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Metrication

This software (ProKon) is intended to give some guidance in applying the International System of Units, also referred to as the modernized metric system. This system was developed and is maintained by the General Conference on Weights and Measures (acronym - CGPM, which comes from the French name Conference Generale des Poids et Mesures). The name International System of Units and the accepted abbreviation SI were adopted by the Eleventh CGPM in 1960. This software is intended to aid in the conversion from non-SI to SI units and vice versa. It is possible to make over **350,000** different conversions with ProKon.

There are two methods of making a conversion to metric, hard and soft. A soft conversion is an exact conversion from one system to another. For instance, a soft conversion for 12 feet would be exactly 3.658 metres. A hard conversion, however, is a more approximate conversion. For instance, a hard conversion for 12 feet could be 3.6 metres. It may seem that the usage of the terms hard and soft are reversed, but that's the way it is.

Conversion Class

ProKon will perform many different types of conversions. This selection window allows the user to narrow the conversion selection field by picking the general classification of the conversion to be made. For instance, if you know that you want to make a speed conversion, you would first make a selection for "Velocity" in this window. You will then be presented with all of the available *'speed/velocity'* conversions in the next window.

The user first selects a class of conversion from this window and the 'Convert From . . ' dialog window appears so the unit to convert from can be selected. Then the 'Convert to . . .' dialog window appears to allow selection of the unit to convert to.

After selection from the 'Convert to . . . ' dialog window, the Calculation dialog window appears to allow entry of the value to convert.

The Conversion Classes are:

- Acceleration
- Angle
- Area
- Capacity
- Concentration
- Constants
- Custom
- Density
- Electricity/Magnetism
- Elements
- Energy
- Energy per Unit Area Time
- Flow
- Force
- Force per Unit Length
- Geometry
- Heat
- Length
- Light
- Mass
- Mass per Unit Area
- Mass per Unit Length
- Miscellaneous
    - Abbreviations
    - Concrete
    - Conductors
    - Date
    - Drill Size
    - Electricity
    - Electrical Symbols
    - Emergent Stem
    - Emissions

- Exchange Rate Calculator
- Formula Weight
- Fractions
- Fuel Economy
- Inorganic Chemicals
- Irrigation
- Lumber
- Mechanical Advantage
- Meteorology
- Moon Phase
- Number Base Conversion
- Nutrition
- Paint
- Resistor/Capacitor
- Roman Numerals
- Sieve Size
- Solutions
- Sound
- Wire/Sheet Gauge

Material Density
Periodic Table
Power
Pressure
Radiation
Temperature
Time
Torque
Velocity
Viscosity

Calculation Window

The calculation dialog window appears after the '*convert to . . .*' unit has been selected. This window contains a number of elements.

At the upper left part of the window is the edit window which allows for entry of the actual numerical value to convert from. Just below this edit window is the unit description for the unit that was selected in the 'convert from . . . ' selection window.

At the lower part of the window is another edit type window which displays the converted value. Just below this edit window is the unit description for the unit that was selected in the 'convert to . . . ' selection window.

At the right edge of the calculation dialog window are four buttons. The '*Calculate*' button is used to force the calculation and to '*select'* the value in the edit window. Once the value is selected, it will be automatically cleared if a new value is entered. The **'Exit'** button exits the dialog immediately and returns to the *'Conversion Class'* selection window. The **'Copy'** button copies the converted result to the clipboard. The **'Help'** button takes the user to this help system.

The **'Copy'** button is also useful for passing the value of a conversion to the pop-up calculator. When a conversion has been completed, pressing the **'Copy'** button will send the converted value shown in the **'Convert To'** window to the calculator display. When the calculator is popped up, the value will be shown on the display and can be used for further calculation. After completing the calculations in the pop-up calculator, pressing the **'Copy'** button *in the calculator* will pass the value shown on the calculator display back to ProKon. Then, when a conversion has been selected from a conversion class, the value passed from the pop-up calculator will automatically be shown in the **'Convert From'** edit window and the **'Convert To'** value will be calculated. Pressing the **'Clear'** button in either the pop-up calculator or in the conversion window in ProKon will erase the value so that it won't be passed to the calculator or to ProKon.

'Convert From/To . . .' Dialog Window

The "Convert From" dialog window prompts for possible units from which to convert. The entries shown in this list depend upon which Conversion Class was selected in the first window. This window should be displayed in the color cyan.

