

**MODEL 609
DUAL
MAGNETIC
TAPE
CASSETTE
READER/
RECORDER**

**REFERENCE
MANUAL**

M-Labor

WANG

**MODEL 609
DUAL
MAGNETIC
TAPE
CASSETTE
READER/
RECORDER**

REFERENCE MANUAL

© Wang Laboratories, Inc., 1973

WANG

LABORATORIES, INC.

836 NORTH STREET, TEWKSBURY, MASSACHUSETTS 01876, TEL. (617) 851-4111, TWX 710 343-6769, TELEX 94-7421

TABLE OF CONTENTS

	Page
Introduction	1
Installation	2
Figure 1 600/609 Interconnecting Diagram	2
Figure 2 Typical System Configuration	2
Turn on Procedure	2
Light Indicators on Front Panel of Dual Tape Cassette	3
Tape Selector Switches	3
Setting of the Channel Selector Switches	3
609 Selection and Data Transfer Commands	4
Manual Operation	4
What Is A Block	4
Rewind	5
Reg 001	5
Examples — Transferring Data From the Calculator to the Dual Tape Cassette	5
Example 1	5
Example 2	6
Example 3	7
Example 4	8
Example 5	9
Changing a Block in the Middle of a Tape	10
600-2 Memory Drawing	11
600-6 Memory Drawing	12
600-14 Memory Drawing	13
Read and Write Data Registers	14
Example 1	14
Example 2	14
Data Storage Register Transfer	15
Example 3	15
Entering Data into the Calculator	15
Loading This Data into the Dual Tape Cassette	15
Recalling the Data Back into the Calculator	15
Program Examples	
Program Example 1	16
Program Example 2	17
Program Example 3	18
609 Specifications	20
Typical Configurations	21
Customer Comment Form	22

TABLE OF CONTENTS

Page

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48

49

50

51

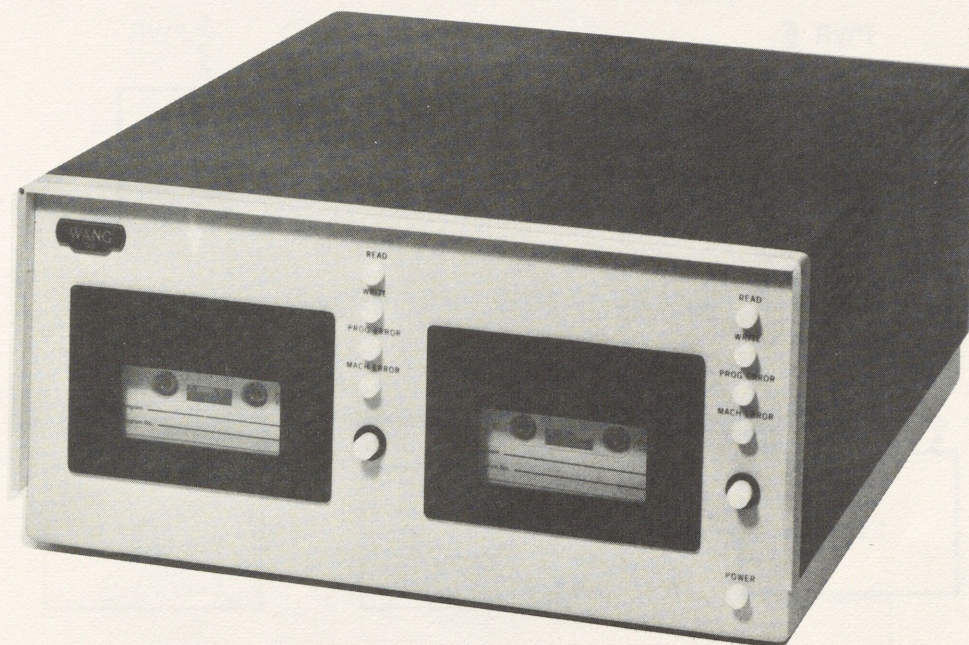
52

53

54

55

56



INTRODUCTION

The Wang Model 609 Dual Magnetic Tape Cassette System incorporates the extensive storage capacity and high access speed long associated with our already proven tape cassettes used on other models of our products.

The Model 609 contains two separately controllable magnetic tape cassette units for recording data from or reading data to the memory of the 600-2, 600-6, 600-14 calculator. Data can be searched in either a forward or reverse direction at a rate of 500 program steps per second. A count of each block on the tape is maintained in the electronics of the Model 609, and a specific block number will be automatically designated. This feature makes the system a high-speed, random-access, data retrieval facility allowing the user to locate and search data very quickly.

Recording or reading is accomplished by selecting the proper cassette unit, placing the block number in REG 000 and the beginning step number of the calculator in REG 001. Use of either the read or write command for the proper size block will cause the transfer of information at a rate of 500 steps per second.

INSTALLATION

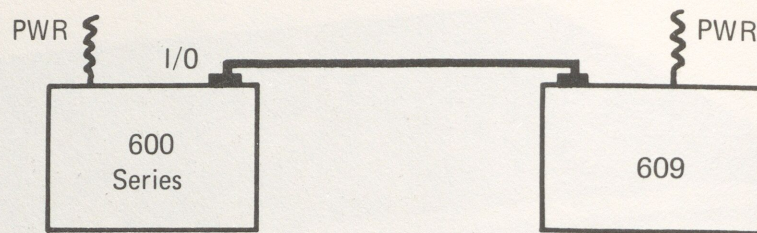


Figure 1. 600/609 Interconnecting Diagram

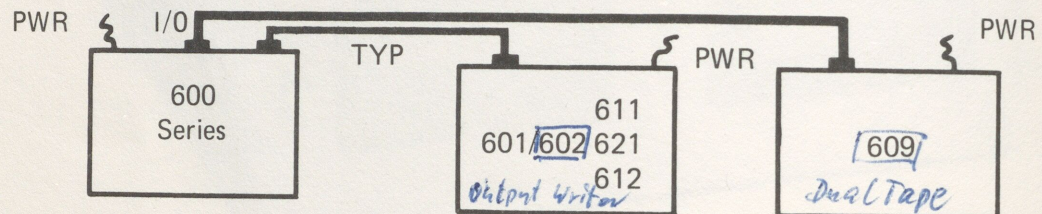


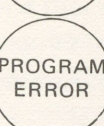
Figure 2. Typical System Configuration

The 600 Series calculators recognize each tape cassette in the 609 to be two separate devices, each of which is assigned a specific address. Since the calculator can address up to 16 individual devices, as many as eight 609 Dual Tape Cassette Units can be accessed by a single 600 Series calculator. Multiple installation of 609 units, a 609 unit used as part of a system with combinations of 608-1, 2 External Core Unit, and/or a 610-1 Disk Drive requires the use of T-connectors.

