GUT-6000A

Digital IC Tester

USER MANUAL

GW INSTEK

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-6000A, 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-6000A 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-6000A 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-6000A 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

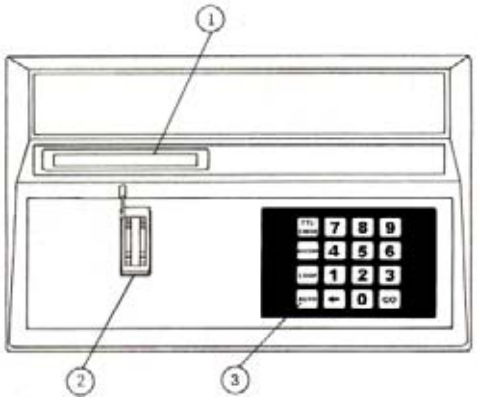
- Reliable desktop design.
- User's friendly set up and operates.
- 16*1 character 9*7 dot matrix LCD display.
- Built in 6 functions and 10 numerical keys.
- Identifier over 1800 CMOS/TTL digital ICs (up to 24 pins).
- High test speed at an average 0.8 second for one IC test.
- The following IC series can be tested under 5V.
  - Texas Instruments 54/74 TTL series.
  - Motorola 14000 and RCA CD4000 CMOS series.
  - Other compatible ICs with the above mentioned devices.

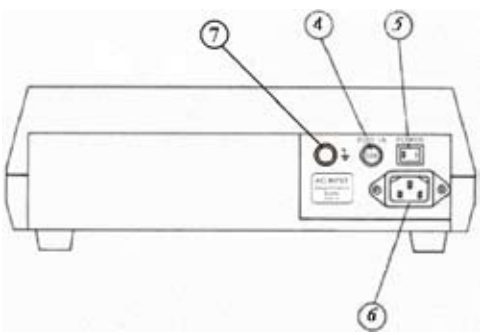
- ''AUTO'' function key supports ''auto search and test'' function. User only to put the IC into the socket, no need to press any key, no need to process any other movements, the ''auto search and test'' will continue processing.
- ''LOOP'' function key supports ''continue examining'', able to make sure reliability of the IC.
- 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) TTL/CMOS, BUZZER, LOOP, AUTO, GO, BACK SPACE
	(2) 10 numerical keys (0 – 9)
TEST VOLTAGE	5 - 24VDC
ALARM	Various tones for the test result
POWER SUPPLY	110/220VAC, 50/60 Hz(Auto range)
OPERARING 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…….....16*1 character 9*7 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 in power cord

(7) GND……...Ground

KEYS' INSTRUCTION

KEYS	INSTRUCTION
0 ····· 9	Numerical Keys Input IC numbers for test.
GO	Execution key ● Executes testing work as inputting a device number. ● Repeats test.
TTL/ CMOS	IC series selection key ● Switches selection TTL74, CMOS40 or CMOS45 IC series
AUTO	Auto search & test key ● Auto detects IC number ● Auto test IC ● If change into new IC, the "auto search & test" will auto detect the IC, and continue to test.
LOOP	Loop Test key ● Tests IC's stability ● Stop and show errors as defective IC is found ● Press any key to stop running ● If take the IC away, the LCD will show "EMPTY". Then, if put any IC into socket, the "LOOP" function will continue. ● Use numerical key of 0 to 9, key in the IC's number , and press "LOOP" key to process loop test.
←	Back space Key ● Erases wrong number in the left side of ←
BUZZER	BUZZERING switching key ● Switches BUZZER on/off

OPERATIONAL INSTRUCTIONS

1. OPERATIONAL PROCEDURES

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.

No system error found displays on the LCD

System error shows on the LCD if it is detected.

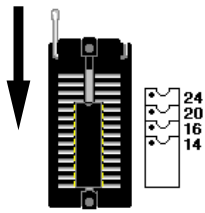
STEP2. Auto search the IC number and test if an IC is on the socket.

STEP3. Use TTL/CMOS to switch the selection of "TTL74", "CMOS40" or "CMOS45" series ICs.

2. TESTING PROCEDURES

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

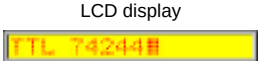
IC pin 1 side faces up



Pull down pin-stabler.

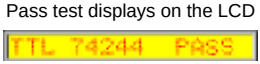
STEP2. Input the IC number such as the TTL 74LS244, and user types in IC number [3] [2] [4] in order.

LCD display

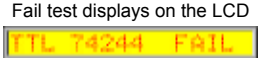


STEP3. Press [GO] , then the test works. Follow-up test result is displayed on the LCD.

Pass test displays on the LCD



Fail test displays on the LCD



STEP4. Repeat test by replacing a new IC, then press [GO] .

