LS 4000 and LS 400Xi Series

Advanced Programmer's Guide

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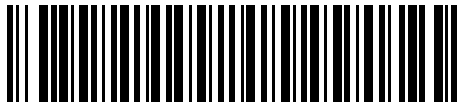

70-35834-01
Revision B — February 2001

Symbol Technologies, Inc. One Symbol Plaza, Holtsville N.Y. 11742-1300

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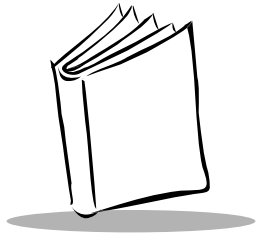

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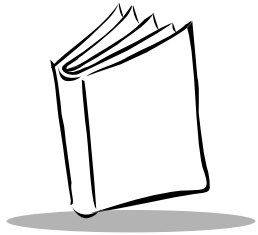


About This Manual

The *LS 4000 and LS 400Xi Advanced Programmers Guide* provides programming information and bar codes for the LS 4000 and LS 400Xi series scanners.

Notational Conventions

The following conventions are used in this document:

- LS 4000 refers to the LS 4000 series of scanners
- LS 400Xi refers to both the LS 4004i and the LS 4005i, unless specifically noted
- Bullets (•) indicate:
  - action items
  - lists of alternatives
  - lists of required steps that are not necessarily sequential.
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists
- References to other sections, chapters, or manuals appear in italics.

Related Publications

- *LS 400Xi Product Reference Guide*, p/n 70-37898-xx
- *LS 400Xi Quick Reference Guide,* p/n 70-33849-xx
- *LS 4000 Series Product Reference Guide*, p/n 70-16171-xx
- *LS 4000 Series Quick Reference Guide*, p/n 70-16423-xx.

Service Information

If you have a problem with your equipment, contact the *Symbol Support Center* for your region. See below for contact information. Before calling, have the model number, serial number, and several of your bar code symbols at hand.

Call the Support Center from a phone near the scanning equipment so that the service person can try to talk you through your problem. If the equipment is found to be working properly and the problem is symbol readability, the Support Center will request samples of your bar codes for analysis at our plant.

If your problem cannot be solved over the phone, you may need to return your equipment for servicing. If that is necessary, you will be given specific directions.

Note: *Symbol Technologies is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty. If the original shipping container was not kept, contact Symbol to have another sent to you.*

Symbol Support Center

In the U.S.A., for service information, warranty information or technical assistance, call:

SYMBOL SUPPORT CENTER **1-800-653-5350**	Europe/Mid-East Distributor Operations Contact your local distributor or call +44 118 945 7360
Canada Mississauga, Ontario Canadian Headquarters (905) 629-7226	Asia Singapore Symbol Technologies Asia, Inc. 337-6588 (Inside Singapore) +65-337-6588 (Outside Singapore)

If you purchased your Symbol product from a Symbol Business Partner, contact that Business Partner for service.

Warranty

Symbol Technologies, Inc (“Symbol”) manufactures its hardware products in accordance with industry-standard practices. Symbol warrants that for a period of twelve (12) months from date of shipment, products will be free from defects in materials and workmanship.

This warranty is provided to the original owner only and is not transferable to any third party. It shall not apply to any product (i) which has been repaired or altered unless done or approved by Symbol, (ii) which has not been maintained in accordance with any operating or handling instructions supplied by Symbol, (iii) which has been subjected to unusual physical or electrical stress, misuse, abuse, power shortage, negligence or accident or (iv) which has been used other than in accordance with the product operating and handling instructions. Preventive maintenance is the responsibility of customer and is not covered under this warranty.

Wear items and accessories having a Symbol serial number, will carry a 90-day limited warranty. Non-serialized items will carry a 30-day limited warranty.

Warranty Coverage and Procedure

During the warranty period, Symbol will repair or replace defective products returned to Symbol’s manufacturing plant in the US. For warranty service in North America, call the Symbol Support Center at 1-800-653-5350. International customers should contact the local Symbol office or support center. If warranty service is required, Symbol will issue a Return Material Authorization Number. Products must be shipped in the original or comparable packaging, shipping and insurance charges prepaid. Symbol will ship the repaired or replacement product freight and insurance prepaid in North America. Shipments from the US or other locations will be made F.O.B. Symbol’s manufacturing plant.

Symbol will use new or refurbished parts at its discretion and will own all parts removed from repaired products. Customer will pay for the replacement product in case it does not return the replaced product to Symbol within 3 days of receipt of the replacement product. The process for return and customer’s charges will be in accordance with Symbol’s Exchange Policy in effect at the time of the exchange.

Customer accepts full responsibility for its software and data including the appropriate backup thereof.

Repair or replacement of a product during warranty will not extend the original warranty term.

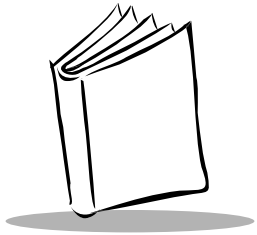
Symbol’s Customer Service organization offers an array of service plans, such as on-site, depot, or phone support, that can be implemented to meet customer’s special operational requirements and are available at a substantial discount during warranty period.

General

Except for the warranties stated above, Symbol disclaims all warranties, express or implied, on products furnished hereunder, including without limitation implied warranties of merchantability and fitness for a particular purpose. The stated express warranties are in lieu of all obligations or liabilities on part of Symbol for damages, including without limitation, special, indirect, or consequential damages arising out of or in connection with the use or performance of the product.

Seller's liability for damages to buyer or others resulting from the use of any product, shall in no way exceed the purchase price of said product, except in instances of injury to persons or property.

Some states (or jurisdictions) do not allow the exclusion or limitation of incidental or consequential damages, so the proceeding exclusion or limitation may not apply to you.



Chapter 1
Advanced Data Formatting

Introduction

Advanced Data Formatting (ADF) is a means of customizing data before transmission to your host device. Scan data can be edited to suit your particular requirements.

ADF can be implemented through scanning a related series of bar codes, which appear in Chapter 2, *ADF Bar Codes*.

Rules: Criteria Linked to Actions

In ADF, data is customized through **rules**. These rules perform detailed actions when the data meets certain criteria. One rule may consist of single or multiple criteria applied to single or multiple actions.

For instance, a data formatting rule could be the following:

Criteria: *When scan data is Code 39, length 12, and data at the start position is the string "129",*

Actions: *pad all sends with zeros to length 8,*
send all data up to X,
send a space.

If a Code 39 bar code of 1299X1559828 is scanned, the following is transmitted: 00001299<space>. If a Code 39 bar code of 1299X15598 is scanned, this rule is ignored.

The rule specifies the editing conditions and requirements before data transmission occurs.

Using ADF Bar Codes

When you program a rule, make sure the rule is logically correct. Plan ahead before you start scanning.

To program each data formatting rule:

- **Start the Rule**. Scan the **BEGIN NEW RULE** bar code on page 2-1.
- **Criteria**. Scan the bar codes for all pertinent criteria. Criteria can include code type (e.g., Code 128), code length, or data that contains a specific character string (e.g., the digits "129"). These options are described in *Criteria* on page 1-3.
- **Actions**. Scan all actions related to, or affecting, these criteria. The actions of a rule specify how to format the data for transmission. These options are described in *Actions* on page 1-4.
- **Save the Rule**. Scan the **SAVE RULE** bar code on page 2-1. This places the rule in the "top" position in the rule buffer.
- If you make errors during this process, some special-purpose bar codes may be useful: **Erase Criteria and Start Again**, **Erase Actions and Start Again**, **Erase Previously Saved Rule**, etc.

Criteria, actions, and entire rules may be erased by scanning the appropriate bar code (see page 2-2).

Beeper Definitions on page 1-11 help guide you through the programming steps.

Special Commands

Begin New Rule

Scan this bar code first when programming a data formatting rule.

Save Rule

Scan this bar code to complete a data formatting rule.

Erase

Use these bar codes to erase criteria, actions, and rules.

Quit Entering Rules

Scan this bar code to quit entering rules.

Disable Rule Set

These bar codes allow you to disable particular rule sets.

Criteria

Code Types

Select any number of code types to be affected. All selected codes must be scanned in succession, prior to selecting other criteria. *If you don't select a code type, all code types will be affected.*

Code Lengths

Define the number of characters the selected code type must contain. *If you don't select a code length, selected code types of any length will be affected.*

Message Containing A Specific Data String

Select whether the formatting affects data that begins with a specific character or data string, or contains a specific character or data string.

Specific String at Start

Scan this bar code, then scan the bar codes representing the desired character or characters (up to a total of 8) in the *Alphanumeric Keyboard* on page 2-66.

Specific String, Any Location

Scan this bar code, then, using the *Numeric Keypad* on page 2-11, scan a two-digit number representing the *position* (use a leading "zero" if necessary). Then scan the desired character or characters (up to a total of 8) on the *Alphanumeric Keyboard* on page 2-66, followed by the **END OF MESSAGE** bar code on page 2-72.

Any Message OK

By not scanning any bar code, all selected code types are formatted, regardless of information contained.

Rule Belongs To Set

Select the set a rule belongs to.

Actions

Select how to format the data for transmission.

Send Data

Send all data that remains, send all data up to a specific character selected from the *Alphanumeric Keyboard*, or send the next N characters. N = any number from 1 to 254, selected from the *Alphanumeric Keyboard*.

Setup Field(s)

Define fields as follows:

Move Cursor To a Character

Scan the **MOVE CURSOR TO CHARACTER** bar code on page 2-16, then any printable ASCII character from the *Alphanumeric Keyboard*. When this is used, the cursor moves to the position after the matching character. If the character is not there, the rule fails and ADF tries the next rule.

Move Cursor to Start of Data

Scan this bar code to move cursor to the beginning of the data.

Move Cursor Past a Character

This parameter moves the cursor past all sequential occurrences of a selected character. Scan the **MOVE CURSOR PAST CHARACTER** bar code on page 2-16, then select a character from the *Alphanumeric Keyboard*. If the character is not there, the cursor does not move (i.e., has no effect).

Skip Ahead "N" Characters

Scan one of these bar codes to select the number of positions ahead you wish to move the cursor.

Skip Back "N" Characters

Scan one of these bar codes to select the number of positions back you wish to move the cursor.

Send Preset Value

Send Values 1 through 6 by scanning the appropriate bar code. These values must be set using the prefix/suffix values in Table A-1 on page A-2.

Value 1 = Scan Suffix

Value 2 = Scan Prefix

Modify Data

Modify data in the ways listed. The following actions work for all send commands that follow it within a rule. If you program *pad zeros to length 6, send next 3 characters, stop padding, send next 5 characters,* three zeros are added to the first send, and the next send is unaffected by the padding. These options do not apply to the **Send Keystroke** or **Send Preset Value** options.

Remove All Spaces

To remove all spaces in the send commands that follow, scan this bar code.

