

**The Visualization of Symbols  
Used to Define the Format  
of RACF Passwords**

by

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This document provides a comprehensive visualization of all available symbols used to define the format of RACF passwords.

## Background

As an aid to establishing and maintaining effective password security policy, RACF provides a means to impose the use of specific symbol sets in the creation of passwords. The symbols included in these sets are further controlled by two RACF password settings flags:

**PASSWORD(MIXEDCASE | NOMIXEDCASE)**

**PASSWORD(SPECIALCHARS | NOSPECIALCHARS)**

This document describes the action of these flags upon the available symbols and provides a visual reference of the actual symbols which are included in each set.

## RACF Password Symbol Sets

RACF provides 13 symbol sets which the RACF Administrator may use in the establishment of RACF password rules. A RACF password rule may include any combination of these symbol sets from which a user must then draw upon to create a password. These symbol sets are named: **ALPHA, ALPHANUM, VOWEL, NOVOWEL, MIXEDVOWEL, CONSONANT, MIXEDCONSONANT, NUMERIC, MIXEDNUM, NATIONAL, SPECIAL, MIXEDALL** and **ANYTHING**. Though the naming convention of these symbol sets may seem intuitive, it is advised that anyone establishing RACF password rules, or those needing to create passwords, become familiar with the actual contents of each symbol set.

## Effects of RACF Password Settings on Symbol Sets

RACF Administrators may opt for additional complexity (i.e.: security) in establishing RACF password rules through the use of two RACF password settings.

Using the flag **PASSWORD(MIXEDCASE | NOMIXEDCASE)**, the RACF Administrator can define whether or not lowercase, alphabetic characters are available. If the **PASSWORD(MIXEDCASE)** is in effect, lowercase letters “a” through “z” are included in the following symbol sets:

**MIXEDVOWEL,  
MIXEDCONSONANT,  
MIXEDALL, and  
ANYTHING.**

Setting this flag to **PASSWORD(NOMIXEDCASE)** will exclude the lowercase letters from these symbol sets. Note that there is no symbol set which contains exclusively lowercase letters.

Using the flag **PASSWORD(SPECIALCHARS | NOSPECIALCHARS)**, the RACF Administrator can define whether or not 14 newly-allowed, special characters are available.

If the **PASSWORD(SPECIALCHARS)** is in effect, the special characters “.,<,+|,&!,\*,-,%,\_,>,?,:;=” are included in the following symbol sets:

**SPECIAL,**  
**MIXEDALL,** and  
**ANYTHING.**

Setting this flag to **PASSWORD(NOSPECIALCHARS)** will exclude “.,<,+|,&!,\*,-,%,\_,>,?,:;=” from these symbol sets. Note that the symbol set **SPECIAL** includes the **NATIONAL** symbols “#,\$,@” regardless of the setting of the **SPECIALCHARS | NOSPECIALCHARS** flag. Therefore, if the flag is set to **PASSWORD(NOSPECIALCHARS)**, the **SPECIAL** and **NATIONAL** symbol sets will be identical.

## **RACF Password Symbol Sets**

Below are the thirteen RACF password symbol sets. As stated above, it is advised that anyone charged with establishing RACF password rules, or users needing to create passwords, become familiar with the symbol sets. To the right of each symbol set name is number of symbols available in the set, noting the effects of the pertinent RACF password settings. Following that, the symbols within each set are listed.

### **A - ALPHA (29 symbols)**

A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z,#,\$,@.

### **L - ALPHANUM (39 symbols)**

A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z,#,\$,@,0,1,2,3,4,5,6,7,8,9.

### **V - VOWEL (5 symbols)**

A,E,I,O,U.

### **W - NOVOWEL (34 symbols)**

B,C,D,F,G,H,J,K,L,M,N,P,Q,R,S,T,V,W,X,Y,Z,#,\$,@,0,1,2,3,4,5,6,7,8,9.

### **v - MIXEDVOWEL (5 symbols with NOMIXEDCASE in effect, 10 symbols with MIXEDCASE in effect.)**

A,E,I,O,U.

**If MIXEDCASE is in effect, these added:**

a,e,i,o,u.

### **C - CONSONANT (21 symbols)**

B,C,D,F,G,H,J,K,L,M,N,P,Q,R,S,T,V,W,X,Y,Z.

### **c - MIXEDCONSONANT (21 symbols with NOMIXEDCASE in effect, 42 symbols with MIXEDCASE in effect.)**

B,C,D,F,G,H,J,K,L,M,N,P,Q,R,S,T,V,W,X,Y,Z.

**IF MIXEDCASE is in effect, these added:**

b,c,d,f,g,h,j,k,l,m,n,p,q,r,s,t,v,w,x,y,z.

**N - NUMERIC (10 symbols)**

0,1,2,3,4,5,6,7,8,9.

**m - MIXEDNUM = (39 symbols with NOMIXEDCASE in effect,  
65 symbols with MIXEDCASE in effect.)**

A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z,#,\$,@,0,1,2,3,4,5,6,7,8,9.

**If MIXEDCASE is in effect, these added:**

a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z.

**\$ - NATIONAL (3 symbols)**

,\$,@.

**s - SPECIAL (3 symbols with NOSPECIALCHARS in effect,  
17 symbols with SPECIALCHARS in effect.)**

,\$,@.

