							
150	X					X							
151	X	X	X	X		X		X	X			X	X
152	X												
153	X	X	X	X		X		X				X	X
154	X					X							
155	X					X							
156	X					X							
157	X	X	X	X	X	X		X	X			X	X
158	X	X	X	X				X				X	X
159	X					X							
160	X	X	X			X		X	X		X		
161	X	X	X			X		X	X		X	X	X
162	X	X	X	X		X		X	X		X		
163	X	X	X	X		X		X	X		X	X	X
164	X	X	X		X	X		X	X	X		X	X
165	X	X				X		X	X				
166	X	X				X							
168	X	X	X	X							X		
169	X	X	X	X							X		
170	X					X							
173	X					X		X	X				

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
174	X	X	X	X		X		X	X			X	X
175	X	X	X	X		X		X	X			X	X
176	X					X							
177	X					X							
178	X					X							
179	X					X							
180	X					X							
181	X					X							
182	X		X			X	X	X					
183	X						X						
184	X					X							
185	X					X							
189	X			X									
190	X	X	X			X		X					
191	X	X	X			X		X				X	X
192	X	X	X		X	X		X	X				
193	X	X										X	X
194	X		X	X		X		X					
195	X			X		X		X	X				
196	X			X		X							
197	X			X		X							
198	X					X							
199	X					X							
230											X		
231	X										X		
238												X	X
240	X	X	X	X				X		X	X	X	X
241	X	X	X	X				X		X	X	X	X
242	X	X	X					X		X	X		
243	X	X	X					X		X	X		
244	X	X	X					X		X	X	X	X
245	X	X	X					X	X	X	X	X	X
246													
247	X					X							
248	X					X							
249	X					X							
251	X	X	X	X		X		X			X	X	X
253	X	X	X					X			X	X	X
257	X	X	X	X				X				X	X
258	X	X	X	X								X	X
259	X	X		X		X		X					
260	X		X										
265	X	X	X			X		X		X			
266	X			X					X				

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
273	X	X				X		X				X	X
274				X									
276	X					X			X				
279	X					X		X					
280	X			X	X				X			X	X
283	X		X	X		X		X				X	X
289													
290						X							
293	X					X							
295	X												
298	X					X		X					
299	X	X	X	X				X			X	X	X
322	X		X										
323	X	X	X			X		X	X		X	X	X
347	X			X		X		X	X		X		
348	X												
350	X		X										
351													
352	X	X	X		X	X		X	X				
353	X					X							
363													
364	X												
365	X	X				X		X					
366	X	X				X		X					
367	X	X				X		X					
368	X	X				X		X					
373	X					X						X	X
374	X	X	X	X				X	X	X	X		
375	X												
377	X												
378	X		X					X				X	X
379	X					X							
382	X												
386	X												
390	X							X		X			
393	X					X		X					
395	X												
399	X		X										
412				X									
425	X					X							
426	X					X							
445	X												
447	X												
465	X	X											

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
466	X	X											
467	X	X											
468	X	X											
490	X	X	X			X							
518	X	X	X										
519	X	X	X										
520	X	X	X										
521	X	X	X					X				X	X
522													
533	X											X	X
534	X											X	X
539	X	X	X										
540												X	X
541												X	X
563	X	X	X					X		X		X	X
*564	X	X	X					X		X		X	X
573	X	X						X	X				
*574	X	X						X	X			X	X
576	X	X									X		
580	X	X									X		
597	X							X		X			
620	X	X						X		X			
621	X	X						X		X			
622	X	X						X		X			
623	X	X						X		X			
638	X	X									X		
639	X	X									X		
640	X	X						X		X			
641	X	X											
642	X	X											
643	X	X						X		X			
644	X	X											
645	X	X											
646	X											X	X
647	X											X	X
652	X							X		X	X	X	
654	X												
668	X												
669	X							X					
670	X	X						X					
682	X							X					
683	X												
684	X							X					
685	X												