- ON/OFF Switch – Facing the unit, the ON/OFF switch is located on the lower left-hand corner of the rear panel.
- POWER CORD – Located on the rear panel, this plugs into any standard outlet. Plug in the 609.
- CONNECTOR CABLES – This connector, also located on the rear panel, plugs into the I/O receptacle. Attach the cable.
- TURN ON PROCEDURE – THE FOLLOWING STEPS ARE NECESSARY FOR PREPARING THE SYSTEM FOR USE:
 1. Power "ON" "609".
 2. Power "ON" calculator.
 3. PRIME the 600.

LIGHT INDICATORS ON FRONT PANEL OF DUAL TAPE CASSETTE

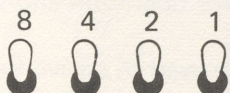
These light indicators give the user a visual view of what is happening during the execution of a program or data transfer.

	This indicator will light when reading data into the calculator takes place.
	This indicator will light when writing data onto tape.
	Indicator will light when power is turned "ON".
	Bit drop out. Noise on the tape causing bits to read.
	Size of block read from tape smaller than that requested. Size of block read larger than that requested.

NOTE:

If the 609 machine error or program error light goes on, the calculator program error light will also go on, indicating to the user that corrective action must be taken. This error condition can be tested by the calculator with the jump if error command.

TAPE SELECTOR SWITCH



These switches are located on the back panel of the 609. They are used to select the tape in which data transfer (read or write) is to take place.

In order for the calculator to operate with the 609, the 609 must be assigned an address since a 600 calculator can drive up to 16 individual external memory devices. The address of the 609 is selected by four toggle switches on the back panel. A two-step command (GROUP 2,00XX) is required to select the 609 where XX corresponds to the setting of the toggle switches.

If the GROUP 2,00XX command does not match the setting of the toggle switches, the 609 will fail to function and the keyboard will lock. If they do match, the 609 will then be accessible through the calculator.

SETTING OF THE CHANNEL SELECTOR SWITCHES

If the XX of the GROUP 2 command is 00, all switches down.

If the XX of the GROUP 2 command is 01, 1 switch up.

If the XX of the GROUP 2 command is 02, 2 switch up.

If the XX of the GROUP 2 command is 03, 1, 2 switch up.

⋮

If the XX of the GROUP 2 command is 15, all switches up.

NOTE:

The sum of the switches in the up position equals the XX of the GROUP 2 command.

609 SELECTION AND DATA TRANSFER COMMANDS

Fourteen transfer commands have been assigned to the 609 to store (write) or recall (read) information via the 600. Information can be transferred in 1, 8, 16, 32, 64, 128 or 256 steps at a time.

This is a two-step command where the I/O key is the first step needed to transfer (read) program steps to the 600.

1300	1 program step	1304	64 program steps
1301	8 program steps	1305	128 program steps
1302	16 program steps	1306	256 program steps
1303	32 program steps		

This is a two-step command where the I/O key is the first step needed to (write) program steps from the 600.

1308	1 program step	1312	64 program steps
1309	8 program steps	1313	128 program steps
1310	16 program steps	1314	256 program steps
1311	32 program steps		

For ease of operation, your function strip on the top of the keyboard can be labeled as illustrated below.

The 13 part of the command is generated by the SP + DIV Selector Switches. The remainder is generated by the special registers.

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
1	8	16	32	64	128	256	I/O	1	8	16	32	64	128	256	I/O
							1400								1400

MANUAL OPERATION

Up to this point, we have covered the installation, turn on procedure, channel selector operation and the commands necessary to transfer data to and from the calculator.

We can now proceed to explain and illustrate how the above information can best be used to derive the most out of your system.

REG 000 is used to designate the block of information we are going to store (write) on tape or the information we are going to recall (read) from tape.

If Block 0 is the one in question, then 0 must be placed into REG 000.

WHAT IS A BLOCK?

A block can be 1, 8, 16, 32, 128, or 256 steps of data. When specifying where we want to write data on the tape, we place the block number in REG 000, i.e., block 0, 1, 2, 3, etc.

NOTE:

Nothing can be written on a block unless the lower number blocks have already been recorded; i.e., block 0 and block one must be recorded before block 2.

The block number is always placed into the REG 000.

REWIND

A GROUP 2, 01 00 ("T" switch down register 00) command will rewind the tape cassette that has been addressed. The block counter will be reset to zero and the tape head will automatically lift.

NOTE:

Both the Prime and Rewind commands will raise the tape head.

REG 001

REG 001 is used to designate the step location of the data in the calculator where you want to store (write) from the 600 or recall (read) to the 600.

EXAMPLES

In the 600 there are three models — 600-2, 600-6 and 600-14. In this text the 600-14 is used for all examples. These examples are easily adaptable to any one of the three models. Refer to Memory Drawings on page 11, 12 and 13.

Example 1: Transferring Data From The Calculator To The Dual Tape Cassette.

Assume that nothing has been written on tape and we want to store a 300-step program on tape 0. This would require both block 0 and block 1. The first 256 steps would be in block 0, while the remaining steps would be in block 1. Transferring a 300-step program from the calculator to tape 0 of the Dual Tape Cassette, the program is in the calculator at steps 0 through 299.

OPERATING PROCEDURES:

Tape 0 (all selector switches down on the 600)

- | | | | |
|-----|---------|---|--|
| 1. | GROUP 2 | } | Address tape 0 (all toggle switches down, special register 00) |
| 2. | 0000 | | |
| 3. | 0 | | 0 to REG 00 indicating block zero for the 600. |
| 4. | ST 00 | } | 0 to REG 001 indicating initial step (0) for the beginning of the transfer. |
| 5. | ST 01 | | |
| 6. | I/O | } | This transfers 256 steps to tape 0, block 0, Special Selector Switches, SP and DIV, Special Register 14. |
| 7. | 13 14 | | |
| 8. | 1 | } | Block 1 in REG 000. |
| 9. | ST 00 | | |
| 10. | 2 | } | Initial location of remaining steps to REG 001. |
| 11. | 5 | | |
| 12. | 6 | | |
| 13. | ST 01 | | |
| 14. | I/O | } | Special Selector Switches SP and DIV, Special Register 12 |
| 15. | 13 12 | | |

This set of instructions writes 320 steps into blocks 0 and 1 (256+64). You can write 300 steps exactly by transferring 256, 32, 8 and 4, one-step blocks. This procedure would be messy and time consuming. It is recommended that you use the longer transfers (256, 128 or 64) even though you have an overflow.