Immediately after making a selection from this window, the *'Convert To . . .'* dialog window will appear. The *Convert To* window gives possible units to convert the units that were selected in the '*Convert From . . .*' dialog window. The units displayed in this window will depend upon which units you have selected to convert from. This window should be displayed in the color aqua.

This window will often contain fewer units to select from because the unit that was selected in the '*Convert From . . .*' dialog window will sometimes limit the possibilities for the conversion.

'Convert From . . .' Dialog Window

The "Convert From" dialog window prompts for possible units from which to convert. The entries shown in this list depend upon which Conversion Class was selected in the first window. This window should be displayed in the color cyan.

'Convert To . . .' Dialog Window

Immediately after making a selection from the '*Convert From . . .*' dialog window, the '*Convert To . . .*' dialog window will appear. The *Convert To* window gives possible units that the units that were selected in the '*Convert From . . .*' dialog window may be converted to. The units displayed in this window will depend upon which units you have selected to convert from. This window should be displayed in the color aqua.

This window will often contain fewer units to select from because the unit that was selected in the '*Convert From . . .*' dialog window will sometimes limit the possibilities for the conversion.

Classes of Units

SI units are grouped into three general classes:

- Base Units
- Supplementary Units
- Derived Units

Base Units

The Base Units in SI are based on seven well-defined units that, by agreement, are regarded as dimensionally independent. The Base Units are shown in the following table:

Quantity	Unit	Symbol
amount of chemical substance	mole	mol
electric current	ampere	A
length	metre	m
luminous intensity	candela	cd
mass	kilogram	kg
thermodynamic temperature	kelvin	K
time	second	s

Supplementary Units

The Supplementary Units class consists of just two units; the radian and the steradian are considered to be dimensionless Derived Units. This is because the plane angle is usually expressed as a ratio between two lengths and the solid angle is usually expressed as a ratio between an area and the square of length. The radian and the steradian may be used or omitted from expressions for Derived Units. The Supplementary Units are shown in the following table:

Quantity	Unit	Symbol
plane angle	radian	rad
solid angle	steradian	sr

Derived Units

The Derived Units are formed by combining the Base Units, the Supplementary Units, and other Derived Units using algebraic relations to link the quantities. The symbols used for the Derived Units are obtained by using the standard mathematical operator signs for multiplication, division, and exponents. For example, the SI unit for Density is kilogram per cubic metre (kg/m³). There are a number of Derived Units that have special names and symbols. These '*special*' units have been approved by the CGPM and are shown in the following table:

Quantity	Unit	Symbol
absorbed dose	gray	Gy
activity (radionuclide)	becquerel	Bq
capacitance (electric)	farad	F
Celsius temperature	Celsius	ºC
conductance (electric)	siemens	S
dose equivalent	sievert	Sv
electric potential (EMF)	volt	V
energy/work, amount of heat	joule	J
force	Newton	N
frequency	hertz	Hz
illuminance	lux	lx
inductance	henry	H
luminous flux	lumen	lm
magnetic flux	weber	Wb
magnetic flux density	tesla	T
power, radiant flux	watt	W
pressure/stress	pascal	Pa
quant. of electricity	coulomb	C
resistance (electric)	ohm	

SI Prefixes

The SI prefixes are used to indicate orders of magnitude. Using the prefixes eliminates leading zeros and non-significant digits in decimal fractions. Also, prefixes can often be used to eliminate the use of E-notation as is used in mathematical computation. For example,

98000 mA = 98 A or
9.80E+0004 m = 98 km or

The following table lists the accepted SI prefixes to be used to create names and symbols of the decimal multiples of the SI units (except for kilogram). These prefixes (or symbols) are to be used by attaching the prefix directly to the front of the unit's name or symbol to form multiples of the units. It should be noted that it is common practice to refer to multiples of the SI units, formed by the use of prefixes, as SI Units. Strictly speaking, they should be referred to as "multiples of SI units".