Crunch All Spaces

To leave one space between words, scan this bar code. This also removes all leading and trailing spaces.

Stop Space Removal

Scan this bar code to disable space removal.

Remove Leading Zeros

Scan this bar code to remove all leading zeros.

Stop Zero Removal

Scan this bar code to disable the removal of zeros.

Pad Data With Spaces

To pad data to the left, scan the bar code containing the desired number of spaces. This parameter is activated by Send commands.

Pad Data With Zeros

To pad data to the left, scan the bar code containing the desired number of zeros. This parameter is activated by Send commands.

Beeps

Select a beep sequence for each ADF rule.

Send Keystroke (Control Characters and Keyboard Characters)

Scan the "Send __" bar code for the keystroke you wish to send.

Turn On/Off Rule Sets

Use these bar codes to turn rule sets on and off.

ADF Bar Code Menu Example

This section provides an example of how ADF rules are entered and used for scan data.

An auto parts distribution center wants to encode manufacturer ID, part number, and destination code into their own Code 128 bar codes. The distribution center also has products that carry UPC bar codes, placed there by the manufacturer. The Code 128 bar codes have the following format:

MMMMMPPPPPDD

Where: M = Manufacturer ID
P = Part Number
D = Destination Code

The distribution center uses a PC with dedicated control characters for manufacturer ID <CTRL M>, part number <CTRL P>, and destination code <CTRL D>. At this center the UPC data is treated as manufacturer ID code.

The following rules need to be entered:

When scanning data of code type Code 128, send the next 5 characters, send the manufacturer ID key <CTRL M>, send the next 5 characters, send the part number key <CTRL P>, send the next 2 characters, send the destination code key <CTRL D>.

When scanning data of code type UPC/EAN, send all data, send the manufacturer ID key <CTRL M>.

To enter these rules, follow the steps below:

Rule 1: The Code 128 Scanning Rule

Step	Bar Code	On Page	Beep Indication
1	Begin New Rule	2-1	High High
2	Code 128	2-4	High High
3	Send next 5 characters	2-13	High High
4	Send <CTRL M>	2-33	High High
5	Send next 5 characters	2-13	High High
6	Send <CTRL P>	2-34	High High
7	Send next 2 characters	2-13	High High
8	Send <CTRL D>	2-32	High High
9	Save Rule	2-1	High Low High Low

Rule 2: The UPC Scanning Rule

Step	Bar Code	On Page	Beep Indication
1	Begin New Rule	2-1	High High
2	UPC/EAN	2-4	High High
3	Send all remaining data	2-13	High High
4	Send <CTRL M>	2-33	High High
5	Save Rule	2-1	High Low High Low

If you made any mistakes while entering this rule, scan the **QUIT ENTERING RULES** bar code on page 2-2. If you already saved the rule, scan the **ERASE PREVIOUSLY SAVED RULE** bar code on page 2-2.

Alternate Rule Sets

ADF rules may be grouped into one of four alternate sets which can be turned on and off when needed. This is useful when you want to format the same message in different ways. For example, a Code 128 bar code contains the following information:

Class (2 digits), Stock Number (8) digits, Price (5 digits)

This bar code might look like this:

245671243701500

where:

Class = 24

Stock Number = 56712437

Price = 01500

Ordinarily you would send this data as follows:

24 (class key)

56712437 (stock key)

01500 (enter key)

But, when there is a sale, you may want to send only the following:

24 (class key)

56712437 (stock key)

and the cashier will key the price manually.

To implement this, you would first enter an ADF rule that applies to the normal situation. This rule may look like this:

When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key, send the data that remains, send the Enter key.

The "sale" rule may look like this:

When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key.

To switch between the two sets of rules, a "switching rule" must be programmed. This rule specifies what type of bar code must be scanned to switch between the rule sets. For example,

in the case of the “sale” rule above, the rule programmer wants the cashier to scan the bar code “M” before a sale. To do this, a rule can be entered as follows:

When scanning a bar code of length 1 that begins with “M”, select rule set number 1.

Another rule could be programmed to switch back.

When scanning a bar code of length 1 that begins with “N”, turn off rule set number 1.

The switching back to normal rules can also be done in the “sale” rule. For example, the rule may look like this:

When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key, turn off rule set 1.

It is recommended that you scan the **DISABLE ALL RULE SETS** bar code on page 2-3 after programming a rule belonging to an alternate rule set.

In addition to enabling and disabling rule sets within the rules, you can enable or disable them by scanning the appropriate bar codes on 2-3.

Rules Hierarchy (in Bar Codes)

The order of programming individual rules is important.The most general rule should be programmed last.

All programmed rules are stored in a buffer. As they are programmed, they are stored at the “top” of a rules list. If three rules have been created, the list would be configured as follows:

Third Rule

Second Rule

First Rule

When data is scanned, the rules list is checked from top to bottom to determine if the criteria matches (and therefore, if the actions should occur). Input is modified into the data format specified by the first matching set of criteria it finds. Be sure that your most general rule is the last one programmed.

For example, if the THIRD rule states:

When scanning a bar code of any length, send all data, then send the ENTER key.

And the SECOND rule states:

When scanning a Code 128 bar code of length 12, send the first four characters, then send the ENTER key, then send all remaining data.

If a Code 128 bar code of length 12 were scanned, the THIRD rule would be in effect. The SECOND rule would appear to not function.

Note also that ADF rules are actually created when you use the standard data editing functions. Scan options are entered as ADF rules, and the hierarchy mentioned above also applies to them. For the LS 4800, this applies to prefix/suffix programming in the parameter *Scan Data Transmission Format*.

These rules reside in the same "rule list" as ADF Rules, so the order of their creation is also important.

Default Rules

Every unit has a default rule to send all scan data. Units with custom software may have one or more default rules burned in. The rules hierarchy checks user programmable rules first, then the default rules. Default rules can be disabled by entering the following general rule in the user programmable buffer:

When receiving scan data, send all data.

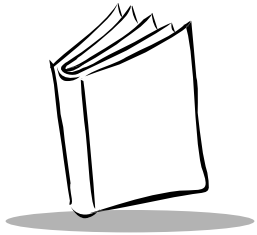
Since this rule always applies, ADF will never go into the default rules.

Beeper Definitions

The following table defines beep sequences which occur during data entry.

Table 1-1. Beeper Definitions

Normal Data Entry. Duration of tones are short.	
Beeper Sequence	**Indication**
High-Low	Entry of a number is expected. Enter another digit. Add leading zeros to the front if necessary.
Low-Low	Entry of an alphabetic character is expected. Enter another character or scan the End of Message bar code.
High-High	Entry of Criterion/Action is expected. Enter another criterion or action, or scan the Save Rule bar code.
High-Low-High-Low	Rule saved. Rule entry mode exited.
High-Low-Low	All criteria or actions were cleared for rule currently being entered; continue entry of rule.
Low	Last saved rule was successfully deleted. The rule presently being entered is left intact.
Low-High-High	All rules are now deleted. The rule presently being entered is left intact. (This beep sequence has a different meaning outside of ADF.)
Error Indications. Duration of tones are very long.	
Beeper Sequence	**Indication**
Low-High-Low-High	Out of rule memory. Erase some existing rules, then try to save rule again. (The current rule need not be re-entered.)
Low-High-Low	Cancel rule entry. Rule entry mode exited because of an error or the user asked to exit rule entry.
Low-High	Entry error, wrong bar code scanned. Re-enter criterion or action. All previously entered criteria and actions are retained. Criteria or action list is too long for a rule.



Chapter 2
ADF Bar Codes

Special Commands

Begin New Rule

Scan this bar code to start entering a new rule.

BEGIN NEW RULE

Save Rule

Scan this bar code to save the rule you entered.

SAVE RULE

Erase

Use these bar codes to erase criteria, actions, or rules.

ERASE CRITERIA AND START AGAIN

ERASE ACTIONS AND START AGAIN

ERASE PREVIOUSLY SAVED RULE

ERASE ALL RULES

Quit Entering Rules

Scan this bar code to quit entering rules.

QUIT ENTERING RULES

Disable Rule Set

Use these bar codes to disable rule sets.

DISABLE RULE SET 1

DISABLE RULE SET 2

DISABLE RULE SET 3

DISABLE RULE SET 4

DISABLE ALL RULE SETS

Criteria

Code Types

Scan the bar codes for all code types desired before selecting other criteria.

CODE 39

CODABAR

CODE 128

D 2 OF 5

IATA 2 OF 5

I 2 OF 5

CODE 93

UPC-A

UPC-E

EAN-8

Code Types (Cont'd)

EAN-13

MSI PLESSEY

EAN 128

UPC-E1

BOOKLAND

TRIOPTIC

Scan the bar code below **only** if you are using an LS 400Xi scanner which supports PDF417.

PDF417

Code Lengths

Scan these bar codes to define the number of characters the selected code types must contain. Select one length per rule only.

Note: *This is not a keypad.*

1

2

3

4

5

6

7

8

Code Lengths (Cont'd)

9

10

11

12

13

14

15

16

Code Lengths (Cont'd)

17

18

19

20

21

22

23

24

Code Lengths (Cont'd)

25

26

27

28

29

30

Specific Data String

After scanning the following bar code:

1. Enter a string using the *Alphanumeric Keyboard* beginning on page 2-66.
2. Scan **END OF MESSAGE** on page 2-72.

SPECIFIC STRING AT START

After scanning the following bar code:

1. Enter a location using the *Numeric Keypad* on page 2-11.
2. Enter a string using the *Alphanumeric Keyboard* beginning on page 2-66.
3. Scan **END OF MESSAGE** on page 2-72.

SPECIFIC STRING ANY LOCATION

Numeric Keypad

Bar codes on this page should not be confused with those on the alphanumeric keyboard.

0

1

2

3

4

5

6

7

8

9

CANCEL

Rule Belongs To Set

Scan a bar code below to select which set a rule belongs to.

RULE BELONGS TO SET 1

RULE BELONGS TO SET 2

RULE BELONGS TO SET 3

RULE BELONGS TO SET 4

Actions

Send Data

Use these bar codes to send data.

SEND DATA UP TO CHARACTER

SEND ALL DATA THAT REMAINS

SEND NEXT CHARACTER

SEND NEXT 2 CHARACTERS

SEND NEXT 3 CHARACTERS

SEND NEXT 4 CHARACTERS

SEND NEXT 5 CHARACTERS

SEND NEXT 6 CHARACTERS

SEND NEXT 7 CHARACTERS

Send Data (Cont'd)

SEND NEXT 8 CHARACTERS

SEND NEXT 9 CHARACTERS

SEND NEXT 10 CHARACTERS

SEND NEXT 11 CHARACTERS

SEND NEXT 12 CHARACTERS

SEND NEXT 13 CHARACTERS

SEND NEXT 14 CHARACTERS

SEND NEXT 15 CHARACTERS

SEND NEXT 16 CHARACTERS

SEND NEXT 17 CHARACTERS

Send Data (Cont'd)

SEND NEXT
18 CHARACTERS

SEND NEXT
19 CHARACTERS

SEND NEXT
20 CHARACTERS

Scan the bar codes below **only** if you are using an LS 400Xi scanner which supports PDF417.