NOTE:

The GROUP 2, 00 00 command need not be given again if you entered the load block of data onto tape 0. However, if a new device is desired, you must address the new device; i.e., Tape 1 – All switches down, 1 switch up. Key GROUP 2, 00 01 and the new device has been addressed.

Example 2: Transferring Data From The Calculator To The Dual Tape Cassette

Transfer program steps 83 through 98 (16 steps) from the calculator to the dual tape cassette (write).

OPERATING PROCEDURES: (RUN MODE, TAPE 0)

- | | | |
|----|---------|---|
| 1. | GROUP 2 | |
| 2. | 00 00 | |
| 3. | 0 | |
| 4. | ST 00 | Initial location of the tape unit to REG 000. |
| 5. | 8 | } REG 001 for the initial step location in the calculator |
| 6. | 3 | |
| 7. | ST 01 | |
| 8. | I/O | } Selector Switches SP and DIV (Special Register 10) |
| 9. | 13 10 | |

This procedure transferred 16 steps of data from the core memory to the tape 0 of the Dual Tape Cassette.

To recall (read) the information back to the calculator at a different step location (26 to 41), the following steps are necessary.

- | | | |
|----|-------|--|
| 1. | 0 | Initial location of the tape unit to REG 001 |
| 2. | ST 00 | } To Register 000 for the initial step location in the calculator. |
| 3. | 2 | |
| 4. | 6 | |
| 5. | ST 01 | |
| 6. | I/O | } Selector Switches SP and DIV (Special Register 02) |
| 7. | 13 02 | |

The sixteen (16) program steps that were previously at step location 83 through 98 are now at step locations 26 through 41.

Example 3:



ALL SWITCHES DOWN CHANNEL 0

These switches are located on the back panel of the unit.

WRITE

1.	PRIME	
2.	GROUP	Sixteen steps
3.	00 00	will be stored
4.	0	(written) onto
5.	ST 00	the tape start-
6.	4	ing at block 0
7.	5	from location
8.	ST 01	45 of calcu-
9.	I/O	lator
10.	13 10	

WRITE

READ

23.	0	
24.	ST 00	Sixteen steps
25.	I/O	will be recalled
26.	13 02	(read) into the
		calculator start-
		ing at step 45

READ

Transfer
Command

Block 0

45

45

11. 1
12. ST 00
13. I/O
14. 13 10

WRITE

Block 1

1.0000000000

27. 1
28. ST 00
29. I/O
30. 13 02

READ

Block 1

1.0000000000

Transfer
Command

15. 2
16. ST 00
17. I/O
18. 13 10

WRITE

Block 2

2.0000000000

31. 2
32. ST 00
33. I/O
34. 13 02

READ

Block 2

2.0000000000

Transfer
Command

19. 3
20. ST 00
21. I/O
22. 13 10

WRITE

Block 3

3.0000000000

35. 3
36. ST 00
37. I/O
38. 13 02

READ

Block 3

3.0000000000

Transfer
Command

Example 4:

8 4 2 1



SWITCH NO. 1 UP CHANNEL 1

These switches are located at the back panel of the unit.

WRITE

1. PRIME 32 steps will
2. GROUP 2 be stored
3. 00 01 (written)
4. 0 onto the tape
5. ST 00 at step loca-
6. 2 tion 25.
7. 5
8. ST 01
9. I/O
10. 13 11

Transfer
Command

25

11. 1
12. ST 00
13. I/O
14. 13 11

Block 1

1.000000000000

Transfer
Command

15. 2
16. ST 00
17. I/O
18. 13 11

Block 2

2.000000000000

Transfer
Command

19. 3
20. ST 00
21. I/O
22. 13 11

3.000000000000

Transfer
Command

WRITE

WRITE

WRITE

WRITE

READ

23. 0 32 steps will
24. ST 00 be recalled
25. I/O (read) from
26. 13 03 the tape starting

at Block 0.

READ

27. 1
28. ST 00
29. I/O
30. 13 03

1.000000000000

READ

31. 2
32. ST 00
33. I/O
34. 13 03

2.000000000000

READ

35. 3
36. ST 00
37. I/O
38. 13 03

3.000000000000

READ

Example 5:

Transfer the data in the first block on tape 0 into the first 128 step locations in the calculator memory. (The first block must have 128 steps.)

Since the initial location in both the tape and the calculator is 0, all that is needed for the transfer is as follows:

OPERATING PROCEDURES: RUN MODE

1. Key PRIME. This keystroke operation puts all zeros in the display.
2. With the SP and DIV Selector Switches on the calculator in the "DOWN" position, depress the 05 Special Function Key. This will generate the 13 05 code. The 13 05 code instructs the system to transfer 128 steps of data.

Result – The transfer of 128 steps has taken place. The information came from the dual tape cassette at block 0 and was transferred to the calculator at locations 0 through 127 of the main memory.

TRANSFERRING DATA FROM ONE DEVICE TO ANOTHER

Sixteen steps are loaded on to tape 0, block 1. This example recalls sixteen steps to the calculator and writes sixteen steps on block 1, tape 0.

TAPE 0 ALL SWITCHES DOWN ON THE 609

RUN MODE

1. GROUP 2
2. 00 00
3. 0
4. ST 00
5. ST 01
6. I/O
7. 13 02 } Transfer Command. Selector Switches, SP & DIV, Special REG 02.