**If SPECIALCHARS is in effect, these added:**

.,<,+ ,|,&! ,\* , - , % , \_ , > , ? , : , = .

**x - MIXEDALL (see below)**

The **MIXEDALL** symbol set exists to impose the use of mixed character types that may include special characters and/or lowercase letters. It consists of four symbol categories. Each **MIXEDALL** symbol included in a RACF password rule requires the selection of a symbol from as many different, active symbol categories as there are **MIXEDALL** positions that are specified, in any combination. The categories are:

**Category1:** (3 or 17 symbols) The **NATIONAL** characters: #,\$,@.

**If SPECIALCHARS is in effect, these added:** .,<,+ ,|,&! ,\* , - , % , \_ , > , ? , : , = .

**Category2:** (10 symbols) **NUMERIC** symbols: 0,1,2,3,4,5,6,7,8,9.

**Category3:** (26 symbols) Uppercase alphabetic characters:

A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z.

**Category4:** This category is used only if **MIXEDCASE** is in effect.

(26 symbols) Lowercase alphabetic characters:

a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z.

The number of available symbols for each **MIXEDALL** password character also depends on the number of **MIXEDALL** characters required by the RACF password rule. When only one **MIXEDALL** symbol is required by a password rule, the number of possible symbols within

the set is strictly determined by the RACF password setting flags **PASSWORD(MIXEDCASE | NOMIXEDCASE)** and/or **PASSWORD(SPECIALCHARS | NOSPECIALCHARS)**.

If four or more **MIXEDALL** positions are specified in the RACF password rule, and **MIXEDCASE** is in effect, at least one of each of the four categories must be specified across the designated **MIXEDALL** positions. If **NOMIXEDCASE** is in effect, the behavior is the same as having three **MIXEDALL** positions, other than the number of positions over which the three active categories must be used.

All possible combinations of RACF password settings flags, and numbers of **MIXEDALL** symbols available, are mapped out below. Each line numbered 1 – 4 represent the number of **MIXEDALL** symbols included in the RACF password rule. Subsequent values in “( )” represent the number of symbols available within each combination of **MIXEDALL** Categories. For example, “(26)” represents either a Category3 or Category4 (either upper or lower case alphabetic) symbol, while “(10)” represents a Category2 (NUMERIC) symbol.

Category combinations, when more than one **MIXEDALL** symbol is designated within a password rule, are shown with “and” and “or” (& and | ) symbols to link them.

**NOMIXEDCASE** is in effect (no lowercase allowed) and  
**NOSPECIALCHARS** is in effect (only national characters allowed):  
Number of **MIXEDALL** positions in the RACF password rule:

- 1: (39)
- 2: (26)&(10) | (26)&(3) | (10)&(3)
- 3: (26)&(10)&(3)
- 4: (26)&(10)&(3)&(26) | (26)&(10)&(10)&(3) | (26)&(10)&(3)&(3)

**NOMIXEDCASE** is in effect (no lowercase allowed) and  
**SPECIALCHARS** is in effect (national and special characters allowed):  
Number of **MIXEDALL** positions in the RACF password rule:

- 1: (53)
- 2: (26)&(10) | (26)&(17) | (17)&(10)
- 3: (26)&(17)&(10)
- 4: (26)&(17)&(10)&(26) | (26)&(17)&(10)&(17) | (26)&(17)&(10)&(10)

**MIXEDCASE** is in effect (lowercase allowed) and  
**NOSPECIALCHARS** is in effect (only national characters allowed):  
Number of **MIXEDALL** positions in the RACF password rule:

- 1: (65)
- 2: (26)&(10) | (26)&(3) | (10)&(3)
- 3: (26)&(10)&(3)
- 4: (26)&(10)&(3)&(26)

**MIXEDCASE** is in effect (lowercase allowed) and  
**SPECIALCHARS** is in effect (national and special characters allowed):

Number of **MIXEDALL** positions in the RACF password rule:

- 1: (79)
- 2: (26)&(10) | (26)&(17) | (17)&(10)
- 3: (26)&(17)&(10)
- 4: (26)&(17)&(10)&(26)

**\* = ANYTHING (39 symbols if NOMIXEDCASE and NOSPECIALCHARS are effect, 53 symbols if NOMIXEDCASE and SPECIALCHARS are in effect, 65 symbols if MIXEDCASE and NOSPECIALCHARS are in effect, 79 symbols if MIXEDCASE and SPECIALCHARS are in effect)**

A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z,0,1,2,3,4,5,6,7,8,9,#,\$,@.

If **SPECIALCHARS** is in effect, these added:

.,<,+,&,&!,\*,-,%,\_,>,?,:|=

If **MIXEDCASE** is in effect, these added:

a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z.

## Conclusion

RACF provides many options to control the complexity of password rules. While the greatest number of symbols available per password character may, on the surface, seem to imply the greatest password complexity, a password rule containing only characters from the **ANYTHING** symbol set does not prevent a user from choosing a password of “AAAAAAAA”. For this reason, it is essential that users crafting passwords, and RACF Administrators creating password rules, be able adequately visualize all those symbols available for use.

For further information on this and related topics, review the sources used in the preparation of this document, cited below.

## Sources

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