SEND NEXT
50 CHARACTERS

SEND NEXT
100 CHARACTERS

SEND NEXT
150 CHARACTERS

SEND NEXT
200 CHARACTERS

SEND NEXT
250 CHARACTERS

Setup Fields

Scan a bar code below to move the cursor in relation to a specified character. Then enter a character by scanning a bar code from the *Alphanumeric Keyboard* beginning on page 2-66.

Note: *If there is no match when the rule is interpreted and the rule fails, the next rule is checked.*

MOVE CURSOR TO CHARACTER

MOVE CURSOR TO START

MOVE CURSOR PAST CHARACTER

SEND PAUSE

Skip Ahead

Use the following bar codes to skip ahead characters.

SKIP AHEAD
1 CHARACTER

SKIP AHEAD
2 CHARACTERS

SKIP AHEAD
3 CHARACTERS

SKIP AHEAD
4 CHARACTERS

SKIP AHEAD
5 CHARACTERS

SKIP AHEAD
6 CHARACTERS

SKIP AHEAD
7 CHARACTERS

SKIP AHEAD
8 CHARACTERS

Skip Ahead (Cont'd)

SKIP AHEAD
9 CHARACTERS

SKIP AHEAD
10 CHARACTERS

Scan the bar codes below **only** if you are using an LS 400Xi scanner which supports PDF417.

SKIP AHEAD
50 CHARACTERS

SKIP AHEAD
100 CHARACTERS

SKIP AHEAD
150 CHARACTERS

SKIP AHEAD
200 CHARACTERS

SKIP AHEAD
250 CHARACTERS

Skip Back

Use the following bar codes to skip back characters.

SKIP BACK 1 CHARACTERS

SKIP BACK 2 CHARACTERS

SKIP BACK 3 CHARACTERS

SKIP BACK 4 CHARACTERS

SKIP BACK 5 CHARACTERS

SKIP BACK 6 CHARACTERS

SKIP BACK 7 CHARACTER

SKIP BACK 8 CHARACTERS

Skip Back (Continued)

SKIP BACK
9 CHARACTERS

SKIP BACK
10 CHARACTERS

Scan the bar codes below **only** if you are using an LS 400Xi scanner which supports PDF417.

SKIP BACK
50 CHARACTERS

SKIP BACK
100 CHARACTERS

SKIP BACK
150 CHARACTERS

SKIP BACK
200 CHARACTERS

SKIP BACK
250 CHARACTERS

Send Preset Value

Use these bar codes to send preset values.

SEND VALUE 1

SEND VALUE 2

SEND VALUE 3

SEND VALUE 4

SEND VALUE 5

SEND VALUE 6

Modify Data

Use the bar codes below to modify data.

REMOVE ALL SPACES

CRUNCH ALL SPACES

STOP SPACE REMOVAL

REMOVE LEADING ZEROS

STOP ZERO REMOVAL

Pad Data with Spaces

Use these bar codes to pad data with spaces.

PAD SPACES TO LENGTH 1

PAD SPACES TO LENGTH 2

PAD SPACES TO LENGTH 3

PAD SPACES TO LENGTH 4

PAD SPACES TO LENGTH 5

PAD SPACES TO LENGTH 6

PAD SPACES TO LENGTH 7

PAD SPACES TO LENGTH 8

Pad Data with Spaces (Cont'd)

PAD SPACES TO LENGTH 9

PAD SPACES TO LENGTH 10

PAD SPACES TO LENGTH 11

PAD SPACES TO LENGTH 12

PAD SPACES TO LENGTH 13

PAD SPACES TO LENGTH 14

PAD SPACES TO LENGTH 15

PAD SPACES TO LENGTH 16

Pad Data with Spaces (Cont'd)

PAD SPACES TO LENGTH 17

PAD SPACES TO LENGTH 18

PAD SPACES TO LENGTH 19

PAD SPACES TO LENGTH 20

PAD SPACES TO LENGTH 21

PAD SPACES TO LENGTH 22

PAD SPACES TO LENGTH 23

PAD SPACES TO LENGTH 24

Pad Data with Spaces (Continued)

PAD SPACES TO LENGTH 25

PAD SPACES TO LENGTH 26

PAD SPACES TO LENGTH 27

PAD SPACES TO LENGTH 28

PAD SPACES TO LENGTH 29

PAD SPACES TO LENGTH 30

STOP PAD SPACES

Pad Data with Zeros

Use these bar codes to pad data with zeros.

PAD ZEROS TO LENGTH 1

PAD ZEROS TO LENGTH 2

PAD ZEROS TO LENGTH 3

PAD ZEROS TO LENGTH 4

PAD ZEROS TO LENGTH 5

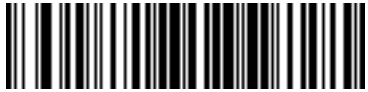
PAD ZEROS TO LENGTH 6

PAD ZEROS TO LENGTH 7

PAD ZEROS TO LENGTH 8

Pad Data With Zeros (Cont'd)

PAD ZEROS TO LENGTH 9



PAD ZEROS TO LENGTH 10

PAD ZEROS TO LENGTH 11

PAD ZEROS TO LENGTH 12

PAD ZEROS TO LENGTH 13

PAD ZEROS TO LENGTH 14

PAD ZEROS TO LENGTH 15

PAD ZEROS TO LENGTH 16

Pad Data With Zeros (Cont'd)

PAD ZEROS TO LENGTH 17

PAD ZEROS TO LENGTH 18

PAD ZEROS TO LENGTH 19

PAD ZEROS TO LENGTH 20

PAD ZEROS TO LENGTH 21

PAD ZEROS TO LENGTH 22

PAD ZEROS TO LENGTH 23

PAD ZEROS TO LENGTH 24

Pad Data With Zeros (Cont'd)

PAD ZEROS TO LENGTH 25

PAD ZEROS TO LENGTH 26

PAD ZEROS TO LENGTH 27

PAD ZEROS TO LENGTH 28

PAD ZEROS TO LENGTH 29

PAD ZEROS TO LENGTH 30

STOP PAD ZEROS

Beeps

Select one beep sequence per ADF rule.

BEEP ONCE

BEEP TWICE

BEEP THREE TIMES

Control Characters

Scan these bar codes to send control characters.

SEND CONTROL 2

SEND CONTROL A

SEND CONTROL B

SEND CONTROL C

SEND CONTROL D

SEND CONTROL E

SEND CONTROL F

SEND CONTROL G

Control Characters (Cont'd)

SEND CONTROL H

SEND CONTROL I

SEND CONTROL J

SEND CONTROL K

SEND CONTROL L

SEND CONTROL M

SEND CONTROL N

SEND CONTROL O

Control Characters (Cont'd)

SEND CONTROL P

SEND CONTROL Q

SEND CONTROL R

SEND CONTROL S

SEND CONTROL T

SEND CONTROL U

SEND CONTROL V

SEND CONTROL W

Control Characters (Cont'd)

SEND CONTROL X

SEND CONTROL Y

SEND CONTROL Z

SEND CONTROL [

**SEND CONTROL **

SEND CONTROL]

SEND CONTROL 6

SEND CONTROL -

Keyboard Characters

Use these bar codes to send keyboard characters.

SEND SPACE

SEND !

SEND “

SEND #

SEND $

SEND %

SEND &

SEND ‘

Keyboard Characters (Cont'd)

SEND (

SEND)

SEND *

SEND +

SEND ,

SEND -

SEND .

SEND /

Keyboard Characters (Cont'd)

SEND 0

SEND 1

SEND 2

SEND 3

SEND 4

SEND 5

SEND 6

SEND 7

Keyboard Characters (Cont'd)

SEND 8

SEND 9

SEND :

SEND ;

SEND <

SEND =

SEND >

SEND ?

Keyboard Characters (Cont'd)

SEND @

SEND A

SEND B

SEND C

SEND D

SEND E

SEND F

SEND G

Keyboard Characters (Cont'd)

SEND H

SEND I

SEND J

SEND K

SEND L

SEND M

SEND N

SEND O

Keyboard Characters (Cont'd)

SEND P

SEND Q

SEND R

SEND S

SEND T

SEND U

SEND V

SEND W

Keyboard Characters (Cont'd)

SEND X

SEND Y

SEND Z

SEND [

**SEND **

SEND]

SEND ^

SEND _

Keyboard Characters (Cont'd)

SEND '

SEND a

SEND b

SEND c

SEND d

SEND e

SEND f

SEND g

Keyboard Characters (Cont'd)

SEND h

SEND i

SEND j

SEND k

SEND l

SEND m

SEND n

SEND o

Keyboard Characters (Cont'd)

SEND p

SEND q

SEND r

SEND s

SEND t

SEND u

SEND v

SEND w

Keyboard Characters (Cont'd)

SEND x

SEND y

SEND z

SEND {

SEND |

SEND }

SEND ~

Send ALT Characters

SEND ALT 2

SEND ALT A

SEND ALT B

SEND ALT C

SEND ALT D

SEND ALT E

SEND ALT F

SEND ALT G

Send ALT Characters (Cont'd)

SEND ALT H

SEND ALT I

SEND ALT J

SEND ALT K

SEND ALT L

SEND ALT M

SEND ALT N

SEND ALT O

Send ALT Characters (Cont'd)

SEND ALT P

SEND ALT Q

SEND ALT R

SEND ALT S

SEND ALT T

SEND ALT U

SEND ALT V

SEND ALT W

Send ALT Characters (Cont'd)

SEND ALT X

SEND ALT Y

SEND ALT Z

SEND ALT [

**SEND ALT **

SEND ALT]

SEND ALT 6

SEND ALT -

Send Command Characters

SEND PA 1

SEND PA 2

SEND CMD 1

SEND CMD 2

SEND CMD 3

SEND CMD 4

Send Command Characters (Cont'd)

SEND CMD 5

SEND CMD 6

SEND CMD 7

SEND CMD 8

SEND CMD 9

SEND CMD 10

Send Special Characters

SEND YEN CHARACTER

SEND POUND STERLING CHARACTER

SEND BOMB CHARACTER

SEND HOOK CHARACTER

SEND BULLET CHARACTER

SEND 1/2 CHARACTER

SEND PARAGRAPH CHARACTER

SEND SECTION CHARACTER

SEND VERTICAL CHARACTER

Send Keypad Characters

SEND KEYPAD *

SEND KEYPAD +

SEND KEYPAD -

SEND KEYPAD .