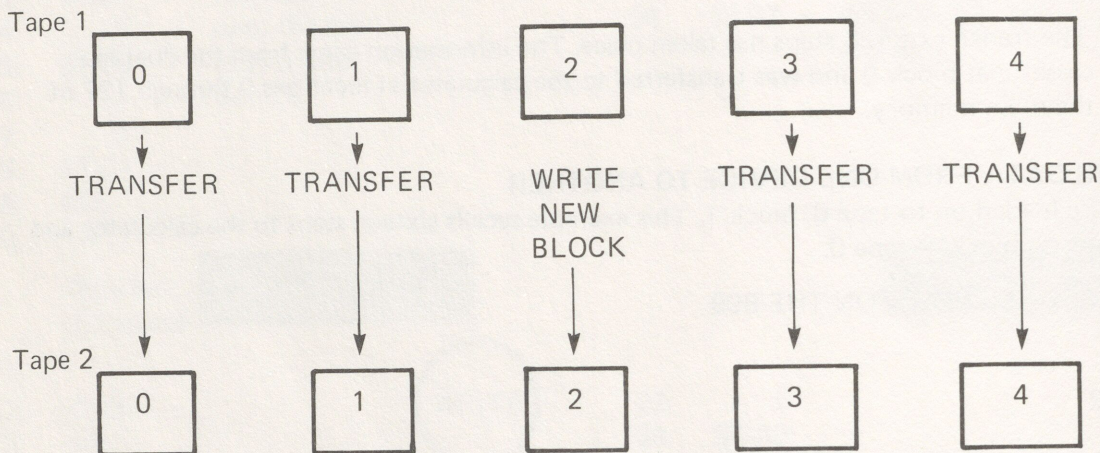
TAPE 0 ALL TOGGLE SWITCHES DOWN. NUMBER 1 SWITCH UP ON THE 609

1. GROUP 2
2. 00 01
3. 1
4. ST 00
5. I/O
6. 13 10 } Transfer Command. Selector Switches, SP & DIV, Special REG 10.

CHANGING A BLOCK IN THE MIDDLE OF A TAPE

Due to phase angle changes of the line voltage, the stop position of the 609 can vary. If the tape is not exactly at the same point when changing a block in the middle of a tape as when originally recorded, the succeeding block may be destroyed. Therefore, Wang Laboratories does not recommend rewriting a block of information in the middle of a tape.

However, there will be occasions when you wish to update a block in the middle of a tape. The recommended procedure is to transfer all the blocks up to the block that is being changed to the second tape, write the new or changed block on the second tape, and continue transferring the remaining blocks onto the second tape.



If it is absolutely necessary to update a block on the original tape without transferring, the following procedure will usually work, however it cannot be guaranteed.

1. Read the block immediately preceding the one to be written.
2. Rewrite the new block.

For the above example, we would read Block 1 and write Block 2.

600-2
312-PROGRAM STEPS/55 DATA REGISTERS
EIGHT STEPS EQUAL ONE REGISTER

REGISTER NUMBER	REGISTER	REGISTER NUMBER	REGISTER	REGISTER	REGISTER	REGISTER	REGISTER
00		27	0	2	2	3	0
01		28	0	2	1	5	0
02		29	0	2	0	7	0
03		30	0	1	9	9	0
04		31	0	1	9	1	0
05		32	0	1	8	3	0
06		33	0	1	7	5	0
07		34	0	1	6	7	0
08		35	0	1	5	9	0
09		36	0	1	5	1	0
10		37	0	1	4	3	0
11		38	0	1	3	5	0
12		39	0	1	2	7	0
13		40	0	1	1	9	0
14		41	0	1	1	1	0
15		42	0	1	0	3	0
16	0	43	0	0	9	5	0
17	0	44	0	0	8	7	0
18	0	45	0	0	7	9	0
19	0	46	0	0	7	1	0
20	0	47	0	0	6	3	0
21	0	48	0	0	5	5	0
22	0	49	0	0	4	7	0
23	0	50	0	0	3	9	0
24	0	51	0	0	3	1	0
25	0	52	0	0	2	3	0
26	0	53	0	0	1	5	0
		54	0	0	0	7	0
			0	0	0	5	0
			0	0	0	4	0
			0	0	0	3	0
			0	0	0	2	0
			0	0	0	1	0
			0	0	0	0	0

824-PROGRAM STEPS/119 DATA REGISTERS EIGHT STEPS EQUAL ONE REGISTER

REGISTER NUMBER	
00	
01	
02	
03	
04	
05	
06	
07	
08	
09	
10	
11	
12	
13	
14	
15	

PROGRAM STEP NO.	
16	0 8 2 3 3 0 8 1 6
17	0 8 1 5 0 8 0 8
18	0 8 0 7 0 8 0 0
19	0 8 9 9 0 7 9 2
20	0 7 9 1 0 7 8 4
21	0 7 8 3 0 7 7 6
22	0 7 7 5 0 7 6 8
23	0 7 6 7 0 7 6 0
24	0 7 5 9 0 7 5 2
25	0 7 5 1 0 7 4 4
26	0 7 4 3 0 7 3 6
27	0 7 3 5 0 7 2 8
28	0 7 2 7 0 7 2 0

REGISTER NUMBER	
29	0 7 1 9 0 7 1 2
30	0 7 1 1 0 7 0 4
31	0 7 0 3 0 6 9 6
32	0 6 9 5 0 6 8 8
33	0 6 8 7 0 6 8 0
34	0 6 7 9 0 6 7 2
35	0 6 7 1 0 6 6 4
36	0 6 6 3 0 6 5 6
37	0 6 5 5 0 6 4 8
38	0 6 4 7 0 6 4 0
39	0 6 3 9 0 6 3 2
40	0 6 3 1 0 6 2 4
41	0 6 2 3 0 6 1 6
42	0 6 1 5 0 6 0 8
43	0 6 0 7 0 6 0 0
44	0 5 9 7 0 5 9 2
45	0 5 9 1 0 5 8 4
46	0 5 8 3 0 5 7 6
47	0 5 7 5 0 5 6 8
48	0 5 6 7 0 5 6 0
49	0 5 5 9 0 5 5 2
50	0 5 5 1 0 5 4 4
51	0 5 4 3 0 5 3 6
52	0 5 3 5 0 5 2 8
53	0 5 2 7 0 5 2 0
54	0 5 1 9 0 5 1 2
55	0 5 1 1 0 5 0 4
56	0 5 0 3 0 4 9 6
57	0 4 9 5 0 4 8 8
58	0 4 8 7 0 4 8 0

PROGRAM STEP NO.

REGISTER NUMBER	
59	0 4 7 9 0 4 7 2
60	0 4 7 1 0 4 6 4
61	0 4 6 3 0 4 5 6
62	0 4 5 5 0 4 4 8
63	0 4 4 7 0 4 4 0
64	0 4 3 9 0 4 3 2
65	0 4 3 1 0 4 2 4
66	0 4 2 3 0 4 1 6
67	0 4 1 5 0 4 0 8
68	0 4 0 7 0 4 0 0
69	0 3 9 9 0 3 9 2
70	0 3 9 1 0 3 8 4
71	0 3 8 3 0 3 7 6
72	0 3 7 5 0 3 6 8
73	0 3 6 7 0 3 6 0
74	0 3 5 9 0 3 5 2
75	0 3 5 1 0 3 4 4
76	0 3 4 3 0 3 3 6
77	0 3 3 5 0 3 2 8
78	0 3 2 7 0 3 2 0
79	0 3 1 9 0 3 1 2
80	0 3 1 1 0 3 0 4
81	0 3 0 3 0 2 9 6
82	0 2 9 5 0 2 8 8
83	0 2 8 7 0 2 8 0
84	0 2 7 9 0 2 7 2
85	0 2 7 1 0 2 6 4
86	0 2 6 3 0 2 5 6
87	0 2 5 5 0 2 4 8
88	0 2 4 7 0 2 4 0

PROGRAM STEP NO.

