

APPENDIX I TO CHAPTER 13

Explanation of Errors and Output of Hourly Data Checking Program U520

Error output from U520 is written to one file and contains 7 columns. They are as follows:

1. Station ICAO
2. Date of error.
3. Observation instrument type.
4. Error code ("Nerr").
5. Old data value to be changed due to error.
6. New data value.
7. English explanation of error.

The tables below indicate the quality control checks, actions taken, and error code for each subroutine of u520.

SUBROUTINE TMPOC

| Temperature | Report error | Nerr |
|---|-------------------------------|--------------------------|
| Consistency check over 3 hours. If there are 2 consecutive hours of an increase/decrease in temperature by 10 degrees, check difference between the average of temperatures 1 and 3 and temperature 2. If +/- 10 degrees. | Change temperature to 9999. | 9901 |
| If the reported synoptic 6-h max (min) is out of tolerance (tolerance is 6+(2*the number of hours missing)). | Change 6-h max (min) to 9999. | 9915 (max) 9925 (min) |

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| <p>If the 6-h max (min) calculated from the hourlies is greater (less) than the reported 6-h max (min) by 2 degrees or more and this occurred more than once during the synoptic period.</p> | <p>Change 6-h max (min) to 9999.</p> | <p>9911 (max) 9921 (min)</p> |
| <p>If the 6-h max (min) calculated from the hourlies is greater (less) than the reported 6-h max (min) by only one degree and this occurred more than once during the synoptic period or if same but occurred only once during the period (with the exception of the first or last hour).</p> | <p>Error is a rounding problem, change the hourly temperatures that reflect this to the correct temperature.</p> | <p>9902</p> |
| <p>If the 6-h max (min) calculated from the hourlies is greater (less) than the reported 6-h max (min) and this occurred only once during the period on either the first or last hour of the synoptic period.</p> | <p>Change the 6-h max (min) to reflect the correct temperature.</p> | <p>9912/ 9913; (max) 9922/ 9923 (min)</p> |
| <p>If the 6-h max (min) calculated from the hourlies is greater(less) than the reported 6-h max (min) by 2 degrees or more on any hour with the exception of first or last hour of the synoptic period.</p> | <p>Change the 6-h max (min) to 9999.</p> | <p>9914 (max) 9924 (min)</p> |

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| If the 6-h max is less than the 6-h min. | Change the 6-h max and min to 9999. | 9930 |
| If the 24-h max is less than the 24-h min. | Change the 24-h max and min to 9999. | 9931 |

| Dewpoint | Report error | Nerr |
|--|--|------|
| If the dewpoint is less than -30 degrees F, and the dewpoint depression is greater than 15 degrees. | Change dewpoint to 9999. | 9800 |
| Consistency check over 3 hours. If there are 2 consecutive hours of an increase/decrease in dewpoint by 10 degrees, check difference between the average of dewpoints 1 and 3 and dewpoint 2. If +/- 10 degrees. | Change dewpoint 2 to 9999. | 9802 |
| If an hourly temperature was changed due to rounding, cross check the temperatures with the dewpoints to assure that the dewpoint will not exceed the temperature. If it does, | Change the dewpoint to the new temperature so that the dewpoint depression is 0. | 9803 |

SUBROUTINE PCPNQC

| Precipitation amount | Report error | Nerr |
|--|-----------------|------|
| Out of range 1-, 3-, 6-, and 24-h amounts. (1-h > 3.75 in, 3-h > 9 in, 6-h > 12 in, and 24-h > 24 in) | Change to 9999. | 9700 |

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| <p>If present weather was reported, but no 1-h precip amount was reported.</p> | <p>Change 1-h precip to 9999.</p> | <p>9705</p> |
| <p>If present weather was reported, but no 3-h precip amount was reported (MANU, AO2, AO2A).</p> | <p>Change 3-h precip to 9999.</p> | <p>9706</p> |
| <p>If present weather was reported, but no 6-h precip amount was reported (MANU, AO2, AO2A).</p> | <p>Change 6-h precip to 9999.</p> | <p>9707</p> |
| <p>If 3-h precipitation amount is greater than 6-h amount.</p> | <p>Change both to 9999.</p> | <p>9710</p> |
| <p>If 3-h precipitation amount reported and 6-h report is missing and no additional precipitation occurred in the last three hours of the synoptic period.</p> | <p>Change the 6-h amount to equal the 3-h amount.</p> | <p>9711</p> |