SEND KEYPAD /

SEND KEYPAD 0

SEND KEYPAD 1

SEND KEYPAD 2

SEND KEYPAD 3

SEND KEYPAD 4

Send Keypad Characters (Cont'd)

SEND KEYPAD 5

SEND KEYPAD 6

SEND KEYPAD 7

SEND KEYPAD 8

SEND KEYPAD 9

SEND KEYPAD ENTER

SEND KEYPAD NUM LOCK

Send Keypad Characters (Cont'd)

SEND BREAK KEY

SEND DELETE KEY

SEND PAGE UP KEY

SEND END KEY

SEND PAGE DOWN KEY

SEND PAUSE KEY

SEND SCROLL LOCK KEY

SEND BACKSPACE KEY

SEND TAB KEY

SEND PRINT SCREEN KEY

Send Keypad Characters (Cont'd)

SEND INSERT KEY

SEND HOME KEY

SEND ENTER KEY

SEND ESCAPE KEY

SEND UP ARROW KEY

SEND DOWN ARROW KEY

SEND LEFT ARROW KEY

SEND RIGHT ARROW KEY

SEND BACK TAB CHARACTER

Send Function Key

SEND F1 KEY

SEND F2 KEY

SEND F3 KEY

SEND F4 KEY

SEND F5 KEY

SEND F6 KEY

SEND F7 KEY

SEND F8 KEY

SEND F9 KEY

SEND F10 KEY

Send Function Key (Cont'd)

SEND F11 KEY

SEND F12 KEY

SEND F13 KEY

SEND F14 KEY

SEND F15 KEY

SEND F16 KEY

SEND F17 KEY

SEND F18 KEY

SEND F19 KEY

SEND F20 KEY

Send Function Key (Cont'd)

SEND F21 KEY

SEND F22 KEY

SEND F23 KEY

SEND F24 KEY

SEND F25 KEY

SEND F26 KEY

SEND F27 KEY

SEND F28 KEY

SEND F29 KEY

SEND F30 KEY

Send Function Key (Cont'd)

SEND PF1 KEY

SEND PF2 KEY

SEND PF3 KEY

SEND PF4 KEY

SEND PF5 KEY

SEND PF6 KEY

SEND PF7 KEY

SEND PF8 KEY

SEND PF9 KEY

SEND PF10 KEY

Send Function Key (Cont'd)

SEND PF11 KEY

SEND PF12 KEY

SEND PF13 KEY

SEND PF14 KEY

SEND PF15 KEY

SEND PF16 KEY

SEND PF17 KEY

SEND PF18 KEY

SEND PF19 KEY

SEND PF20 KEY

Send Function Key (Cont'd)

SEND PF21 KEY

SEND PF22 KEY

SEND PF23 KEY

SEND PF24 KEY

SEND PF25 KEY

SEND PF26 KEY

SEND PF27 KEY

SEND PF28 KEY

SEND PF29 KEY

SEND PF30 KEY

Turn On/Off Rule Set

Use these bar codes to turn rule sets on and off.

TURN ON RULE SET 1

TURN ON RULE SET 2

TURN ON RULE SET 3

TURN ON RULE SET 4

TURN OFF RULE SET 1

TURN OFF RULE SET 2

TURN OFF RULE SET 3

TURN OFF RULE SET 4

Alphanumeric Keyboard

SPACE

#

$

%

*****

+

-

.

/

!

Alphanumeric Keyboard (Continued)

“

&

‘

(

)

:

;

<

=

>

Alphanumeric Keyboard (Continued)

?

@

[

\

]

^

_

`

Alphanumeric Keyboard (Continued)

Bar codes on this page should not be confused with those on the numeric keypad.

0

1

2

3

4

5

6

7

8

9

Alphanumeric Keyboard (Continued)

A

B

C

D

E

F

G

H

I

J

Alphanumeric Keyboard (Continued)

K

L

M

N

O

P

Q

R

S

T

Alphanumeric Keyboard (Continued)

U

V

W

X

Y

Z

CANCEL

END OF MESSAGE

Alphanumeric Keyboard (Continued)

a

b

c

d

e

f

g

h

i

j

Alphanumeric Keyboard (Continued)

k

l

m

n

o

p

q

r

s

t

Alphanumeric Keyboard (Continued)

u

v

w

x

y

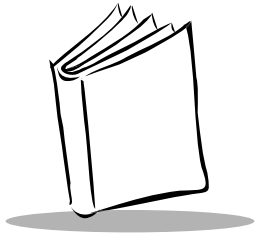
z

{

|

}

~



Appendix A
ASCII Tables and Keyboard Layouts

Prefix / Suffix Values

The following values can be assigned as prefixes or suffixes for ASCII character data transmission. If you're using a keyboard interface, refer to the *Synapse "Smart Cable" Interface Guide* for keystroke prefix/suffix values.

Table A-1. Prefix/Suffix Values

Prefix/Suffix Value	Full ASCII Code 39 Encode Char.	ASCII Character	Prefix/Suffix Value	Full ASCII Code 39 Encode Char.	ASCII Character
1000	%U	NUL	1030	%D	RS
1001	$A	SOH	1031	%E	US
1002	$B	STX	1032	Space	Space
1003	$C	ETX	1033	/A	!
1004	$D	EOT	1034	/B	"
1005	$E	ENQ	1035	/C	#
1006	$F	ACK	1036	/D	$
1007	$G	BELL	1037	/E	%
1008	$H	BCKSPC	1038	/F	&
1009	$I	HORIZ TAB	1039	/G	‘
1010	$J	LF/NW LN	1040	/H	(
1011	$K	VT	1041	/I	)
1012	$L	FF	1042	/J	*
1013	$M	CR/ENTER	1043	/K	+
1014	$N	SO	1044	/L	,
1015	$O	SI	1045	-	-
1016	$P	DLE	1046	.	.
1017	$Q	DC1	1047	/	/
1018	$R	DC2	1048	0	0
1019	$S	DC3	1049	1	1
1020	$T	DC4	1050	2	2
1021	$U	NAK	1051	3	3
1022	$V	SYN	1052	4	4
1023	$W	ETB	1053	5	5
1024	$X	CAN	1054	6	6
1025	$Y	EM	1057	7	7
1026	$Z	SUB	1056	8	8
1027	%A	ESC	1057	9	9
1028	%B	FS	1058	/Z	:
1029	%C	GS	1059	%F	;

Table A-1. Prefix/Suffix Values (Cont'd)

Prefix/Suffix Value	Full ASCII Code 39 Encode Char.	ASCII Character	Prefix/Suffix Value	Full ASCII Code 39 Encode Char.	ASCII Character
1060	%G	<	1095	%O	_
1061	%H	=	1096	%W	`
1062	%I	>	1097	+A	a
1063	%J	?	1098	+B	b
1064	%V	@	1099	+C	c
1065	A	A	1100	+D	d
1066	B	B	1101	+E	e
1067	C	C	1102	+F	f
1068	D	D	1103	+G	g
1069	E	E	1104	+H	h
1070	F	F	1105	+I	i
1071	G	G	1106	+J	j
1072	H	H	1107	+K	k
1073	I	I	1108	+L	l
1074	J	J	1109	+M	m
1075	K	K	1110	+N	n
1076	L	L	1111	+O	o
1077	M	M	1112	+P	p
1078	N	N	1113	+Q	q
1079	O	O	1114	+R	r
1080	P	P	1115	+S	s
1081	Q	Q	1116	+T	t
1082	R	R	1117	+U	u
1083	S	S	1118	+V	v
1084	T	T	1119	+W	w
1085	U	U	1120	+X	x
1086	V	V	1121	+Y	y
1087	W	W	1122	+Z	z
1088	X	X	1123	%P	{
1089	Y	Y	1124	%Q	|
1090	Z	Z	1125	%R	}
1091	%K	[	1126	%S	~
1092	%L	\	1127		Undefined
1093	%M	]			
1094	%N	^	7013		ENTER

ASCII Character Set

Table A-2. ASCII Character Se t

ASCII Value	Full ASCII Code 39 Encode Char.	Keystroke	ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1000	%U	CTRL 2	1024	$X	CTRL X
1001	$A	CTRL A	1025	$Y	CTRL Y
1002	$B	CTRL B	1026	$Z	CTRL Z
1003	$C	CTRL C	1027	%A	CTRL [
1004	$D	CTRL D	1028	%B	CTRL \
1005	$E	CTRL E	1029	%C	CTRL]
1006	$F	CTRL F	1030	%D	CTRL 6
1007	$G	CTRL G	1031	%E	CTRL -
1008	$H	CTRL H	1032	Space	Space
1009	$I	CTRL I	1033	/A	!
1010	$J	CTRL J	1034	/B	‘
1011	$K	CTRL K	1035	/C	#
1012	$L	CTRL L	1036	/D	$
1013	$M	CTRL M	1037	/E	%
1014	$N	CTRL N	1038	/F	&
1015	$O	CTRL O	1039	/G	‘
1016	$P	CTRL P	1040	/H	(
1017	$Q	CTRL Q	1041	/I	)
1018	$R	CTRL R	1042	/J	*
1019	$S	CTRL S	1043	/K	+
1020	$T	CTRL T	1044	/L	,
1021	$U	CTRL U	1045	-	-
1022	$V	CTRL V	1046	.	.
1023	$W	CTRL W	1047	/	/
1048	0	0	1073	I	I

Table A-2. ASCII Character Set (Cont'd)

ASCII Value	Full ASCII Code 39 Encode Char.	Keystroke	ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1049	1	1	1074	J	J
1050	2	2	1075	K	K
1051	3	3	1076	L	L
1052	4	4	1077	M	M
1053	5	5	1078	N	N
1054	6	6	1079	O	O
1055	7	7	1080	P	P
1056	8	8	1081	Q	Q
1057	9	9	1082	R	R
1058	/Z	:	1083	S	S
1059	%F	;	1084	T	T
1060	%G	<	1085	U	U
1061	%H	=	1086	V	V
1062	%I	>	1087	W	W
1063	%J	?	1088	X	X
1064	%V	@	1089	Y	Y
1065	A	A	1090	Z	Z
1066	B	B	1091	%K	[
1067	C	C	1092	%L	\
1068	D	D	1093	%M	]
1069	E	E	1094	%N	^
1070	F	F	1095	%O	_
1071	G	G	1096	%W	‘
1072	H	H	1097	+A	a
1098	+B	b	1113	+Q	q
1099	+C	c	1114	+R	r
1100	+D	d	1115	+S	s

Table A-2. ASCII Character Set (Cont'd)

ASCII Value	Full ASCII Code 39 Encode Char.	Keystroke	ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1101	+E	e	1116	+T	t
1102	+F	f	1117	+U	u
1103	+G	g	1118	+V	v
1104	+H	h	1119	+W	w
1105	+I	i	1120	+X	x
1106	+J	j	1121	+Y	y
1107	+K	k	1122	+Z	z
1108	+L	l	1123	%P	{
1109	+M	m	1124	%Q	|
1110	+N	n	1125	%R	}
1111	+O	o	1126	%S	~
1112	+P	p	1127		Undefined

Table A-2. ASCII Character Set (Cont'd)