REGISTER NUMBER	
89	0 2 3 9 0 2 3 2
90	0 2 3 1 0 2 2 4
91	0 2 2 3 0 2 1 6
92	0 2 1 5 0 2 0 8
93	0 2 0 7 0 2 0 0
94	0 1 9 9 0 1 9 2
95	0 1 9 1 0 1 8 4
96	0 1 8 3 0 1 7 6
97	0 1 7 5 0 1 6 8
98	0 1 6 7 0 1 6 0
99	0 1 5 9 0 1 5 2
100	0 1 5 1 0 1 4 4
101	0 1 4 3 0 1 3 6
102	0 1 3 5 0 1 2 8
103	0 1 2 7 0 1 2 0
104	0 1 1 9 0 1 1 2
105	0 1 1 1 0 1 0 4
106	0 1 0 3 0 0 9 6
107	0 0 9 5 0 0 8 8
108	0 0 8 7 0 0 8 0
109	0 0 7 9 0 0 7 2
110	0 0 7 1 0 0 6 4
111	0 0 6 3 0 0 5 6
112	0 0 5 5 0 0 4 8
113	0 0 4 7 0 0 4 0
114	0 0 3 9 0 0 3 2
115	0 0 3 1 0 0 2 4
116	0 0 2 3 0 0 1 6
117	0 0 1 5 0 0 0 8
118	0 0 0 7 0 0 0 0

PROGRAM STEP NO.

16	1847					1840
17	1839					1832
18	1831					1824
19	1823					1816
20	1815					1808
21	1807					1800
22	1799					1792
23	1791					1784
24	1783					1776
25	1775					1768
26	1767					1760
27	1759					1752
28	1751					1744
29	1743					1736
30	1735					1728

REGISTER NUMBER											
31	1 7 2										1 7 2
32	1 7 1										1 7 1
33	1 7 1										1 7 0
34	1 7 0										1 6 9
35	1 6 9										1 6 8
36	1 6 8										1 6 8
37	1 6 7										1 6 7
38	1 6 7										1 6 6
39	1 6 6										1 6 5
40	1 6 5										1 6 4
41	1 6 4										1 6 4
42	1 6 3										1 6 3
43	1 6 3										1 6 2
44	1 6 2										1 6 1
45	1 6 1										1 6 0
46	1 6 0										1 6 0
47	1 5 9										1 5 9
48	1 5 9										1 5 8
49	1 5 8										1 5 7
50	1 5 7										1 5 6
51	1 5 6										1 5 6
52	1 5 5										1 5 5
53	1 5 5										1 5 4
54	1 5 4										1 5 3
55	1 5 3										1 5 2
56	1 5 2										1 5 2
57	1 5 1										1 5 1
58	1 5 1										1 5 0
59	1 5 0										1 4 9
60	1 4 9										1 4 8
61	1 4 8										1 4 8

PROGRAM STEP NO.

[illegible][illegible]

PROGRAM STEP NO.	REGISTER NUMBER
0	0976
9	0968
8	0960
3	0952
0	0944
0	0936
9	0928
3	0920
5	0912
1	0904
0	0896
0	0888
8	0880
8	0872
7	0864
9	0856
0	0848
8	0840
6	0832
3	0824
0	0816
0	0808
8	0800
0	0792
7	0784
9	0776
1	0768
0	0760
7	0752
8	0744
3	0736

MEMBER	REGISTRATION NUMBER
0735	0728
0727	0720
0719	0712
0711	0704
0703	0696
0695	0688
0687	0680
0679	0672
0671	0664
0663	0656
0655	0648
0647	0640
0639	0632
0631	0624
0623	0616
0615	0608
0607	0600
0599	0592
0591	0584
0583	0576
0575	0568
0567	0560
0559	0552
0551	0544
0543	0536
0535	0528
0527	0520
0519	0512
0511	0504
0503	0496
0495	0488

PROGRAM STEP NO.										REGISTER NUMBER	
									0 4 8 0		
									0 4 7 2	217	0 2 3 9
									0 4 6 4	218	0 2 3 1
									0 4 5 6	219	0 2 2 3
									0 4 4 8	220	0 2 5 5
									0 4 4 0	221	0 2 0 7
									0 4 3 2	222	0 1 9 9
									0 4 2 4	223	0 1 9 1
									0 4 1 6	224	0 1 8 3
									0 4 0 8	225	0 1 7 5
									0 4 0 0	226	0 1 6 7
									0 3 9 2	227	0 1 5 9
									0 3 8 4	228	0 1 5 1
									0 3 7 6	229	0 1 4 3
									0 3 6 8	230	0 1 3 5
									0 3 6 0	231	0 1 2 7
									0 3 5 2	232	0 1 1 9
									0 3 4 4	233	0 1 1 1
									0 3 3 6	234	0 1 0 3
									0 3 2 8	235	0 0 9 5
									0 3 2 0	236	0 0 8 7
									0 3 1 2	237	0 0 7 9
									0 3 0 4	238	0 0 7 1
									0 2 9 6	239	0 0 6 3
									0 2 8 8	240	0 0 5 5
									0 2 8 0	241	0 0 4 7
									0 2 7 2	242	0 0 3 9
									0 2 6 4	243	0 0 3 1
									0 2 5 6	244	0 0 2 3
									0 2 4 8	245	0 0 1 5
									0 2 4 0	246	0 0 0 7

[illegible]

READ AND WRITE DATA REGISTERS

It is possible to store (write) and recall (read) complete registers from the 600 calculator to the 609 dual tape. Illustrated on the previous page is a complete explanation of the memory, how it is used and where data is stored.