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
688	X	X						X		X			
689	X	X											
795													
796	X	X											
797													
798	X	X											
804		X		X						X			
805		X		X						X			
808		X		X						X			
810		X									X		X
811		X									X		
821			X								X		
827	X	X	X										
832		X		X						X			
841		X									X		
874		X									X		
1000	X	X											
1002		X											
1003		X											
1004		X											
1005		X											
1008		X											
1010		X											
1011		X											
1020		X											
1034		X											
1035		X											
1036		X											
1244													
1245		X											

SERIES 40 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
0	X	X		X									
1	X	X											
2	X	X	X	X									
7	X	X											
8	X	X											
9	X	X											
10	X	X											

SERIES 40 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
11	X	X		X									
12	X	X											
13	X	X											
14	X	X											
15	X	X											
16	X	X	X										
17	X	X	X										
18	X	X											
19	X	X											
20		X	X										
21	X	X											
22	X	X											
23	X	X		X									
24		X											
25	X	X		X									
26	X	X											
27	X	X											
28	X	X											
29	X	X											
30	X	X											
31		X											
32	X	X											
33	X	X											
35	X	X											
38	X	X											
40		X	X										
41	X	X											
42		X											
43		X											
44	X	X											
48	X	X		X									
49	X	X											
50	X	X											
51		X											
52		X											
53		X											
54		X											
55		X											
56		X											
60		X											
63		X											
66	X	X	X										
67		X											

SERIES 40 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
68		X											
69		X		X									
70		X											
71		X											
72		X											
73		X											
75		X											
76	X	X											
77	X	X											
78	X	X	X										
H78					9078								
81	X	X											
82	X	X											
85	X	X											
86	X	X											
93	X	X											
94	X	X											
95	X	X											
96	X	X											
97	X	X											
99	X	X											
100	X	X											
101	X	X											
102		X											
103		X											
104	X	X											
106	X	X											
109	X	X											
110		X											
147	X	X											
160	X	X											
161	X	X											
162	X	X											
163	X	X											
174	X	X											
175		X											
181	X	X											
182	X	X											
192	X												
193	X												
194	X	X											
257	X	X											

SERIES 45 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
1	X	X											
2	X	X											
3	X	X											
4		X											
6		X											
8		X											
10	X	X											
11	X	X	X										
12	X	X											
13		X											
14	X	X											
15	X	X											
16	X	X											
17		X											
18	X	X											
19	X	X											
20	X	X	X										
22	X	X											
26	X	X											
27		X											
29	X	X											
32	X	X											
39	X	X	X										
43	X	X											
51		X											
55	X	X											
53		X											
56	X	X											
60	X	X											
61	X	X											
66		X											
72	X	X											
81		X											
84	X	X											
85	X	X											

SERIES 140 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
0	X	X		X									
1		X		X									
2	X	X	X	X									
6	X	X											
7	X	X											
8	X	X											
9	X	X											
10	X	X											
11	X	X		X									
12	X	X		X									
13	X	X											
14	X	X											
15	X	X											
16	X	X	X										
17	X	X	X										
18		X											
19	X	X											
20	X	X	X										
21	X	X											
22	X	X											
23	X	X		X									
24	X	X	X										
25	X	X		X									
26	X	X											
27	X	X											
28	X	X											
29	X	X											
30	X	X											
31		X											
32	X	X											
33	X	X											
35	X	X											
38	X	X											
40	X	X											
41	X	X											
42	X	X											
43	X	X											
44	X	X											
48	X	X											
49		X		X									
50		X											
51		X											
52		X	X										

SERIES 140 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
53													
54		X											
55		X											
56		X											
60		X											
63		X											
66	X	X	X										
67		X											
68		X											
69		X											
70		X											
71		X											
72		X											
73		X											
75		X	X										
76		X											
77		X											
78		X	X										
H78					9078								
81		X											
82		X											
85	X	X											
86	X	X											
93		X											
94		X											
95	X	X											
96	X	X											
97	X	X											
99		X											
100	X	X											
101	X	X											
102		X											
103		X											
104	X	X											
106	X	X											
109	X	X											
110		X											
147	X	X											
160		X											
161		X											
162		X											
163		X											
175		X											

SERIES 140 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
181	X	X											
182	X	X											
192	X												
193	X												
194		X											
257	X	X											

* Manually select IC number but not automatically.

Driver

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