ASCII Value	Full ASCII Code 39 Encode Char.	Keystroke	ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
ALT Keys	**Keystroke**	**ALT Keys**	**Keystroke**	**ALT Keys**	**Keystroke**
2064	ALT 2	2075	ALT K	2086	ALT V
2065	ALT A	2076	ALT L	2087	ALT W
2066	ALT B	2077	ALT M	2088	ALT X
2067	ALT C	2078	ALT N	2089	ALT Y
2068	ALT D	2079	ALT O	2090	ALT Z
2069	ALT E	2080	ALT P	2091	ALT [
2070	ALT F	2081	ALT Q	2092	ALT \
2071	ALT G	2082	ALT R	2093	ALT]
2072	ALT H	2083	ALT S	2094	ALT 6
2073	ALT I	2084	ALT T	2095	ALT -
2074	ALT J	2085	ALT U		
Misc. Key	**Keystroke**	**Misc. Key**	**Keystroke**	**Misc. Key**	**Keystroke**
3001	PA 1	3009	CMD 7	3017	°
3002	PA 2	3010	CMD 8	3018	1/2
3003	CMD 1	3011	CMD 9	3019	¶
3004	CMD 2	3012	CMD 10	3020	§
3005	CMD 3	3013	¥	3021	|
3006	CMD 4	3014	£	3022	0/00
3007	CMD 5	3015	¤		
3008	CMD 6	3016	¬		

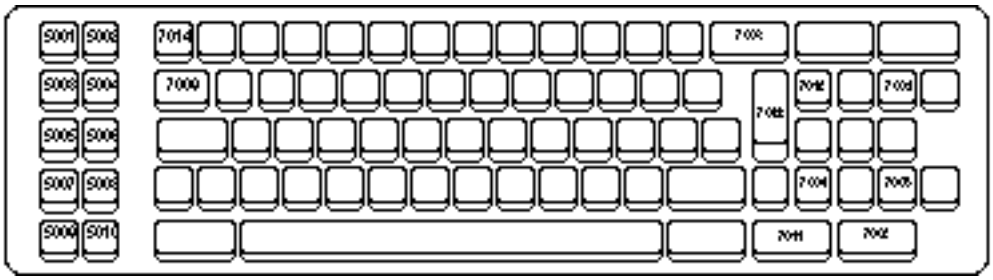
Table A-2. ASCII Character Set (Cont'd)

ASCII Value	Full ASCII Code 39 Encode Char.	Keystroke	ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
PF Keys	**Keystroke**	**PF Keys**	**Keystroke**	**PF Keys**	**Keystroke**
4001	PF 1	4009	PF 9	4017	PF 17
4002	PF 2	4010	PF 10	4018	PF 18
4003	PF 3	4011	PF 11	4019	PF 19
4004	PF 4	4012	PF 12	4020	PF 20
4005	PF 5	4013	PF 13	4021	PF 21
4006	PF 6	4014	PF 14	4022	PF 22
4007	PF 7	4015	PF 15	4023	PF 23
4008	PF 8	4016	PF 16	4024	PF 24
F Keys	**Keystroke**	**F Keys**	**Keystroke**	**F Keys**	**Keystroke**
5001	F 1	5014	F 14	5027	F 27
5002	F 2	5015	F 15	5028	F 28
5003	F 3	5016	F 16	5029	F 29
5004	F 4	5017	F 17	5030	F 30
5005	F 5	5018	F 18	5031	F 31
5006	F 6	5019	F 19	5032	F 32
5007	F 7	5020	F 20	5033	F 33
5008	F 8	5021	F 21	5034	F 34
5009	F 9	5022	F 22	5035	F 35
5010	F 10	5023	F 23	5036	F 36
5011	F 11	5024	F 24	5037	F 37
5012	F 12	5025	F 25	5038	F 38
5013	F 13	5026	F 26	5039	F 39

Table A-2. ASCII Character Set (Cont'd)

ASCII Value	Full ASCII Code 39 Encode Char.	Keystroke	ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
Numeric Keypad	**Keystroke**	**Numeric Keypad**	**Keystroke**	**Numeric Keypad**	**Keystroke**
6042	*	6049	1	6056	8
6043	+	6050	2	6057	9
6044	Undefined	6051	3	6058	Enter
6045	-	6062	4	6059	Num Lock
6046	.	6063	5	6060	00
6047	/	6064	6		
6048	0	6065	7		
Extended Keypad	**Keystroke**	**Extended Keypad**	**Keystroke**	**Extended Keypad**	**Keystroke**
7001	Break	7008	Backspace	7015	Up Arrow
7002	Delete	7009	Tab	7016	Dn Arrow
7003	Pg Up	7010	Print Screen	7017	Left Arrow
7004	End	7011	Insert	7018	Right Arrow
7005	Pg Dn	7012	Home	7019	Back Tab
7006	Pause	7013	Enter		
7007	Scroll Lock	7014	Escape		

Keyboard Maps



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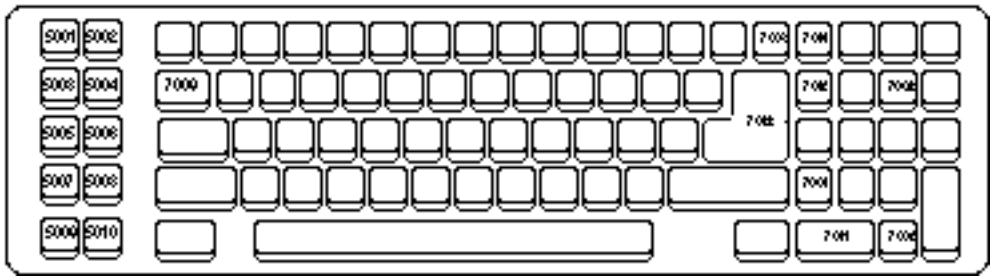
NCR PC4 **ADDS PC I/II** **SPERRY PC**

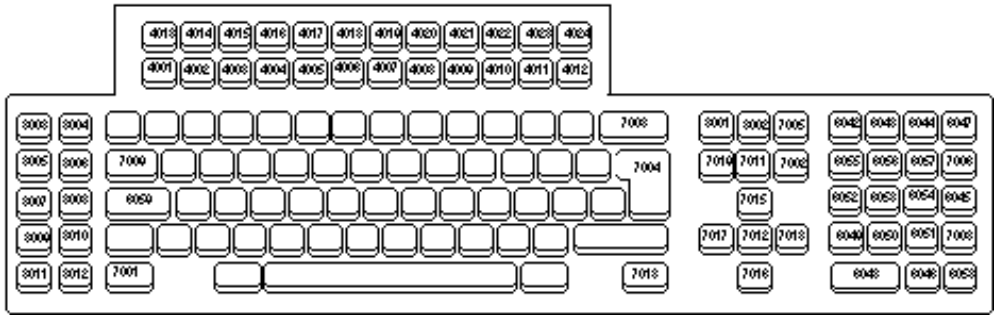
COMPAQ DESKPRO **LEADING EDGE PC** **PITNEY BOWES A2000**

COLUMBIA PC **HP VECTRA CS/RS**



IBM PC/AT **NCR PC8** **ZENITH 248**

WYSE PC



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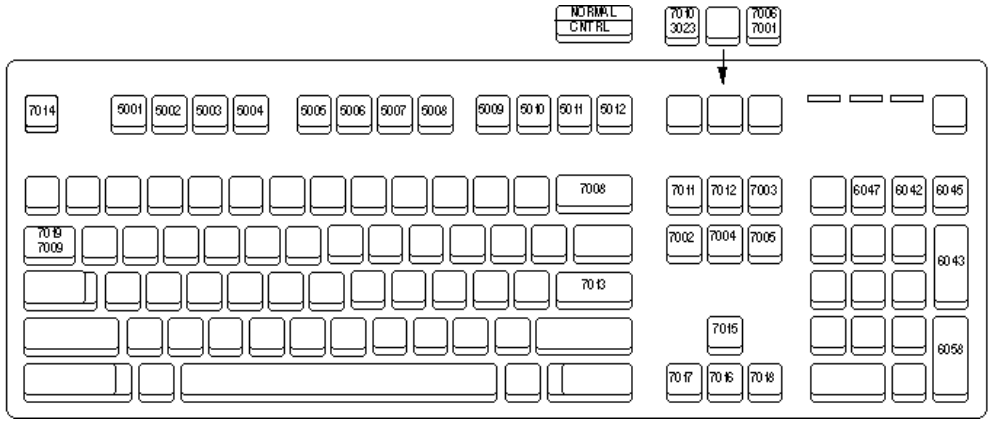
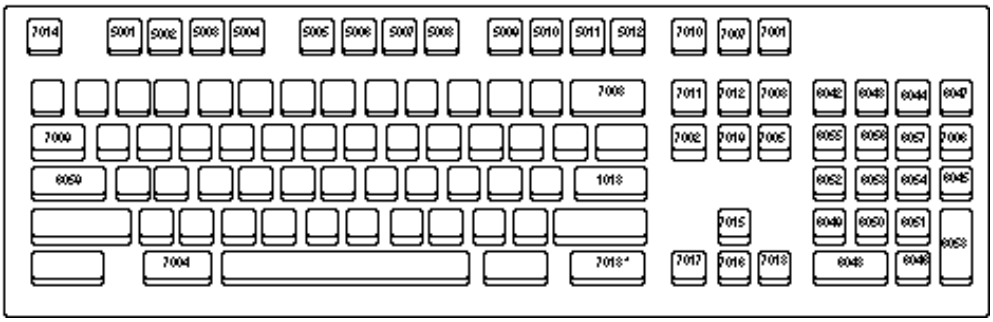
IBM 347X **TELEX 122**



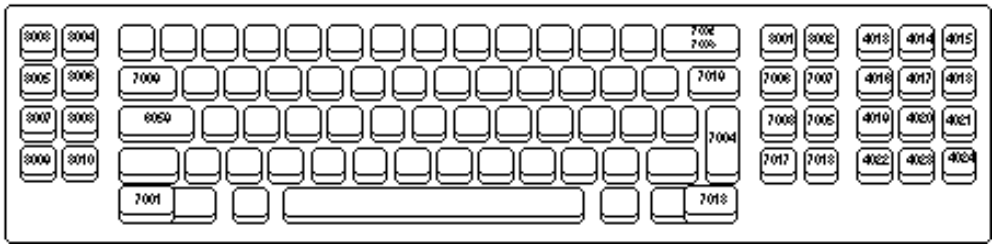
IBM PS2 **COMPAQ 386** **WYSE PC ENHANCED**