PRIME

GROUP 2

00 00 Selection Switches (all down)

Example 1:

To store registers 16 and 17 of the memory (which is equivalent to 16 steps of data) onto block 0:

- | | | |
|----|-------|---|
| 1. | 0 | |
| 2. | ST 00 | |
| 3. | 1 | |
| 4. | 8 | } Initial step location in the calculator |
| 5. | 3 | |
| 6. | 2 | |
| 7. | ST 01 | |
| 8. | I/O | } Transfer command |
| 9. | 13 10 | |

Example 2:

To retrieve data stored on block 0 of dual tape cassette and place it in registers 22 and 23 of the memory (steps 1784–1799, 600–14), the following steps must be taken:

- | | | |
|----|-------|---|
| 1. | 0 | |
| 2. | ST 00 | |
| 3. | 1 | |
| 4. | 7 | } Initial step location in the calculator |
| 5. | 8 | |
| 6. | 4 | |
| 7. | ST 01 | |
| 8. | I/O | } Transfer command |
| 9. | 13 02 | |

DATA STORAGE REGISTER TRANSFER

Example 3:

Enter the number "100" into both Data Storage Registers 018 and 019 of the calculator. Load them onto the dual tape cassette starting at initial location block 0 and recall them back to the calculator at storage registers 020 and 021 of the calculator.

ENTERING DATA INTO THE CALCULATOR

RUN MODE

OPERATING PROCEDURES:

1. PRIME
2. 100
3. STORE
4. 018
5. STORE
6. 019

The number 100 is now in Storage Registers 018 and 019.

To store the data on the dual tape cassette, we first need to know the 16 program steps corresponding to the storage registers 018 and 019. As indicated on the memory, the locations in question are steps 1816 through 1831 on the 600-14.

LOADING THIS DATA INTO THE DUAL TAPE CASSETTE

OPERATING PROCEDURES:

1. GROUP 2
2. 00 00
3. 0
4. ST 0
5. 1
6. 8
7. 1
8. 6
9. ST 01
10. I/O
11. 13 10

The contents of storage registers 018 and 019 are now on tape at location Block 0.

RECALLING THE DATA BACK INTO THE CALCULATOR

We are now going to transfer the data back to the calculator, but at a different location, which will be storage registers 020 and 021 of the calculator. Again the step location must be known for data registers 020 and 021. The 600 Reference Manual indicates that when we are concerned with steps 1800-1815 of the calculator, Register 000 still contains the initial tape location of Block 0.

PROGRAM EXAMPLE 1

A. Key 00 00

This transfers step 0003 (in calculator) (+ command in block 0)
to block 0.

Transfers step 0010 (in calculator) (– command in block 1)
to block 1.

Transfers step 0018 (in calculator) (x command in block 2)
to block 2.

Transfers step 0026 (in calculator) (÷ command in block 3)
to block 3.

B. To add, key first number, key 10 01, key second number, key GO. This transfers the step in block 0 to step 0074 in the calculator and adds the 2 numbers.

To subtract, key the number, key 10 02, key the subtrahend, key GO. This transfers the step in block 1 to step 00 in the calculator and subtracts the 2 numbers.

To multiply, key the first number, key 10 03, key the second number, key GO. This transfers the step in block 2 to step 0074 in the calculator and multiplies the 2 numbers.

To divide, key the dividend, key 10 04, key the divisor, key GO. This transfers the step in block 3 to step 0074 in the calculator and divides the 2 numbers.

STEP	COMMAND	STEP	COMMAND	STEP	COMMAND
0000	MARK	0027	2	0054	ST 03
0001	10 00	0028	6	0055	2
0002	T 00	0029	ST 01	0056	ST 00
0003	+02	0030	I/O	0057	SEARCH
0004	3	0031	13 08	0058	03 00
0005	ST 01	0032	RETURN	0059	MARK
0006	I/O	0033	MARK	0060	10 04
0007	13 08	0034	10 01	0061	ST 02
0008	1	0035	ST 02	0062	STOP
0009	ST 00	0036	STOP	0063	ST 03
0010	–02	0037	ST 03	0064	3
0011	1	0038	T 00	0065	ST 00
0012	0	0039	SEARCH	0066	MARK
0013	ST 01	0040	03 00	0067	03 00
0014	I/O	0041	MARK	0068	7
0015	13 08	0042	10 02	0069	4
0016	2	0043	ST 02	0070	ST 01
0017	ST 00	0044	STOP	0071	I/O
0018	X 02	0045	ST 03	0072	13 00
0019	1	0046	1	0073	RE 03
0020	8	0047	ST 00	0074	GO
0021	ST 01	0048	SEARCH	0075	RETURN
0022	I/O	0049	03 00	0076	END PROGRAM
0023	13 08	0050	MARK		
0024	3	0051	10 03		
0025	ST 00	0052	ST 02		
0026	÷02	0053	STOP		

PROGRAM EXAMPLE 2

600-14

This example transfers 8 steps from block 0 to steps 0024-0031 (in calculator) and executes them. 1147.30 will be added to the number you entered.

- A. Key 00 00
This transfers steps 0002-0009 (in calculator) to block 0.
- B. Key any number.
Key 00 01.

STEP	CODE	KEY
0000	09 00	MARK
0001	10 00	1000
0002	00 01	1
0003	00 04	4
0004	00 04	4
0005	00 07	7
0006	00 10	D.P.
0007	00 03	3
0008	00 00	0
0009	02 02	+ 02
0010	01 00	T 00
0011	00 02	2
0012	06 01	ST 01
0013	15 02	I/O
0014	13 09	WRITE 8
0015	09 15	RETURN
0016	09 00	MARK
0017	10 01	1001
0018	06 02	ST 02
0019	00 02	2
0020	00 04	4
0021	06 01	ST 01
0022	15 02	I/O
0023	13 01	READ 8
0024	08 03	GO
0025	08 03	GO
0026	08 03	GO
0027	08 03	GO
0028	08 03	GO
0029	08 03	GO
0030	08 03	GO
0031	08 03	GO
0032	09 15	RETURN
0033	09 14	END PROGRAM

PROGRAM EXAMPLE 3

600-14

A. Key 10 00

16 numbers can be stored in registers 020 - 035

1. Key number, Key GO.
Repeat (1) until 16 numbers are entered.
2. Registers 020-035 are transferred from calculator to block 0.
The first number keyed will appear in the display.
Continue keying GO until the sixteen numbers are reviewed.