STEP5. Re-type the IC's numbers for other another test.

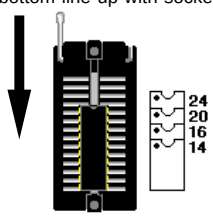
Note. "Pass" may also happen to some logic function compatible but different number's two ICs if their numbers are exchanged with each other to test.

3. 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 of IC need to be test, the auto loop test is speeding the process.

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

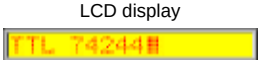
IC pin 1 side faces up



Pull down pin-stabler

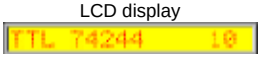
STEP2. Input the IC number such as the TTL 74LS244 device, and user types in IC number [2] [4] [4] in order.

LCD display



STEP3. Press [LOOP], then the test is running. Follow-up test result is displayed on the LCD.

LCD display



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

STEP4. If take the IC away from the socket, the system will back to waiting IC put in situation.

STEP5. Put IC into the socket, tight down the pin-stabler, the system will stat the "auto loop test".

STEP6. Press any key to stop the "auto loop test".

Note: The biggest number for counter is 65535, if the over this number, the counter will start from "0".

4. AUTO Search

This test aims to search the unknown IC number.

STEP1. Press "AUTO" key, the LCD will show "AUTO SEARCH". The "AUTO SEARCH" function is beginning. For example the TTL 74244.

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

STEP3. Take the IC away the socket. The system will back to 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, only need to press "AUTO" key. The system will switch to the new IC number. Repeat to press "AUTO" to switch to new IC number.

STEP5. Press any key but not "AUTO" to quit the auto search function. The LCD will show "CANCEL AUTO". Release to the original mode.

Note: IC number's search result is presented from a small number to a bigger one. For example, IC 74520 is found earlier than IC 74521.

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	∵ BZZER off	∴ Press BUZZER to switch
	∵ BUZZER damaged ∵ Components Q11,R3 damaged	∴ Replace SP1 ∴ Replace Q11, 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
	∵ Loose CPU ∵ Unstable internal circuit	∴ Check U1 ∴ Re-put U. ∴ Connect local distributor for assistance
● Some keys no response	∵ Key board damaged	∴ Replace U4 ∴ 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 ∵ Power supply damaged	∴ Check U1 ∴ Re-put U1 ∴ Tighten internal connector & plug ∴ Connect local distributor for assistance

MESSAGE DESCRIPTION

< Version xxxx >	System version
SYSTEM CHECK...	Power on self-test
SYSTEM READY !!	Pass self-test
SYSTEM ERROR !!	Error found form system
POWER ON SEARCH	Power on to search IC number
TTL 74xxxx	Cue for TTL 54/74xxx IC series
CMOS40xxx	Cue for CMOS 40XX IC series
CMOS45xxx	Cue for CMOS 45XX IC series
TTL 74xxx TEST	IC test is going on
TTL 74xxx PASS	No defective IC found
TTL 74xxx FAIL	Defective IC found
TTL 74xxx nnnnn	Counter for the total number
Error in: nnnnn	Counter for the error number
LOGIC IC SEARCH	Searching IC number
** NOT FOUND **	IC number not found
*** EMPTY ***	To search without any IC is placed for
TTL 74xxx FIND	IC number found
- AUTO SEARCH -	Enter "auto search" mode
TTL 74xxx EMPTY	Waiting for IC be put
TTL 74xxx >>	Test and search function is running
- CANCEL AUTO!	Quit from auto search and test mode
- CANCEL LOOP!	Quit from auto loop mode
-- BEEP ON --	Sound on
-- BEEP OFF --	Sound off

PARTS LIST			
Item	Quantity	Reference	Part
1	2	C1, C2	18P
2	1	C4	0.1uF 50V
3	1	C3	4.7uF 15V
4	1	C5	47uF 15V
5	1	R1	10K 5% 1/4W
6	1	R2	470K 5% 1/4W
7	1	R3	4.7K 5% 1/4W
8	2	R4, R5	470 5% 1/4W
9	1	RP1	47Kx8 8R9P
10	1	RP2	4.7Kx5 4R6P
11	3	RP3-RP5	4.7Kx8 8R9P
12	1	RP6	10Kx6 6R7P
13	6	RS1-RS6	100x4 4R8P
14	6	RS7, RS8	3.3KX4 4R8P
15	1	D1	1N4148
16	6	Q1-Q6	2SA1020
17	4	Q7-Q10	2SC1384
18	1	Q11	2SC945
19	1	U1	CPU UNIT
20	2	U2, U3	74HTC05
21	1	U4	74HCT139
22	1	XTAL	14.318 MHZ
23	1	SP1	5V SPEAKER 1205
24	16	SW1-SW16	KEY(12x12mm)DTSK-22
25	1	TEXTOOL1	28 Pin TEXTOOL
26	1	CON1	2Pin 180' POWER CONNECTOR
27	1	CON2	14 Pin 180' HEADER
28	1	LCD	16x1 LCD PC-1601L
29	1	PCB	GUT-6000A PCB
30	2	CASE	GUT-6000A
31	1	POWER	S/W POWER SUPPLY 5V 2A AC 90-230V

KEY CODE DESCRIPTION

Input device number without series key code, it runs by switching TTL/CMOS selection.