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| <p>For ASOS, if 6-h precipitation was reported (amount must be .01 or .02), the dewpoint depression was less than 2, FG (visibility less than ½ mile) was reported, no precipitation was observed and the sky was either partially or totally obscured then, ASOS dew.</p> | <p>Change the 1-, 3-, and 6-h amounts to 0. Keep track of the amount of precipitation eliminated for one day.</p> | <p>9720</p> |
| <p>For ASOS, if 6-h precipitation amount was reported, no weather observed, sky was clear at least 4 of the hours during the period, and the temperature rose from lower or equal to 30 to a temperature greater than or equal to 35 (unless the temperature has remained above freezing allowing for additional snowmelt from earlier periods, max of 4 unless the temperature falls below freezing again), then ASOS snowmelt.</p> | <p>Change the 1-, 3-, and 6-h amounts to 0. Keep track of the amount of precipitation eliminated for one day.</p> | <p>9730</p> |
| <p>If precipitation amounts have been eliminated due to dew or snow melt and no other precip was reported.</p> | <p>Change 24-h precip to 0.</p> | <p>9740</p> |
| <p>If precipitation amounts have been eliminated due to dew or snow melt and other precip was reported.</p> | <p>Subtract the amounts eliminated from the 24-h period ending 12z</p> | <p>9741</p> |

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| SCD snowfall amount reported without a 6-h liquid equivalent. | Change 6-h precip amount to 9999. | 9750 |
| SCD snowfall amount out of range (> 20 inches). | Change snowfall to 9999. | 9760 |
| Indeterminant precip amount (-9) reported. | Change to 9999. DOES NOT WRITE ANYTHING TO ERROR FILE. | Nothing |

SUBROUTINE PRESOC

| Pressure | Report error | Nerr |
|---|-----------------------------|------|
| Out of range, MSL > 1075 mb or < 875 mb. | Change pressure to 9999. | 9601 |
| Out of range, altimeter > 32.00 in or < 24.00 in. | Change altimeter to 9999. | 9602 |
| Consistency check over 3 hours. If there is a decrease/increase of barometric pressure in MSL of 3.4 mb for 2 consecutive hours then, compare the average of pressures 1 and 3 against pressure 2. If +/- 3.4 mb. | Change pressure 2 to 9999. | 9603 |
| Consistency check over 3 hours. If there is a decrease/increase of barometric pressure in ALT of 0.10 in for 2 consecutive hours then, compare the average of pressures 1 and 3 against pressure 2. If +/- 0.10 in. | Change altimeter 2 to 9999. | 9604 |

SUBROUTINE CLDSOC

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| Cloud height and amount | 13.6 | Report error | Nerr |
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| <p>Cloud height out of range (>45,000 ft).</p> | <p>Change cloud height and amount at all layers to 9999.</p> | <p>9500</p> |
| <p>Invalid cloud height reported. (Not checked at Canadian stations.)</p> | <p>Change cloud height and amount at all layers to 9999.</p> | <p>9501</p> |
| <p>Cloud height not increasing though groups.</p> | <p>Change cloud height and amount at all layers to 9999.</p> | <p>9510</p> |
| <p>Cloud amounts not increasing through groups.</p> | <p>Change cloud height and amount at all layers to 9999.</p> | <p>9511</p> |
| <p>Missing cloud height but amount present or missing amount but height present occurring at any level. (This will not check those cases fixed by 9521).</p> | <p>Change cloud height and amount at all layers to 9999.</p> | <p>9520</p> |