HP VECTRA ES/QS



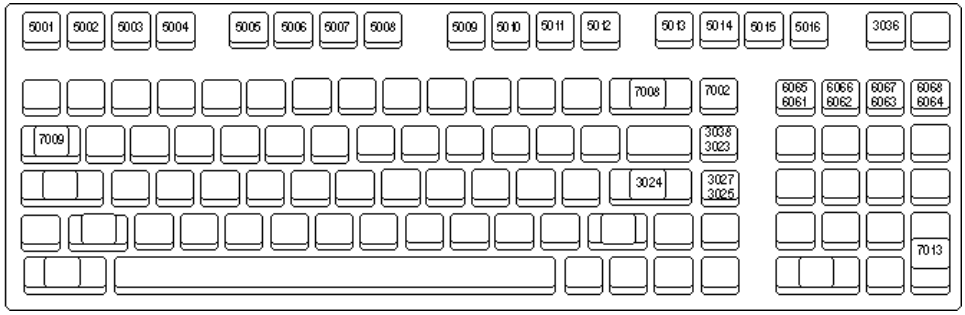
*3001 for IBM 3151

IBM 3151 **DEC VT2XX/VT3XX/VT4XX** **IBM 316X**

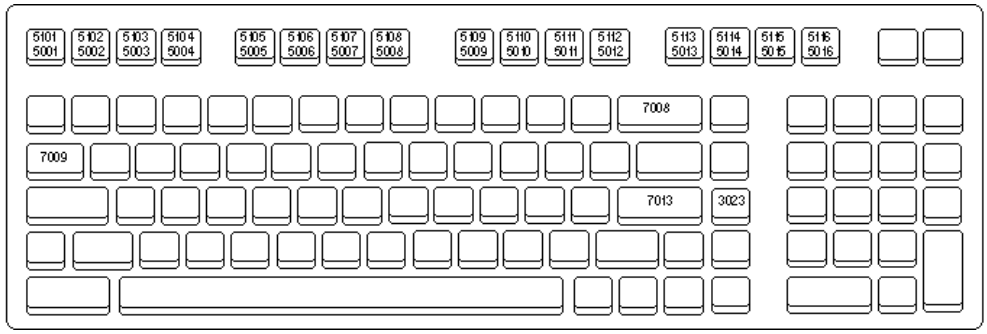


TEXAS INSTRUMENTS 924

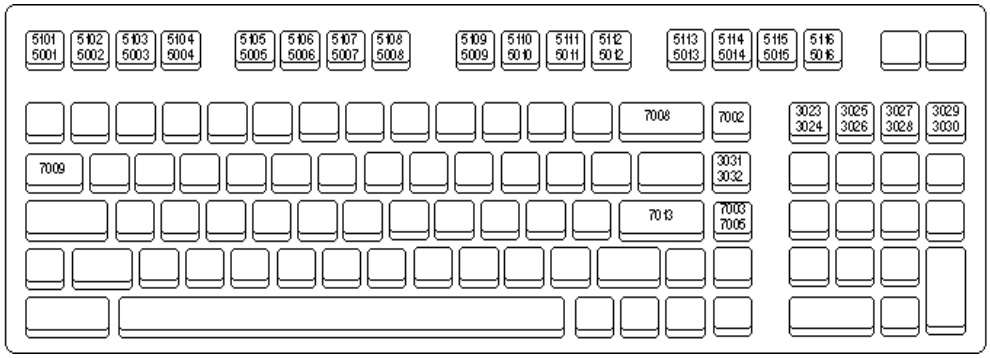
TELEX 88



WYSE 50



WYSE 60 ANSI KYBD



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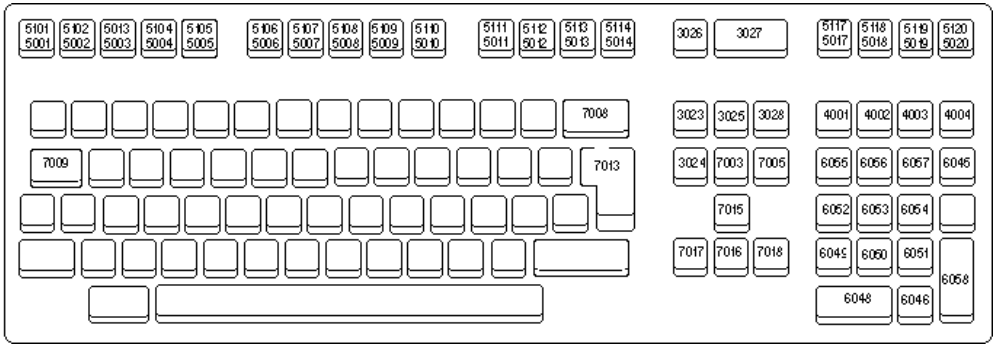

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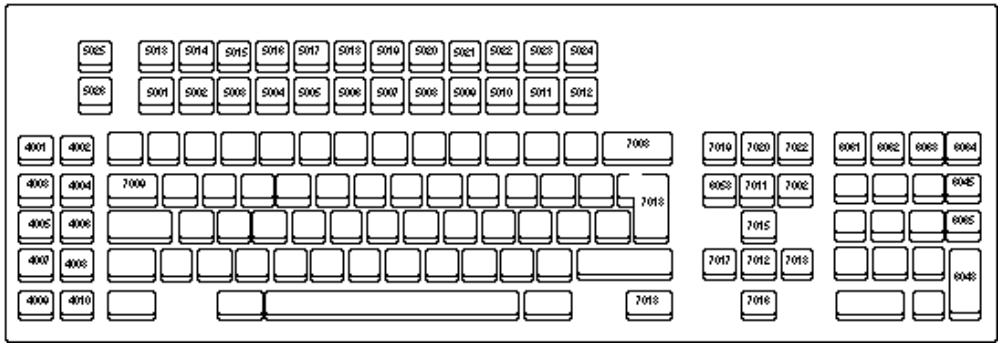

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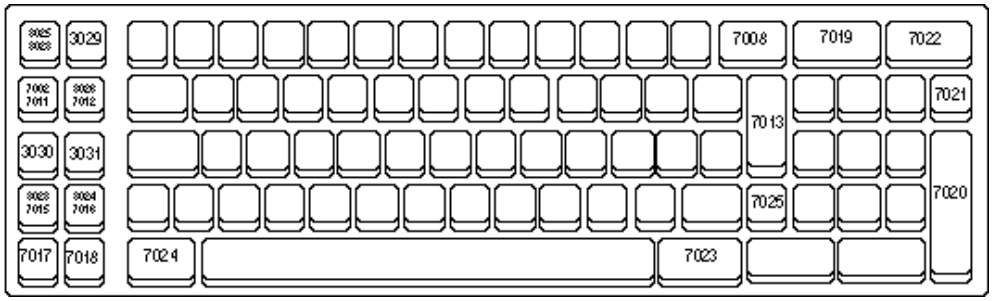

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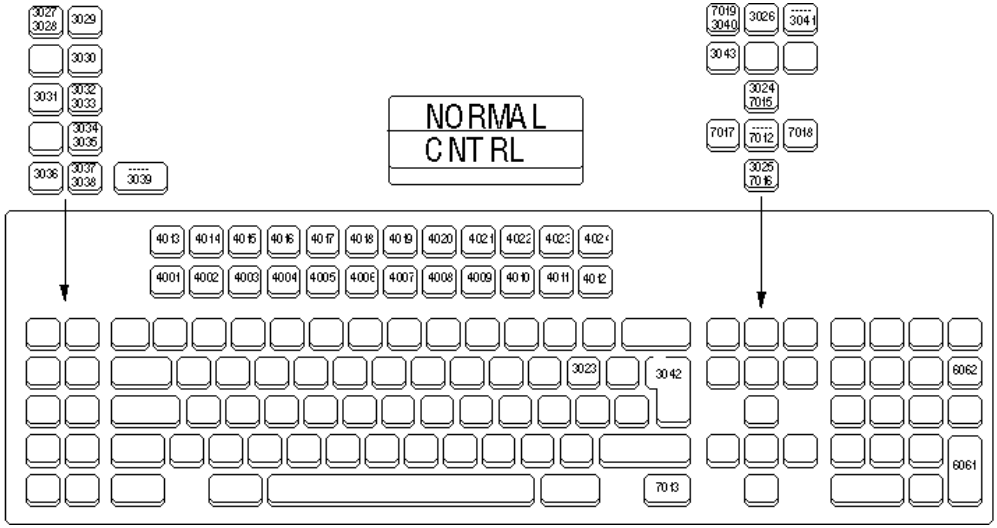

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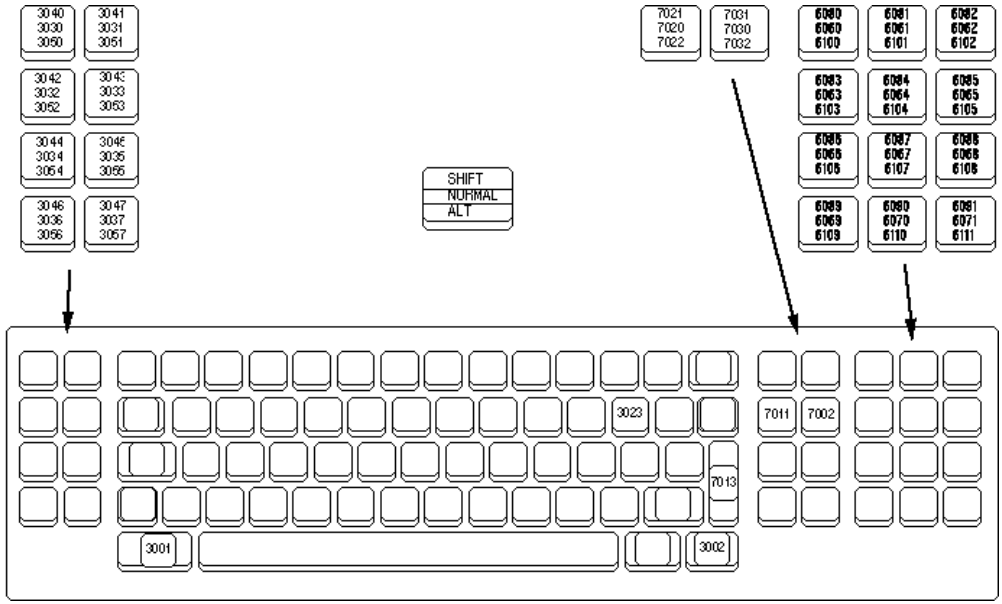

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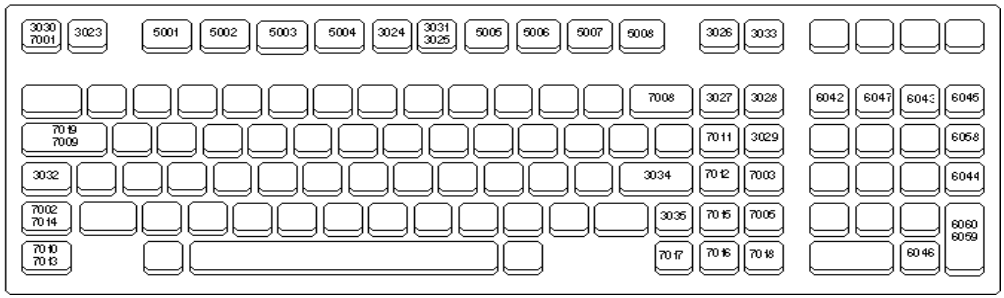

