14. **SOUNDING INDICES**.

Sounding indices are convenient numerical indicators of atmospheric stability and other key parameters. The following indices are automatically calculated by RAOB and displayed throughout the program. These indices are also available in RAOB's Severe Weather Parameter Table. (See Sturtevant, 1995, for additional discussion of these indices and related meteorological data, including interpretation and application.) Standard severe weather threshold values are listed below. All temperatures are Celsius (°C), unless otherwise indicated.

14.1 Boyden Index. This index was developed by the British Meteorological Office to forecast the probability of frontal thunderstorms in the UK (Boyden, 63). Available documentation indicates that it forecasts correctly approximately 60 to 65 percent of the time. If the index is $\geq$94, then thunderstorms are most likely.

$$\text{Boyden Index} = T_{700} + \frac{(1000\text{-}700\text{mb Thickness})}{10} - 200$$

where the thickness is measured in meters.

14.2 Bulk Richardson Number (BRN). BRN is the ratio between CAPE and a wind shear vector difference (Hart & Korotky, 91).

$$BRN = CAPE / (.5 * (BRN\_SHR)^2)$$

where: BRN_SHR is the magnitude of the vector difference between the 0-6 km mean wind and the 0-500 m mean wind, where both mean winds are density weighted. The individual mean wind values are listed in the Analyses data screen display.

Note: The RAOB program also produces and evaluates the BRN Shear value, which is composed of the entire denominator of the BRN number.

14.3 CAP. CAP strength, also called the Lid Index, is determined by finding the maximum temperature difference between the environmental and the lifted parcel profiles, within the layer bounded by the lifted parcel level and the LFC. The *lifted* profile is defined by the dry adiabat below the LCL and the moist adiabat above the LCL. Note: CAP does not consider elevated convection, and it is a warm season – warm sector index. CAP is meaningless if there is zero CAPE in the troposphere. A cap of 2 degrees Celsius or greater is a good inhibitor of convection. A strong cap can hold energy down too much and thus cause thunderstorms not to break. A weak cap can cause development to occur before enough energy builds up for the cells to become severe. A median of a strong cap and a weak cap (a cap strength from 1-2°C) is generally ideal to allow enough time for energy to build and then break the cap, allowing storms to go severe and possibly tornadic.

14.4 Craven SigSvr Parameter. The product of the 100 mb Mixed-Layer CAPE (MLCAPE) and the 0-6 km magnitude of the vector difference (m/s; often referred to as "deep layer shear") accounts for the compensation between instability and shear magnitude. Units are scaled to the nearest 1000.

Craven = (mlCAPE J/Kg) * (SHR6 m/s) / 1000

14.5 Cross Totals (CT) Index. This index is commonly used as a severe weather indicator and is based on temperature and moisture data (AWS/TR 200).

$$CT = Td_{850} - T_{500}$$

CT Index	Thunderstorm Potential
< 20	Weak
20 to 28	Moderate
> 28	Strong