Multiplication Factor	Prefix	Symbol
0.000 000 000 000 000 001 (E-18)	atto	a
0.000 000 000 000 001 (E-15)	femto	f
0.000 000 000 001 (E-12)	pico	p
0.000 000 001 (E-9)	nano	n
0.000 001 (E-6)	micro	µ
0.001 (E-3)	milli	m
0.01 (E-2)	centi	c
0.1 (E-1)	deci	d
10 (E+1)	deka	da
100 (E+2)	hecto	h
1 000 (E+3)	kilo	k
1 000 000 (E+6)	mega	M
1 000 000 000 (E+9)	giga	G
1 000 000 000 000 (E+12)	tera	T
1 000 000 000 000 000 (E+15)	peta	P
1 000 000 000 000 000 000 (E+18)	exa	E

The kilogram (the SI Unit of mass) is the only SI Unit whose name contains a prefix, and this was done by the CGPM purely for historical reasons. The decimal multiple of the unit of mass is created by attaching the appropriate prefix to the word gram (g).

Rules for Writing

A number of rules have been established for writing SI Unit names and symbols.

1) Unit symbols should not be followed by a period unless they come at the end of a sentence.

2) Unit symbols should never be pluralized.

3) The unit symbols are always written in lower case unless the unit name comes from a proper name, in which case the first letter of the symbol should be capitalized, as in Pa for Pascal. The exception is the symbol for litre, L.

4) Always write 123 cm, NOT 123cm. In other words, leave a space between the numerical value and the symbol. An exception is made when writing the symbols for degree Celsius, and degree, minute, and second of plane angle. Write 123ºC NOT 123 ºC.

5) Do not use a space between a unit symbol and its prefix. In other words, write km NOT k m.

6) Use symbols, not abbreviations, e.g., write ºC NOT deg C.

7) When a quantity written as a number and a unit is used as an adjective, use a hyphen between the number and the unit symbol. For instance, write '*40-cm length of rope'* or '*two-litre pail*'.

Using ProKon

ProKon is easy to use. When you first start the program, you are presented with a window titled 'Conversion Class'. This window is used to enter the general class of conversion that you wish to make. For instance, if you wish to convert centimetres to feet, you would select the *'Length'* item. A selection is made by either using the arrow keys to move the highlight bar to the item you wish to select and pressing <enter>, or by clicking on the item with the left mouse button. Anytime you are presented with a pick list window, selections are made in the same manner.

Once you have selected a Conversion Class, you will be presented with a pick window titled '*Convert From . . .*' which shows possible conversions for that class. Select one of the units shown in this window.

You will then be presented with a window titled '*Convert To . . .*'. This window contains the possible units that the unit first selected may be converted to. Depending upon what unit was chosen in the 'Convert From . . .' window, the *'Convert To . . .'* window will show only the valid units that you may convert to. Select one of the units shown in this window.

You are next presented with the 'Conversion' dialog window in which the conversion takes place. A value may be entered in the edit field in the upper left of this window. If the blinking cursor is not in the edit window, click in the window with the left mouse button or press the *'Tab'* key repeatedly until it is. Once the cursor is in the edit window, the value to be converted may be entered. As each digit of the value is entered, the '*result'* window in the lower portion of the window will be updated with the result of the conversion. If you make a mistake entering the value, backspace and enter the correct value. Notice that the unit chosen to *'convert from'* is shown just below the edit window and the unit chosen to '*convert to'* is shown just below the result window.

At any time that you wish to clear the value entered in the edit window, press the '**Calculate**' button. This action '*selects*' the value shown in the edit window. If you begin entering a new value, the old value will be automatically deleted and the new value will take its place.

At any time you may return to the Conversion Class window Simply press the '**Exit'** button to exit the calculation dialog window and return to the Conversion Class window.

Why Metric?

The decimal system of units was originally developed in the 16th century. Then, in 1790, the French Academy of Sciences worked out a system that would be suitable for the entire world. The system, based on the metre for length and the gram for mass, was adopted in commerce and, eventually, it was also adopted in the scientific community. The standardization of weights and measures continued over the years and eventually the system was expanded to include a unit for time (the second) in 1881. The ampere was added in 1935 to include a unit for electrical current. The degree Kelvin as a unit of temperature and the candella as a unit of luminous intensity were added in 1954. In 1960 the system was officially given the title, International System of Units, which is abbreviated "SI" in all languages. In 1971, the seventh base unit, the mole, was added. The SI system has evolved into a rationalized system of seven base units for which precise definitions, along with symbols and names, have been established.