B. Key 10 01

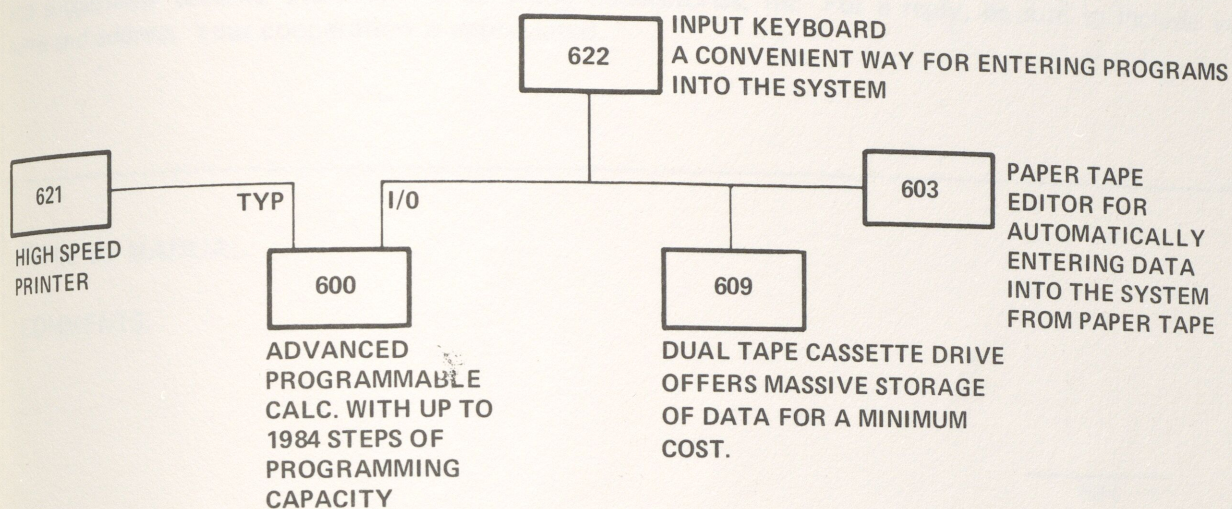
1. The contents of register 020 will now appear as 0.
Continue keying GO until the contents of all sixteen registers appear (note that the contents of each register is zero).
2. Key GO, 128 steps (16 registers) are transferred from block 0 to calculator (in registers 020-035).
Contents of register 020 will appear in the display.
Continue keying GO until the sixteen numbers are reviewed.
The program listing is on the next page.

STEP	CODE	KEY	COMMENT	STEP	CODE	KEY	COMMENT
0000	09 00	MARK	#	0050	01 00	T 00	
0001	10 00	10 00		0051	15 02	I/O	
0002	00 01	1		0052	13 05	READ 128	
0003	00 09	9		0053	11 00	11 00	SR
0004	06 02	ST 02		0054	09 15	RETURN	
0005	09 00	MARK	#	0055	09 00	MARK	#
0006	02 00	+ 00		0056	11 00	11 00	
0007	00 01	1		0057	00 01	1	
0008	02 02	+ 02		0058	00 09	9	
0009	06 00	ST 00		0059	06 02	ST 02	
0010	00 15	CLEAR W		0060	09 00	MARK	#
0011	09 03	STOP		0061	02 02	+ 02	
0012	15 11	INDIR		0062	00 01	1	
0013	06 02	ST 02		0063	02 02	+ 02	
0014	00 03	3		0064	06 00	ST 00	
0015	00 05	5		0065	15 11	INDIR	
0016	09 02	ALPHA		0066	07 02	RE 02	
0017	08 04	JUMP IF 0	SKIP	0067	09 03	STOP	
0018	08 00	SEARCH	*	0068	00 03	3	
0019	02 00	+ 00		0069	00 05	5	
0020	01 00	T 00		0070	09 02	ALPHA	
0021	00 01	1		0071	08 04	JUMP IF 0	SKIP
0022	00 06	6		0072	08 00	SEARCH	*
0023	00 08	8		0073	02 02	+ 02	
0024	00 08	8		0074	09 15	RETURN	
0025	06 01	ST 01		0075	09 14	END PROG	
0026	15 02	I/O					
0027	13 13	WRITE 128					
0028	11 00	11 00	SR				
0029	09 15	RETURN					
0030	09 00	MARK	#				
0031	10 01	10 01					
0032	00 01	1					
0033	00 05	5					
0034	06 02	ST 02					
0035	09 00	MARK					
0036	02 01	+ 01					
0037	00 01	1					
0038	02 02	+ 02					
0039	06 00	ST 00					
0040	00 00	0					
0041	15 11	INDIR					
0042	06 02	ST 02					
0043	00 03	3					
0044	00 05	5					
0045	09 02	ALPHA					
0046	08 04	JUMP IF 0	SKIP				
0047	08 00	SEARCH	*				
0048	02 01	+01					
0049	11 00	11 00	SR				

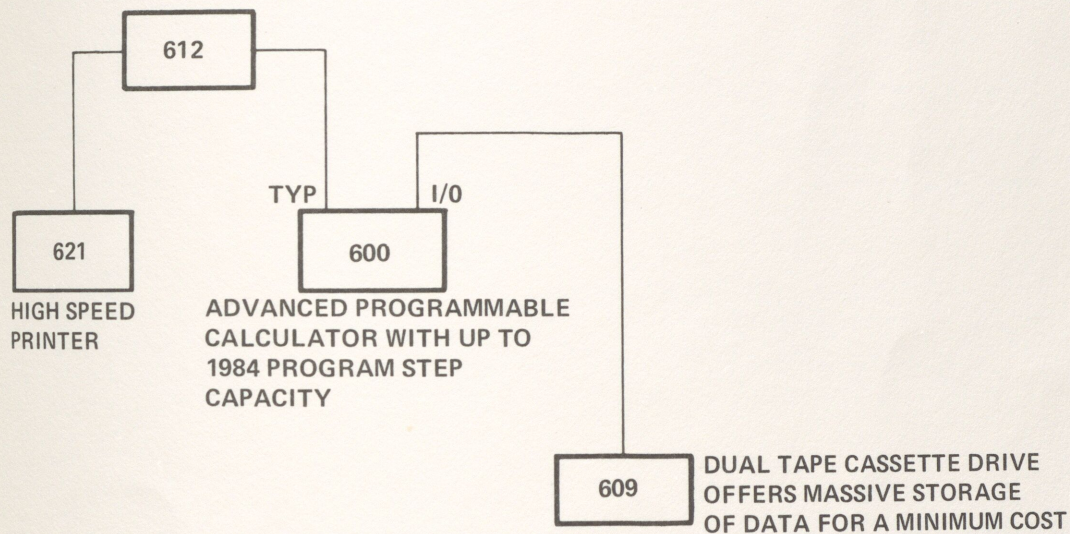
609 SPECIFICATIONS

1. Power Requirement: 115 VAC, 60 Hz or 230 VAC, 50 Hz
2. Connecting Cable: 6 ft. (2 meter) with I/O Connector to 600
3. Operating Environment:
 - Temperature: 50° F to 104° F
(10° C to 40° C)
 - Humidity: 20% to 80% Relative Humidity
4. Recording Speed: 7.5"/sec.
 - Search Speed: 7.5"/sec.
 - Rewind Speed: 90"/sec.
 - Recording Method: NRZ# Dual Track
 - Recording Density: 533 Flux Change Per Inch (fpi)
 - Inter-Recording Gap: 1.25"
5. Size:
 - 6" Height (15.2 cm)
 - 14" Width (35.6 cm)
 - 16" Depth (40.6 cm)
6. Weight: 34 lbs. (15.4 kg)

TYPICAL CONFIGURATIONS



FLAT PED PLOTTER
FOR HIGH PRECISION
PLOTS OF CALCULATIONS



For more information on these and other configurations of Wang Calculating Systems, look in your Yellow Pages for the local Wang sales office; or call us at (617)-851-4111.