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| <p>Cloud report contains 4 or more layers and the first cloud height was set to 9999 due to a BUFR problem (only happened in data through Nov. 1997).</p> | <p>Change cloud heights at all layers to 9999.</p> | <p>9521</p> |
| <p>CLR or SKC reported.</p> | <p>Change cloud height at layer 1 to 888 and all others to 9999. DOES NOT WRITE ANYTHING TO ERROR FILE.</p> | <p>9530</p> |
| <p>POB reported in first group. (After 11/10/97 this is done in the program that creates the hourly tables.)</p> | <p>Change cloud height at layer 1 to 0.</p> | <p>9531</p> |
| <p>KMWN or KMWS report POB in first and second cloud amounts (represents fog in the valley below the station).</p> | <p>Delete the cloud height (POB) and amount (0) for the first layer. Move the data for the remaining layers down one layer and set the height and amount for layer 6 to 9999</p> | <p>9540</p> |

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| Any station (except KMWN or KMWS) reports POB in any cloud amount besides layer 1. | Change cloud height and amount at all layers to 9999. | 9541 |
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SUBROUTINE WNDQC

| Wind speed, direction, and gusts | Report error | Nerr |
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| Wind direction not to the nearest 10 degrees. | Change wind speed, direction and gust to 9999. | 9401 |
| Wind gust not greater than or equal to 10 kts and not between (wind speed + 3 kts) and (wind speed + 40 kts). | Change wind gust to 9999. | 9402 |
| Calm report does not have 0 for all three wind components | Change wind speed, direction, and gust to 9999. | 9403 |
| Variable wind direction (-9) reported. | Change wind direction to 990. DOES NOT WRITE ANYTHING TO ERROR FILE. | Nothing |

SUBROUTINE VISWXQC

| Visibility and present weather | Report error | Nerr |
|--|---|---------------|
| Invalid visibility value reported. (Not checked at Canadian and Mexican stations.) | Change the visibility to 9999. | 9300 |
| If the visibility is between 7 and 10 miles and the present weather group is an obstruction to vision. | Change the visibility to 6 miles. | 9310 |
| If the visibility is greater than 10 miles and the present weather is something that would reduce the visibility. | Change the visibility and all present weather groups to 9999. | 9312/ 9212 |
| If visibility is greater than ½ mile and the present weather is FG. | Change the present weather group to BR. | 9210 |
| If visibility is less than or equal to ½ mile and the present weather is BR. | Change the present weather group to FG. | 9211 |
| MANU or AO2 reports visibility less than or equal to 6 miles but doesn't report present weather. (Not checked at Canadian and Mexican stations.) | Change the present weather groups to 9999. | 9213 |

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| Intensity of snow/drizzle reported does not match visibility reported, and no other weather was reported. | Change the present weather to the proper intensity as dictated by the visibility. | 9214 |
| Intensity of ice pellets reported does not match visibility reported, and no other weather was reported. | Change the present weather to the proper intensity as dictated by the visibility. | 9215 |
| If the order of the present weather groups is incorrect. | Correct order. | 9220 |
| If VCSH is reported with any other precipitation occurring. | Eliminate VCSH. | 9221 |
| If thunderstorm with precipitation is reported and is accompanied by thunderstorm with hail. | Change groups so that they indicate just one thunder qualifier. | 9222 |
| If duplicate reports of the same precipitation type. | Keep the first report and change all other present weather groups to 9999. | 9223 |
| If liquid precipitation is reported and temperature is below 30 degrees. | Change present weather groups to 9999. | 9230 |
| If freezing precipitation or ice crystals reported with temperature greater than 40 degrees. | Change present weather groups to 9999. | 9231 |
| If frozen precipitation or ice pellets reported with temperature greater than 44 degrees. | Change present weather groups to 9999. | 9232 |
| Blowing phenomenon is reported, but there isn't enough wind to blow things around (wind less than 9 knots without a gust reported). | Change blowing present weather group and any after that to 9999. | 9240 |
| MANU or A02 reports OB but does not report any present weather. | Change present weather groups to 9999. | 9250 |
| MANU reports clear sky but also reports present weather (except for IC). | Change present weather groups and cloud amount layer 1 to 9999. | 9251 |

SUBROUTINE CNVTWX

| Present weather, station type, and cloud amount | Report error | Nerr |
|--|---------------------------------------|------|
| Weather element not recognized. | Change present weather group to 9999. | 9101 |
| Station type not recognized. | Change station type to 9. | 9102 |
| Cloud amount not recognized. | Change cloud amount to 9999. | 9103 |