The first questions asked by many people when they hear that the United States is going to metric are, "Why?", "Do we have to?", or "Says who?". This country is *'going metric'* primarily because the U.S. Congress has decided that it is time for us to do so. Nearly all other industrialized countries have already made the commitment to convert or are already converted to the metric system. This puts the U.S. at a disadvantage in the world market. Congress has told larger government agencies, such as the Department of Transportation, to be prepared to accept bids only in metric by 1996. This order appears in the Omnibus Trade Act of 1991. Since the Department of Transportation doles out many billions of dollars in federal aid, this has the effect of forcing myriads of other agencies and corporations to make the conversion to metric also. The net effect is cascading, forcing more and more companies to convert as orders move down through the supply chain.

Will the conversion be easy? That depends upon what business you are in. An engineer or a chemist, for instance, won't have a very difficult time making the conversion because they have already been trained in the use of metric. For a carpenter or a plumber, the transition will be more difficult. The same goes for and industry faced with converting to metric. It will be much easier for an industry that already has a long track record of supplying to foreign markets to make the transition; many have already done so in order to remain competitive in world markets. It will be much more difficult for the lumber industry, for instance, to convert. Lumber products have traditionally been marketed in the United States using the Imperial (English) system, so the conversion in this industry will require a reeducation of many people down through the supply chain. How about real estate industry? Since the United States has been keeping property records, in the form of abstracts, for example, the surveyor's measure has been in Imperial (English units). Do we attempt to go back and change all of this data over to metric? Some of these questions remain to be answered. It has been said that a complete conversion in a society will take at least one generation, so our adoption of the metric system won't come quickly. However, it WILL come. The METRIC software will help to ease the transition for anyone faced with making the change.

Most agree that the metric system is far superior to the Imperial (English) system (commonly referred to as the inch-pound system). One of the most obvious benefits is the absence of fractions in the metric system. This is one of the reasons that most industrialized countries have already converted to metric. The metric system is based on tens; a kilometre is 1000 metres, a metre is 100 centimetres, a centimetre is 10 millimetres. Unlike teaspoons and tons, its volumes and weights can be related to one another. A liter of water weighs a kilogram. The

metric temperature scale, Celsius, sets the freezing point of water at 0 degrees and the boiling point at 100 degrees.

As a final note, there is some misunderstanding as to the proper term to use when referring to making the change to the metric system. The act of making the conversion is called *'metrication'*, NOT metrification, as is often used.

Accuracy?

Most of the conversion factors used in ProKon use seven significant figures. This must be kept in mind when using the results of a conversion. Often, the results are given in the Calculation dialog window to more significant figures that this. The user must decide what is required in the result and round to only as many significant figures as is mathematically correct. The conversion factors used in ProKon were drawn from a number of sources and are the latest that the author could obtain. Keep in mind that, in some cases, there is some disagreement among the experts in the various fields covered by the Conversion Classes as to the exact factor to be applied for a given conversion.

When results are shown, ProKon uses fixed format (standard notation) to convert to the shortest possible decimal string. If the converted value exceeds these limits, the result will be shown in scientific notation or *'E-notation'*. Trailing zeros are removed from the resulting string, and a decimal point appears only if necessary. The resulting string uses fixed point format if the number of digits to the left of the decimal point in the value is less than or equal to 15 places, and if the value is greater than or equal to 0.00001. Otherwise the resulting value uses scientific format. The minimum number of digits in the exponent is four.

ProKon will not convert from or to numerical values greater than 1E+450 or less than -1E450. If you attempt to enter a value for conversion that do not meet these requirements, you will be presented with an error message and the conversion will not be completed. Also, if the value that you enter in the edit window converts to a value that does not fall within these limits, you will be presented with an error message and the conversion will not take place.

The number of decimal places can be set by entering the desired number of digits in the Preferences menu. Number of decimal places can be set from 1 to 15 places. A setting made here will force ProKon to round converted results to the desired number of places. Keep in mind that ProKon is capable of displaying fifteen digits (total before and after the decimal place) accurately. For instance, if your converted result contains 8 digits before the decimal place, 7 places will be shown after the decimal. However, if you set the number of decimal places at 4, only 4 places will display, no matter how many digits occur before the decimal.

SI Units

AREA

The square metre (m^2) is the SI Unit of area. When referring to large land masses or bodies of water, it is acceptable to use the hectare (ha) or square kilometre (km^2).

ENERGY

The SI Unit of energy is the joule (J).

