

**TABLE A.2**  
CCITT makeup  
codes.

| Run Length | White Code Word | Black Code Word | Run Length   | White Code Word | Black Code Word |
|------------|-----------------|-----------------|--------------|-----------------|-----------------|
| 64         | 11011           | 0000001111      | 960          | 011010100       | 0000001110011   |
| 128        | 10010           | 000011001000    | 1024         | 011010101       | 0000001110100   |
| 192        | 010111          | 000011001001    | 1088         | 011010110       | 0000001110101   |
| 256        | 0110111         | 000001011011    | 1152         | 011010111       | 0000001110110   |
| 320        | 00110110        | 000000110011    | 1216         | 011011000       | 0000001110111   |
| 384        | 00110111        | 000000110100    | 1280         | 011011001       | 0000001010010   |
| 448        | 01100100        | 000000110101    | 1344         | 011011010       | 0000001010011   |
| 512        | 01100101        | 0000001101100   | 1408         | 011011011       | 0000001010100   |
| 576        | 01101000        | 0000001101101   | 1472         | 010011000       | 0000001010101   |
| 640        | 01100111        | 0000001001010   | 1536         | 010011001       | 0000001011010   |
| 704        | 011001100       | 0000001001011   | 1600         | 010011010       | 0000001011011   |
| 768        | 011001101       | 0000001001100   | 1664         | 011000          | 0000001100100   |
| 832        | 011010010       | 0000001001101   | 1728         | 010011011       | 0000001100101   |
| 896        | 011010011       | 0000001110010   |              |                 |                 |
| Code Word  |                 | Code Word       |              | Code Word       |                 |
| 1792       | 00000001000     | 2240            | 000000010110 |                 |                 |
| 1856       | 00000001100     | 2304            | 000000010111 |                 |                 |
| 1920       | 00000001101     | 2368            | 000000011100 |                 |                 |
| 1984       | 000000010010    | 2432            | 000000011101 |                 |                 |
| 2048       | 000000010011    | 2496            | 000000011110 |                 |                 |
| 2112       | 000000010100    | 2560            | 000000011111 |                 |                 |
| 2176       | 000000010101    |                 |              |                 |                 |

**TABLE A.3** JPEG  
coefficient coding  
categories.

| Range                                  | DC Difference Category | AC Category |
|--|------------------------|-------------|
| 0                                      | 0                      | N/A         |
| -1, 1                                  | 1                      | 1           |
| -3, -2, 2, 3                           | 2                      | 2           |
| -7, ..., -4, 4, ..., 7                 | 3                      | 3           |
| -15, ..., -8, 8, ..., 15               | 4                      | 4           |
| -31, ..., -16, 16, ..., 31             | 5                      | 5           |
| -63, ..., -32, 32, ..., 63             | 6                      | 6           |
| -127, ..., -64, 64, ..., 127           | 7                      | 7           |
| -255, ..., -128, 128, ..., 255         | 8                      | 8           |
| -511, ..., -256, 256, ..., 511         | 9                      | 9           |
| -1023, ..., -512, 512, ..., 1023       | A                      | A           |
| -2047, ..., -1024, 1024, ..., 2047     | B                      | B           |
| -4095, ..., -2048, 2048, ..., 4095     | C                      | C           |
| -8191, ..., -4096, 4096, ..., 8191     | D                      | D           |
| -16383, ..., -8192, 8192, ..., 16383   | E                      | E           |
| -32767, ..., -16384, 16384, ..., 32767 | F                      | N/A         |

| Category | Base Code | Length | Category | Base Code | Length |
|----------|-----------|--------|----------|-----------|--------|
| 0        | 010       | 3      | 6        | 1110      | 10     |
| 1        | 011       | 4      | 7        | 11110     | 12     |
| 2        | 100       | 5      | 8        | 111110    | 14     |
| 3        | 00        | 5      | 9        | 1111110   | 16     |
| 4        | 101       | 7      | A        | 11111110  | 18     |
| 5        | 110       | 8      | B        | 111111110 | 20     |