Ex1. IC TTL 74138
An user switches [TTL/CMOS] to "TTL 74", then input [1], [3], [8] in order.

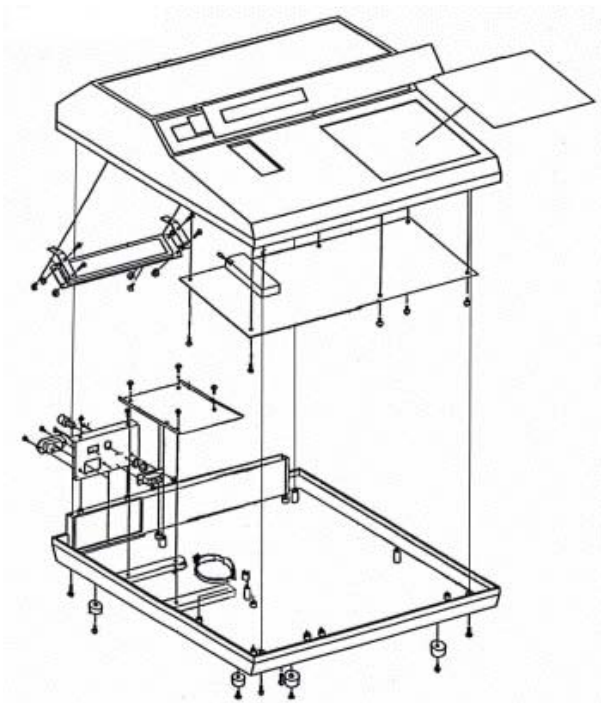
Ex2. CMOS 4020
An user switches [TTL/CMOS] to "CMOS40", then input [2], [0] in order.

Ex3. CMOS 74HC4040
An user switches [TTL/CMOS] to "CMOS40", then input [4], [0] in order.

Some ICs have different pin arrangements despite that have the same number. In that situation, various key codes information is supplemented for this group's ICs (see appendixes).

Users may come upon difficult in some generic type's ICs. For example, an IC is numbered TTL 7454 and 74H54, the user identifies the difference with "XXX" and "9XXX". If the user is interested in testing TTL 74H54 device, then selects "TTL 74" first. Then types [9], [0], [5], [4].

TOTAL ASSEMBLY



KEY CODE TABLES

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
00	X	X	X	X	X	X	X	X	X	X		X	X
01	X	X				X							
02	X	X	X	X	X		X	X				X	X
03	X	X		X	X	X		X					
04	X	X	X	X	X	X	X	X	X	X		X	X
05	X	X		X		X	X					X	X
06	X					X							
07	X					X							
08	X	X	X	X		X		X	X			X	X
09	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				

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
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							
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								
H52							9052						
53	X					X							
54	X				X		9054						
55	X				X								
60							X						
H61							9061						
63	X												
64			X	X									
65				X									
70						X							
72					X	X	X						
73	X							X	X				

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
74	X	X	X	X	X	X	X	X	X				
75	X				X	X		X					
77	X					X							
H78							9078						
80													
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													
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													

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
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

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
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				
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		

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
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				
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

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
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											

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
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												
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											

SERIES 54/74 NO.	CIRCUIT DESCRITPION												
	LS	ALS	F	S	L	STD	H	HC	C	HCT	AS	AC	ACT
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									
00	X	X		X									
01	X	X											
02	X	X	X	X									
07	X	X											
08	X	X											
09	X	X											
10	X	X											
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											

SERIES 40 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
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											

SERIES 40 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
66	X	X	X										
67		X											
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											

SERIES 40 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
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									
01	X	X											
02	X	X											
03	X	X											
04		X											
06		X											
08		X											
10	X	X											
11	X	X	X										
12	X	X											
13		X											
14	X	X											
15	X	X											
16	X	X											

SERIES 45 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
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									
00	X	X		X									
01		X		X									
02	X	X	X	X									
06	X	X											
07	X	X											
08	X	X											
09	X	X											

SERIES 140 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
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											

SERIES 140 NO.	CIRCUIT DESCRITPION												
	A	B	HC	UB									
49		X		X									
50		X											
51		X											
52		X	X										
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											

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

* Manually select IC number but not automatically.

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