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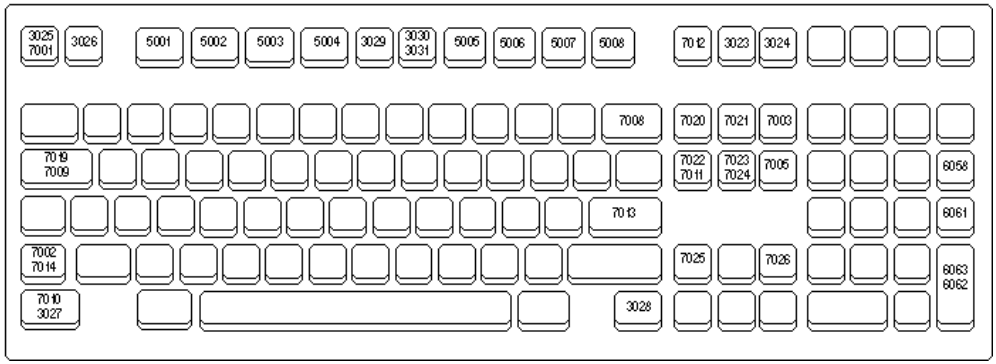
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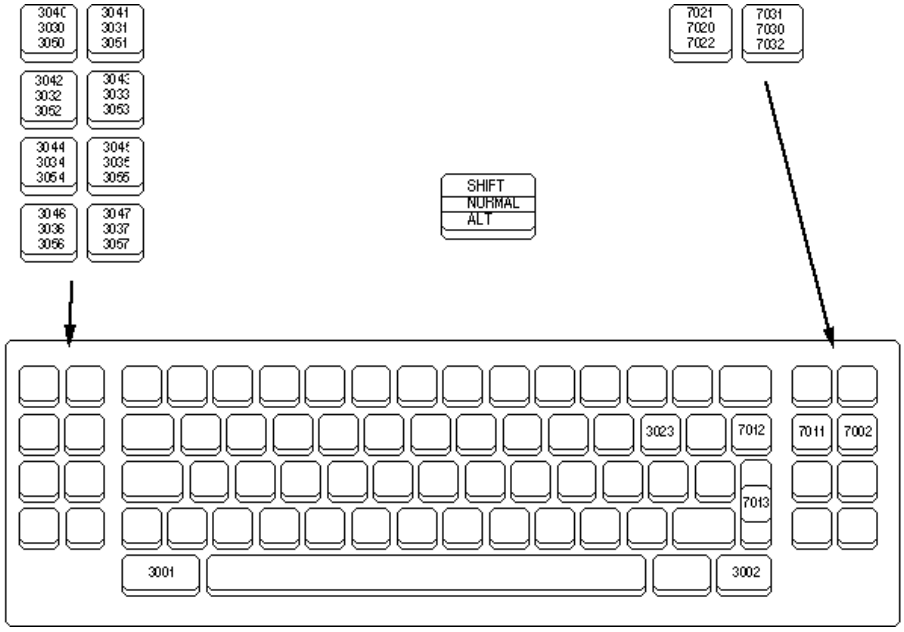
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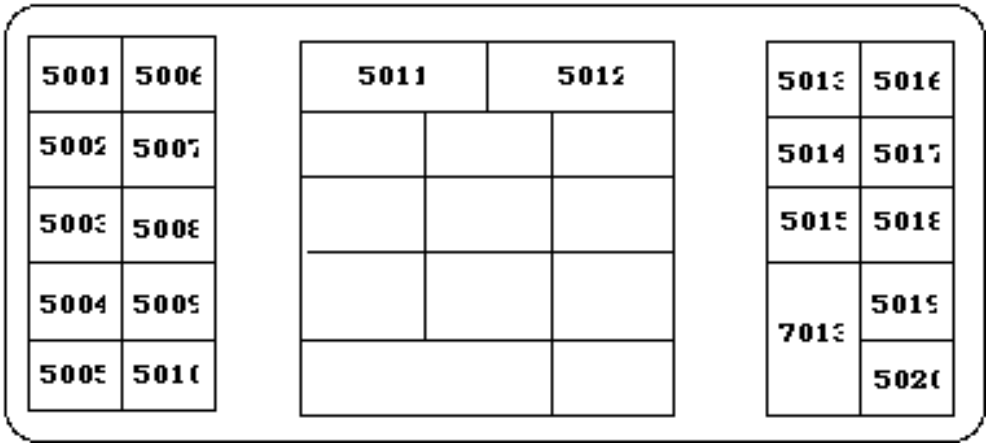

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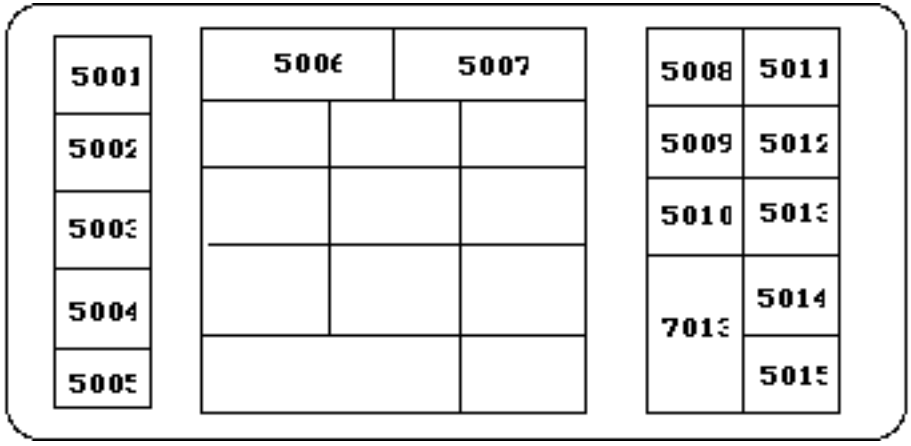

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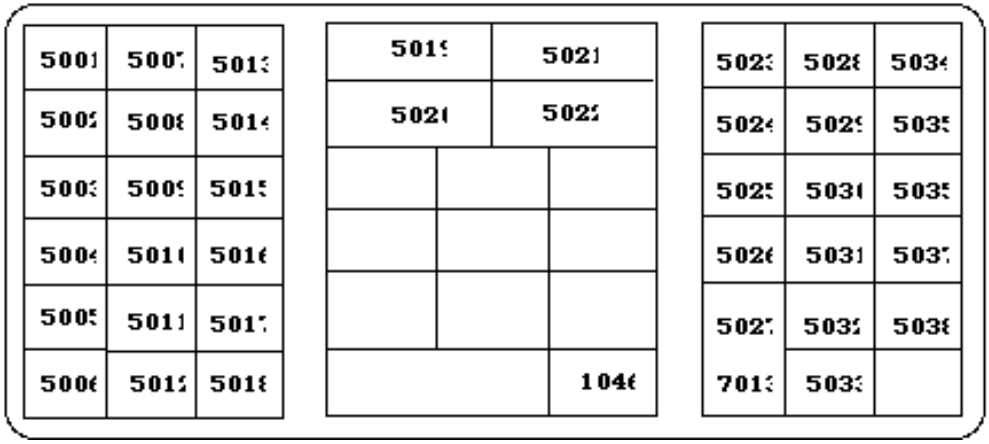

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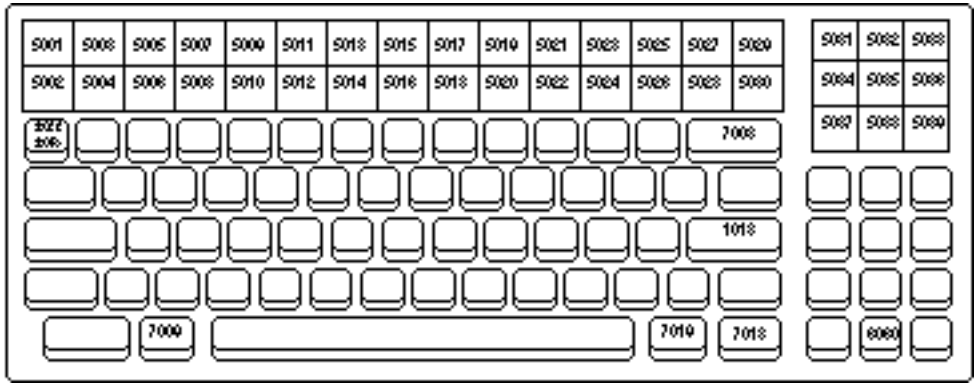

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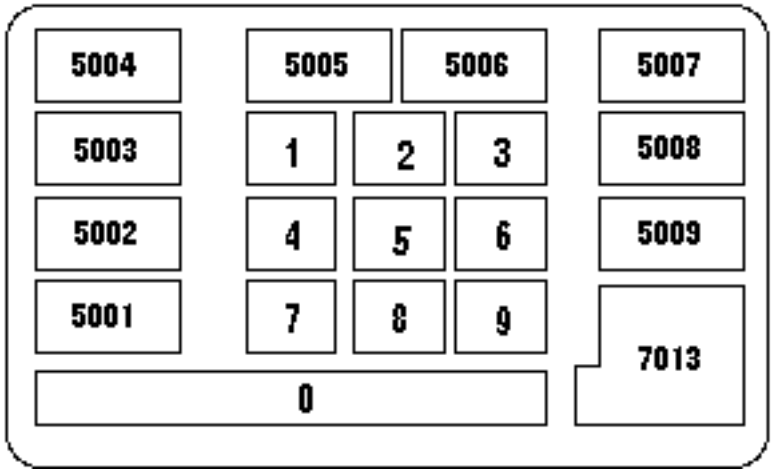

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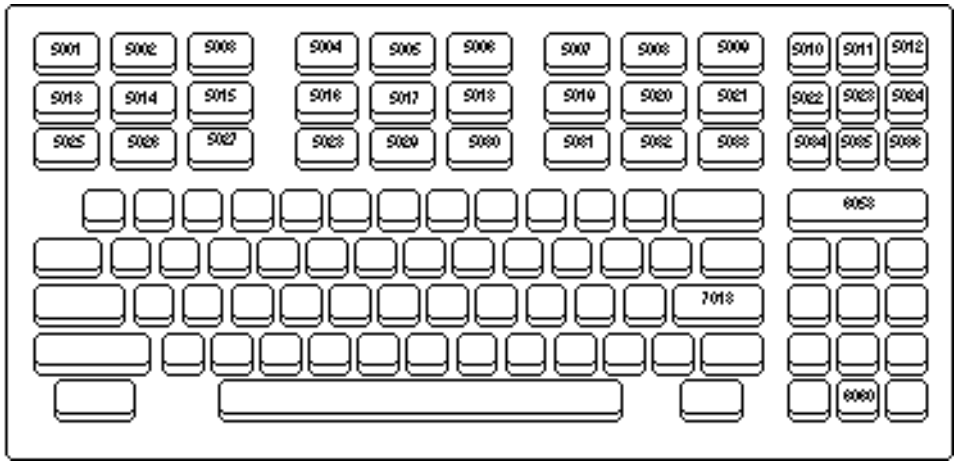