MASS

The Unit of mass is the kilogram (kg). It is acceptable to use this unit or one of its related units formed as a multiple of the unit gram (g) by attaching one of the multiplier prefixes. Instead of referring to the '*ton*', as has been common practice, it is preferred to express these quantities of mass as the megagram (Mg). It is also acceptable to use the term metric ton, as long as its use is restricted to commercial references.

PLANE ANGLE

The SI Unit for plane angle is the radian. It is acceptable to use the degree or its multiples if the radian is not convenient. The use of the second and minute is not recommended.

PRESSURE/STRESS

The SI Unit of pressure or stress is the pascal (Pa).

TIME

The SI Unit of time is the second and should be used if it's at all practical to do so. This is particularly true when used in a technical context. Some judgment is required when this unit is used in referring to times that relate to life style or to the calendar. In these cases it may be advisable to use weeks, days, hours, or minutes rather than second. A good example would be when referring to the speed limit as kilometres per hour.

VOLUME

The SI Unit of volume is the cubic metre (m^3). The cubic metre or one of its multiples formed by the addition of a prefix is preferred (for instance, cubic millimetre [mm^3]). The cubic decimetre (dm^3) has been assigned the *'special'* name of litre (L) by the CGPM. The litre should be used only for volumetric capacity, the measure of gasses and liquids, and for dry measure. In addition, only the prefixes milli- or micro- are allowed with litre.

Acceleration

Acceleration defines the time rate of change of velocity in speed or direction. Also defined as the rate of change in velocity (speed), either increase (positive acceleration) or decrease (negative acceleration). The International System of Units (SI) derived unit for acceleration is metre per second squared (m/s^2).

Angle

Angle defines the ratio of the arc and the radius of the arc. The units of the angle are the radian, which is the angle subtended by an arc that is equal to the radius, and the degree, which is 1/360th part of the total angle about a point. The International System of Units (SI) standard unit for angle is the radian (rad).

SYNONYMS: phase

Area

Area is defined as the total outside surface of an object, as measured in square units. The International System of Units (SI) standard unit for area is the square metre (m^2). The hectare (ha) is a special designation for the square hectometre (hm). Land masses and large areas of water are generally expressed as either hectares (ha) or as square kilometres (km^2).

Bending Moment

Bending Moment is defined as the product of a force and the perpendicular distance to a turning axis. The International System of Units (SI) unit for bending moment is the Newton metre (N-m). The SI unit for bending moment per unit length is the Newton metre per metre (N-m/m).

SYNONYMS: torque, force moment

Capacity

Capacity is defined as the amount of space occupied in three dimensions; cubic contents or cubic magnitude. The International System of Units (SI) standard unit for capacity is the cubic metre (m^3).

SYNONYMS: volume, bulk

Concentration

Concentration is defined as the amount of substance in weight, moles or equivalents contained in a unit volume. The International System of Units (SI) derived unit for mass per unit volume is the kilogram per cubic metre (kg/mf). Concentration is a more loosely defined quantity which can include various other measures, such as parts per million (ppm), percent (%), moles per litre, etc.

SYNONYMS: mass per unit volume, density, moles per litre, percent, ppm, parts per million

Density

Density is defined as the concentration of matter, measured by the mass per unit volume. The International System of Units (SI) derived unit for density is the kilogram per cubic metre (kg/m^3).

The specific gravity, often confused with density, is actually defined as the ratio of the mass of a body compared to the mass of an equal volume of water at 4ºC or another specified temperature. Specific gravity is unitless.

SYNONYMS: mass capacity, concentration, mass per unit volume , mass per unit capacity

Electricity/Magnetism

Electricity is a loosely defined term that, in general, denotes a form of energy generated by friction, induction, or chemical change and having chemical, magnetic, and radiant effects. The base International System of Units (SI) standard unit for electricity is the ampere. Others shown are derived SI units. Electrical energy is subdivided into the following:

Ampere -
Electrical current is rate of transfer of electricity. The International System of Units (SI) standard unit for current is the ampere (A). The ampere is defined as that constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross section, and placed one meter apart in a vacuum, would produce between these conductors a force of 2E-07 Newton per metre of length. The ampere is the base SI unit for this class.

Coulomb -
The coulomb is defined as the quantity of electricity that must flow through a circuit to deposit 0.0011180 grams of silver from a solution of silver nitrate. The coulomb (C) is an SI unit of the International System of Units.