**TABLE A.4** JPEG default DC code (luminance).

| Run/Category | Base Code           | Length   | Run/Category | Base Code         | Length |
|--------------|---------------------|----------|--------------|-------------------|--------|
| <b>0/0</b>   | <b>1010 (= EOB)</b> | <b>4</b> |              |                   |        |
| 0/1          | 00                  | 3        | 8/1          | 11111010          | 9      |
| 0/2          | 01                  | 4        | 8/2          | 111111111000000   | 17     |
| 0/3          | 100                 | 6        | 8/3          | 1111111110110111  | 19     |
| 0/4          | 1011                | 8        | 8/4          | 1111111110111000  | 20     |
| 0/5          | 11010               | 10       | 8/5          | 1111111110111001  | 21     |
| 0/6          | 111000              | 12       | 8/6          | 1111111110111010  | 22     |
| 0/7          | 1111000             | 14       | 8/7          | 1111111110111011  | 23     |
| 0/8          | 1111110110          | 18       | 8/8          | 1111111110111100  | 24     |
| 0/9          | 1111111110000010    | 25       | 8/9          | 1111111110111101  | 25     |
| 0/A          | 1111111110000011    | 26       | 8/A          | 1111111110111110  | 26     |
| 1/1          | 1100                | 5        | 9/1          | 111111000         | 10     |
| 1/2          | 111001              | 8        | 9/2          | 1111111110111111  | 18     |
| 1/3          | 1111001             | 10       | 9/3          | 1111111111000000  | 19     |
| 1/4          | 111110110           | 13       | 9/4          | 1111111111000001  | 20     |
| 1/5          | 11111110110         | 16       | 9/5          | 1111111111000010  | 21     |
| 1/6          | 1111111110000100    | 22       | 9/6          | 1111111111000011  | 22     |
| 1/7          | 1111111110000101    | 23       | 9/7          | 11111111110000100 | 23     |
| 1/8          | 1111111110000110    | 24       | 9/8          | 11111111110000101 | 24     |
| 1/9          | 1111111110000111    | 25       | 9/9          | 11111111110000110 | 25     |
| 1/A          | 11111111100001000   | 26       | 9/A          | 11111111110000111 | 26     |
| 2/1          | 11011               | 6        | A/1          | 111111001         | 10     |
| 2/2          | 11111000            | 10       | A/2          | 1111111111001000  | 18     |
| 2/3          | 1111110111          | 13       | A/3          | 1111111111001001  | 19     |
| 2/4          | 1111111110001001    | 20       | A/4          | 1111111111001010  | 20     |
| 2/5          | 1111111110001010    | 21       | A/5          | 1111111111001011  | 21     |
| 2/6          | 1111111110001011    | 22       | A/6          | 1111111111001100  | 22     |
| 2/7          | 1111111110001100    | 23       | A/7          | 1111111111001101  | 23     |
| 2/8          | 1111111110001101    | 24       | A/8          | 1111111111001110  | 24     |
| 2/9          | 1111111110001110    | 25       | A/9          | 1111111111001111  | 25     |
| 2/A          | 1111111110001111    | 26       | A/A          | 1111111111010000  | 26     |
| 3/1          | 111010              | 7        | B/1          | 111111010         | 10     |
| 3/2          | 111110111           | 11       | B/2          | 1111111111010001  | 18     |
| 3/3          | 11111110111         | 14       | B/3          | 1111111111010010  | 19     |
| 3/4          | 1111111110010000    | 20       | B/4          | 1111111111010011  | 20     |
| 3/5          | 1111111110010001    | 21       | B/5          | 1111111111010100  | 21     |
| 3/6          | 1111111110010010    | 22       | B/6          | 1111111111010101  | 22     |
| 3/7          | 1111111110010011    | 23       | B/7          | 1111111111010110  | 23     |

**TABLE A.5** JPEG default AC code (luminance).

(Continued)