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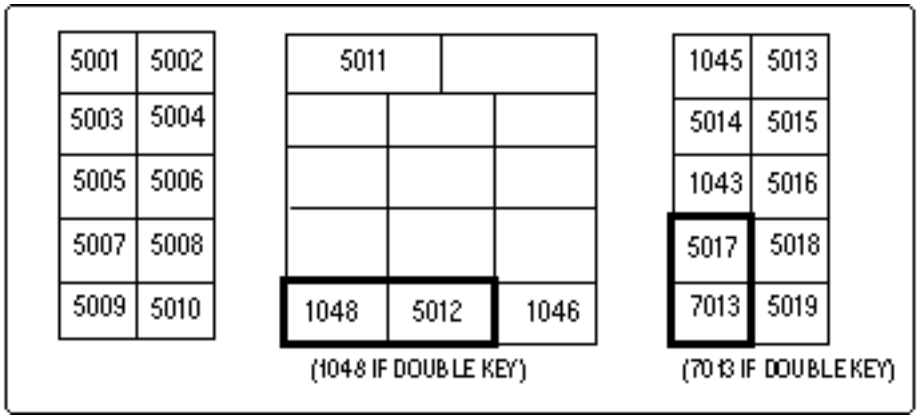

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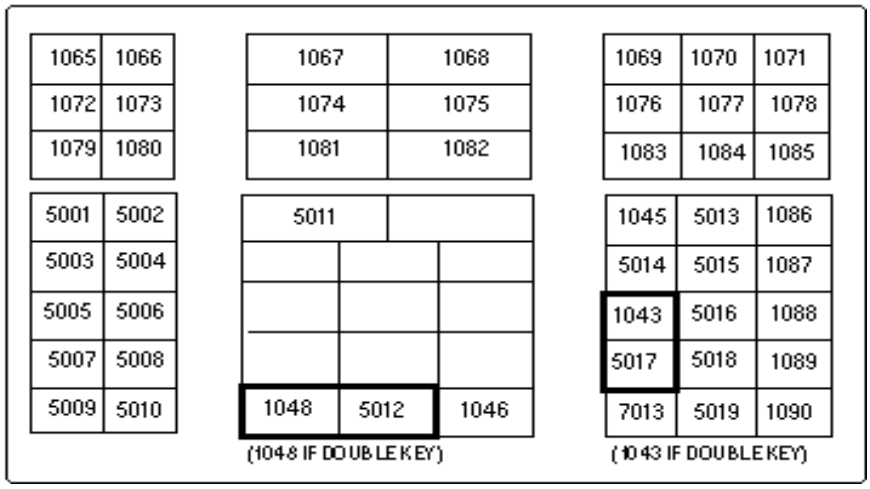

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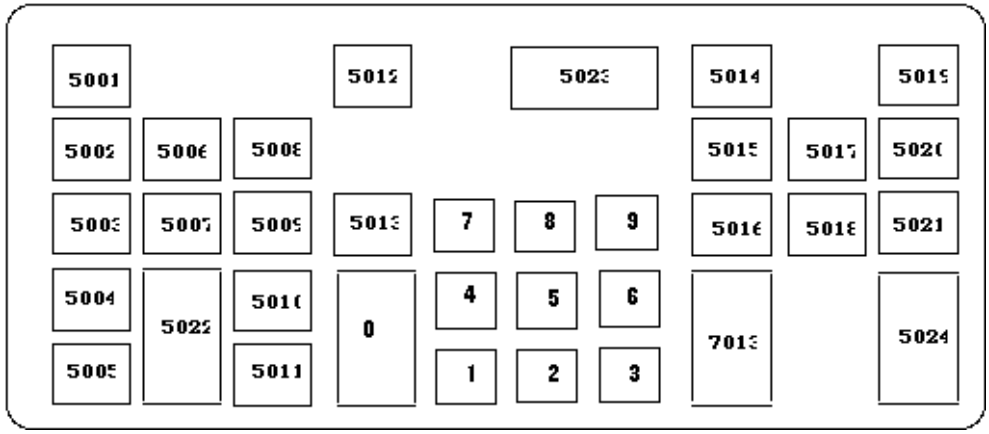

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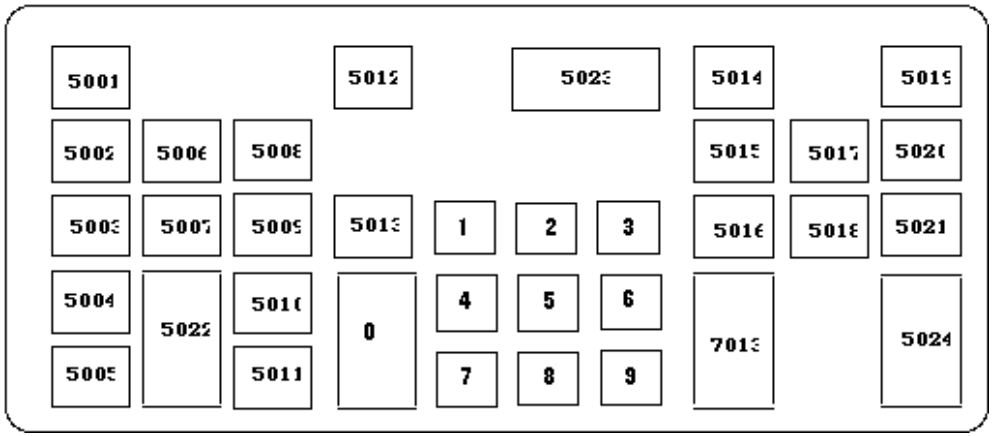

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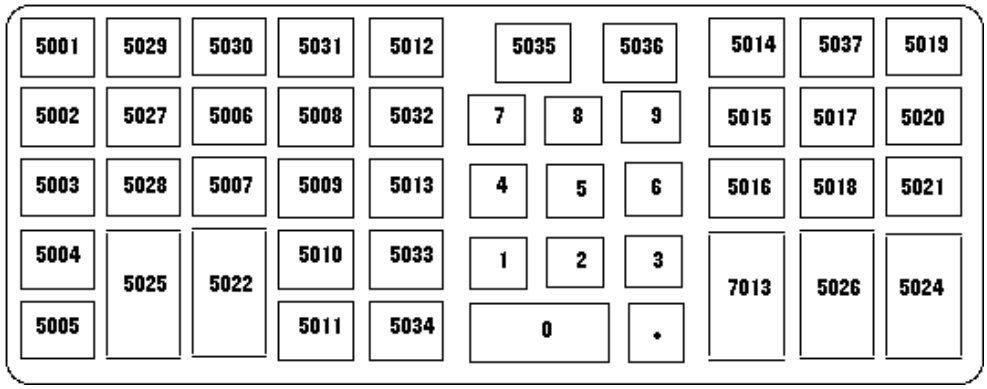

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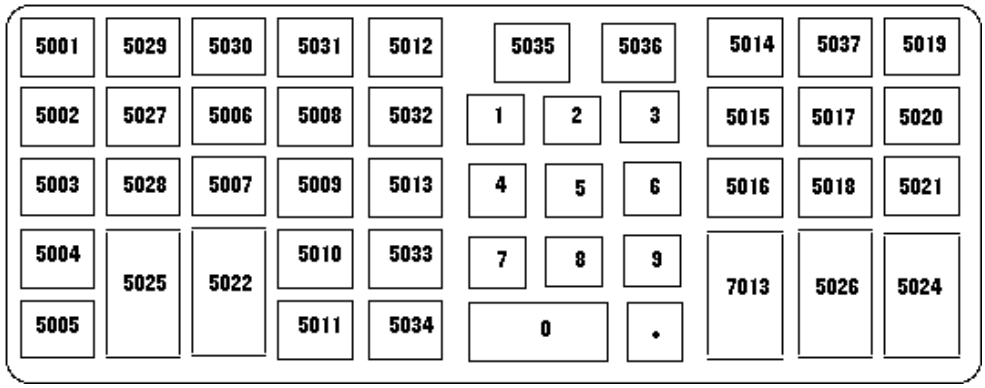

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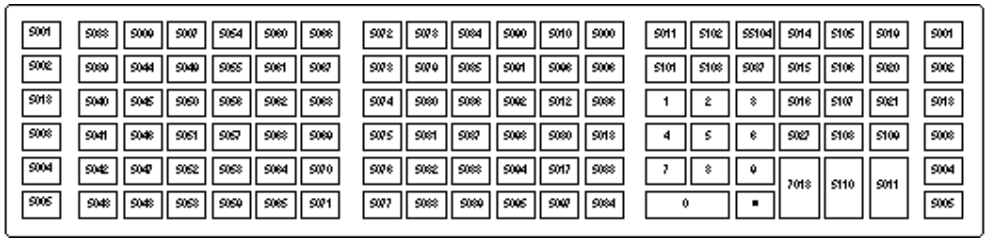

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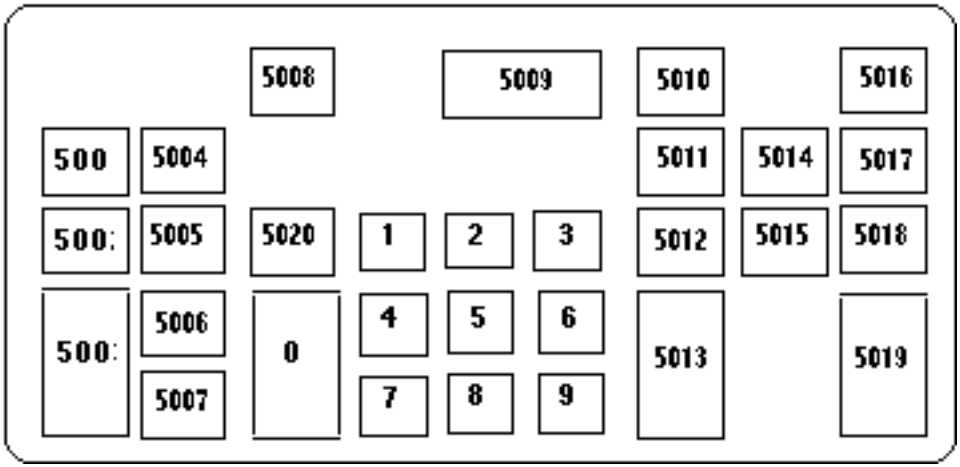

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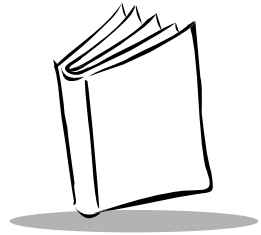

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What topics need to be added to the index, if applicable? _____
_____

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_____

What can we do to further improve our manuals?_____
_____
_____

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