Farad -
Capacitance is measured by the charge which must be transferred to a body to raise its potential one unit. The farad (F) is defined as the capacitance of a capacitor between the plates of which there appears a difference of potential of one volt when the capacitor is charged by a quantity of electricity equal to one coulomb. The farad (F) is an SI unit of the International System of Units.

Henry -
Inductance is measured by the electrical force induced in a conductor by a unit rate of variation of the current. The henry is defined as the inductance of a closed circuit in which an electromotive force of one volt is produced when the electric current in the circuit is varied uniformly at a rate of one ampere per second.

Siemens -
Conductance is the reciprocal of resistance and is measured by the ratio of the current flowing through a conductor to the difference in potential between its ends. The SI unit is the siemens (S) (equal to the mho) and is defined as the electric conductance of a conductor in which one ampere of current is produced when the potential difference equals one volt.

Ohm -
Resistance is a property of electrical conductors which depends on the type of material, their dimensions, and the temperature. The SI unit of resistance is the ohm and is defined as the electrical resistance between two points of a conductor when a constant difference of potential of one volt, applied between the two points, produces in the conductor a current of one ampere, assuming the conductor is not the source of any electromotive force.

Volt -
The volt is the difference in electrical potential between two points on a conductor carrying a constant current of one ampere, when the power dissipated between the two points is equal to one watt. The volt (V) is the SI unit.

Weber -

The weber is a measure of magnetic flux and is defined as the magnetic flux which, linking a circuit of one turn, produces in the circuit an electromotive force of one volt as the flux is reduced to zero at a uniform rate in one second.

Tesla -

Magnetic flux density is measured as the strength of a magnetic field per unit area. It is defined as the magnetic flux density given by a magnetic flux of one weber per square metre.

SYNONYMS: electric charge, potential difference, electromotive force, capacitance, resistance, conductance, magnetic flux, magnetic flux density, inductance, electric current, current density, charge density, field strength

Energy

Energy (which also includes work) is measured by the capability of doing work. Energy is generally divided into potential energy, which is energy due to the position of one body in relation to another or to relative parts of the same body, and kinetic energy, which is energy due to motion of a body. The erg is defined as the energy expended when a force of one dyne acts through a distance of one centimetre. The International System of Units (SI) standard unit for energy/work is the Joule (J), and is defined as the work done when the point of application of a force of one Newton is displaced a distance of one metre in the direction of the force. The Joule is equal to 1E+07 ergs.

SYNONYMS: potential energy, kinetic energy, work

Energy per Unit Area Time

Energy per unit area time is defined as watts per square meter. Watt per square metre (W/m^2) is the International System of Units (SI) derived unit for energy per unit area time.

Flow

Flow is measured by the quantity of matter, in mass or volume, which moves past a given point during a given period of time. For mass flow the generally accepted units are defined as mass per unit time and are the kilogram per pascal second square metre (kg/(Pa-s-m²)) or the kilogram per second (kg/s). For volume flow the unit is the cubic metre per second (m³/s).

SYNONYMS: Mass per unit time, volume per unit time

Force

The Newton is defined as the force that, when applied to a body having a mass of one kilogram gives it an acceleration of one metre per second squared (m/s^2). The SI unit of force is the Newton (N).

Force per Unit Area

Force per unit area is defined as the force applied to or distributed over an area. Force per unit area is commonly referred to as pressure and is often also referred to as stress. Pressure is further divided into Absolute Pressure and Gauge Pressure. Absolute pressure is measured with respect to zero pressure; gauge pressure is pressure measured with respect to atmospheric pressure. The International System of Units (SI) derived unit for force per unit area is the pascal (P) which is the Newton per square metre.

SYNONYMS: pressure, stress

Force per Unit Length

The International System of Units (SI) derived unit for force per unit length is the Newton per metre (N/m).

Heat

Heat is the common term used to refer to various forms of thermodynamic energy and is more properly referred to as energy. However, the term is often used to refer to quantities of energy per unit weight, energy per unit volume, energy per unit time, etc.

Length

Length refers to the units denoting distance. The International System of Units (SI) standard unit for length is the metre (m). The metre is defined to be the length of the path traveled by light in a vacuum during the time interval of 1/299,792,458 of a second.