**TABLE A.5**  
(Continued)

| Run/<br>Category | Base Code        | Length | Run/<br>Category | Base Code           | Length    |
|------------------|------------------|--------|------------------|---------------------|-----------|
| 3/8              | 1111111110010100 | 24     | B/8              | 1111111111010111    | 24        |
| 3/9              | 1111111110010101 | 25     | B/9              | 1111111111011000    | 25        |
| 3/A              | 1111111110010110 | 26     | B/A              | 1111111111011001    | 26        |
| 4/1              | 111011           | 7      | C/1              | 1111111010          | 11        |
| 4/2              | 1111111000       | 12     | C/2              | 1111111111011010    | 18        |
| 4/3              | 1111111110010111 | 19     | C/3              | 1111111111011011    | 19        |
| 4/4              | 1111111110011000 | 20     | C/4              | 1111111111011100    | 20        |
| 4/5              | 1111111110011001 | 21     | C/5              | 1111111111011101    | 21        |
| 4/6              | 1111111110011010 | 22     | C/6              | 1111111111011110    | 22        |
| 4/7              | 1111111110011011 | 23     | C/7              | 1111111111011111    | 23        |
| 4/8              | 1111111110011100 | 24     | C/8              | 1111111111100000    | 24        |
| 4/9              | 1111111110011101 | 25     | C/9              | 1111111111100001    | 25        |
| 4/A              | 1111111110011110 | 26     | C/A              | 1111111111100010    | 26        |
| 5/1              | 1111010          | 8      | D/1              | 11111111010         | 12        |
| 5/2              | 1111111001       | 12     | D/2              | 1111111111100011    | 18        |
| 5/3              | 1111111110011111 | 19     | D/3              | 1111111111100100    | 19        |
| 5/4              | 1111111110100000 | 20     | D/4              | 1111111111100101    | 20        |
| 5/5              | 1111111110100001 | 21     | D/5              | 1111111111100110    | 21        |
| 5/6              | 1111111110100010 | 22     | D/6              | 1111111111100111    | 22        |
| 5/7              | 1111111110100011 | 23     | D/7              | 1111111111101000    | 23        |
| 5/8              | 1111111110100100 | 24     | D/8              | 1111111111101001    | 24        |
| 5/9              | 1111111110100101 | 25     | D/9              | 1111111111101010    | 25        |
| 5/A              | 1111111110100110 | 26     | D/A              | 1111111111101011    | 26        |
| 6/1              | 1111011          | 8      | E/1              | 111111110110        | 13        |
| 6/2              | 11111111000      | 13     | E/2              | 1111111111101100    | 18        |
| 6/3              | 1111111110100111 | 19     | E/3              | 1111111111101101    | 19        |
| 6/4              | 1111111110101000 | 20     | E/4              | 1111111111101110    | 20        |
| 6/5              | 1111111110101001 | 21     | E/5              | 1111111111101111    | 21        |
| 6/6              | 1111111110101010 | 22     | E/6              | 1111111111110000    | 22        |
| 6/7              | 1111111110101011 | 23     | E/7              | 1111111111110001    | 23        |
| 6/8              | 1111111110101100 | 24     | E/8              | 1111111111110010    | 24        |
| 6/9              | 1111111110101101 | 25     | E/9              | 1111111111110011    | 25        |
| 6/A              | 1111111110101110 | 26     | E/A              | 1111111111110100    | 26        |
| 7/1              | 11111001         | 9      | <b>F/0</b>       | <b>111111110111</b> | <b>12</b> |
| 7/2              | 11111111001      | 13     | F/1              | 1111111111110101    | 17        |
| 7/3              | 1111111110101111 | 19     | F/2              | 1111111111110110    | 18        |
| 7/4              | 1111111110110000 | 20     | F/3              | 1111111111110111    | 19        |
| 7/5              | 1111111110110001 | 21     | F/4              | 1111111111111000    | 20        |
| 7/6              | 1111111110110010 | 22     | F/5              | 1111111111111001    | 21        |
| 7/7              | 1111111110110011 | 23     | F/6              | 1111111111111010    | 22        |
| 7/8              | 1111111110110100 | 24     | F/7              | 1111111111111011    | 23        |
| 7/9              | 1111111110110101 | 25     | F/8              | 1111111111111100    | 24        |
| 7/A              | 1111111110110110 | 26     | F/9              | 1111111111111101    | 25        |
|                  |                  |        | F/A              | 1111111111111110    | 26        |