RADICAL CONFIGURATIONS

1. The first step is to identify the radical center.

2. The second step is to identify the radical center.

3. The third step is to identify the radical center.

4. The fourth step is to identify the radical center.

5. The fifth step is to identify the radical center.

6. The sixth step is to identify the radical center.

7. The seventh step is to identify the radical center.

8. The eighth step is to identify the radical center.

9. The ninth step is to identify the radical center.

10. The tenth step is to identify the radical center.

11. The eleventh step is to identify the radical center.

12. The twelfth step is to identify the radical center.

13. The thirteenth step is to identify the radical center.

14. The fourteenth step is to identify the radical center.

15. The fifteenth step is to identify the radical center.

16. The sixteenth step is to identify the radical center.

17. The seventeenth step is to identify the radical center.

18. The eighteenth step is to identify the radical center.

19. The nineteenth step is to identify the radical center.

20. The twentieth step is to identify the radical center.

21. The twenty-first step is to identify the radical center.

22. The twenty-second step is to identify the radical center.

23. The twenty-third step is to identify the radical center.

24. The twenty-fourth step is to identify the radical center.

25. The twenty-fifth step is to identify the radical center.

26. The twenty-sixth step is to identify the radical center.

27. The twenty-seventh step is to identify the radical center.

28. The twenty-eighth step is to identify the radical center.

29. The twenty-ninth step is to identify the radical center.

30. The thirtieth step is to identify the radical center.

31. The thirty-first step is to identify the radical center.

32. The thirty-second step is to identify the radical center.

33. The thirty-third step is to identify the radical center.

34. The thirty-fourth step is to identify the radical center.

35. The thirty-fifth step is to identify the radical center.

36. The thirty-sixth step is to identify the radical center.

37. The thirty-seventh step is to identify the radical center.

38. The thirty-eighth step is to identify the radical center.

39. The thirty-ninth step is to identify the radical center.

40. The fortieth step is to identify the radical center.

41. The forty-first step is to identify the radical center.

42. The forty-second step is to identify the radical center.

43. The forty-third step is to identify the radical center.

44. The forty-fourth step is to identify the radical center.

45. The forty-fifth step is to identify the radical center.

To help us to provide you with the best manuals possible, please make your comments and suggestions concerning this publication on the form below. Then detach, fold, tape closed and mail to us. All comments and suggestions become the property of Wang Laboratories, Inc. For a reply, be sure to include your name and address. Your cooperation is appreciated.

TITLE OF MANUAL:

COMMENTS:

Fold

Fold

(Please tape. Postal regulations prohibit the use of staples.)



Fold

FIRST CLASS
PERMIT NO. 16
Tewksbury, Mass.

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

— POSTAGE WILL BE PAID BY —

WANG LABORATORIES, INC.
836 NORTH STREET
TEWKSBURY, MASSACHUSETTS 01876

Attention: Marketing Department

Fold

Cut along dotted line.

**WANG LABORATORIES
(CANADA) LTD.**

180 Duncan Mill Road
Don Mills, Ontario
TELEPHONE (416) 449-7890
TELEX 06-21-7549

WANG EUROPE, S.A.

Rue Anatole France 115-121
1030 Brussels, Belgium
TELEPHONE 15.48.01/02/03

WANG ELECTRONICS LTD.

40-44 High Street
Northwood, Middlesex, England
TELEPHONE Northwood 27677

WANG FRANCE SARL

47, Rue de la Chapelle
Paris 18, France
TELEPHONE 203.27.94 or 203.25.94

WANG LABORATORIES GMBH

Moselstrasse No. 4
6000 Frankfurt am Main
West Germany
TELEPHONE (611) 23-00-40

WANG SKANDINAVISKA AB

Fredsgaten 17
S-172 33
Sundbyberg, Sweden
TELEPHONE 98-12-45

WANG NEDERLAND N.V.

Damstraat 2
Utrecht, Netherlands
TELEPHONE 030-930947

WANG PACIFIC LTD.

61, King Yip Street, 1st Floor
Kwun Tong, Kowloon, Hong Kong
TELEPHONE K-450528

WANG INDUSTRIAL CO., LTD.

110-118 Kuang-Fu N. Rd.
Taipei, Taiwan
Republic of China
TELEPHONE 77.96.19 or 71.35.78

WANG GESELLSCHAFT MBH

Grinzinger Allee 16
1190 Vienna 19
Austria
TELEPHONE (0222) 32.42.43

WANG COMPUTER PTY. LTD.

25 Bridge Street
Pymble, NSW 2073
Australia
TELEPHONE 449-6388

WANG MEDICAL SYSTEMS, INC.

836 North Street
Tewksbury, Massachusetts 01876
TELEPHONE (617) 851-4111
TWX 710-343-6769
TELEX 94-7421

WANG MEMORY SYSTEMS, INC.

836 North Street
Tewksbury, Massachusetts 01876
TELEPHONE (617) 851-4111
TWX 710-343-6769
TELEX 94-7421

**WANG INTERNATIONAL
TRADE, INC.**

836 North Street
Tewksbury, Massachusetts 01876
TELEPHONE (617) 851-4111
TWX 710-343-6769
TELEX 94-7421

PHI COMPUTER SERVICES, INC.

800 Massachusetts Avenue
Arlington, Massachusetts 02174
TELEPHONE (617) 648-8550

836 North Street
Tewksbury, Massachusetts 01876
TELEPHONE (617) 851-4111
TWX 710-343-6769
TELEX 94-7421

WANG

LABORATORIES, INC.

836 NORTH STREET, TEWKSBURY, MASSACHUSETTS 01876, TEL (617) 851-4111, TWX 710 343-6769, TELEX 94-7421

Printed in U.S.A.
700-0932
1-73-5C
Price \$5.00