Light

Light, more properly referred to a illuminance, is defined as the luminous intensity, in a given direction, of a source that emits monochromatic radiation of frequency 540E+12 hertz and that has a radiant intensity in that direction of 1/683 watt per steradian. A related derived SI unit is the lumen which is defined as the illuminance produced by a luminous flux of one lumen, uniformly distributed over a surface of one square metre. The International System of Units (SI) standard unit for light is the candella (cd).

Mass

Mass is the quantity of matter. The International System of Units (SI) standard unit is the kilogram (kg). The kilogram is defined as the mass of the International prototype of the kilogram.

Mass per Unit Area

Mass per unit area is defined in the metric system as kilogram per square metre (kg/m^2).

Mass per Unit Capacity

Mass per unit capacity is defined as the concentration of matter, measured as the mass per unit volume. Mass per unit capacity is more commonly referred to as the density. The International System of Units (SI) derived unit for density is the kilogram per cubic metre (kg/mf).

SYNONYMS: density, concentration, mass per unit volume

Mass per Unit Length

Mass per unit length is defined in the metric system as kilogram per metre (kg/m).

Mass per Unit Time

Mass per unit time is measured as the quantity of mass which moves past a given point during a given period of time. The generally accepted units for mass per unit time (also referred to as flow) are the kilogram per pascal second square metre (kg/(Pa-s-m²)) or the kilogram per second (kg/s).

SYNONYMS: flow

Mass per Unit Volume

Mass per unit volume is defined as the concentration of matter. Mass per unit volume is more commonly referred to as the density . The International System of Units (SI) derived unit for density is the kilogram per cubic metre (kg/m³).

SYNONYMS: density, concentration, mass per unit capacity , mass capacity

Mass Capacity

Mass capacity is defined as the concentration of matter. Mass capacity is more commonly referred to as the density. The International System of Units (SI) derived unit for density is the kilogram per cubic metre (kg/m^3).

SYNONYMS: density, concentration, mass per unit volume , mass per unit capacity

Material Density

The Material Density class gives the approximate density of various materials, some common, some not so common. There are over 500 materials listed in the class. Each material is shown with its mass per unit volume and volume per unit mass in both metric and imperial units. All of the density values in this listing are approximate since many of the materials listed have no exact density value, but rather, have a range of density values depending upon the physical form of the material.

Power

Power is measured as the process which gives rise to the production of energy at the rate of one joule per second. The International System of Units (SI) standard unit for power is the watt (W). The watt is a derived unit of the International System.

Pressure

Pressure is measured as the quantity of force applied per unit area. The International System of Units (SI) standard unit for pressure is the pascal (Pa) (Newton per square metre).

SYNONYMS: force per unit area , stress

Radiation

Radiation is represented in the metric system by two units, the gray and the sievert. The gray (Gy) is defined as the absorbed dose when the energy per unit mass imparted to matter by ionizing radiation in one joule per kilogram. The sievert (Sv) is the dose equivalent when the absorbed dose of ionizing radiation multiplied by the dimensionless factors Q, which is a quality factor, and N, which is the product of any other multiplying factors, stipulated by the International Commission on Radiological Protection is one joule per kilogram.

Stress

Stress is measured as the quantity of force applied per unit area. The International System of Units (SI) derived unit for stress is the pascal (Pa) (Newton per square metre).

SYNONYMS: force per unit area, pressure

Temperature

Temperature is defined in the modernized metric system by the thermodynamic temperature kelvin (K). This is the proper unit to use to express thermodynamic temperatures and temperature intervals. The degree Celsius (ºC) is used widely for expressing Celsius temperature and temperature intervals. The Celsius scale, which was formerly called the Centigrade temperature scale, is the proper SI scale to use to express temperatures and temperature intervals in Celsius.

Time

The International System of Units (SI) standard unit for time is the second (s). The minute, hour, day, week, month, etc., may be necessary when the expression of time is related to calendar cycles or life customs.

Torque

Torque is defined as the product of a force and the perpendicular distance to a turning axis. The International System of Units (SI) unit for torque is the Newton metre (N-m)

SYNONYMS: bending moment , force moment

Torque per Unit Length

The International System of Units (SI) standard unit for torque per unit length is derived as the Newton metre per metre (N-m/m).

Velocity

Velocity is measured as the distance traveled per unit time. Velocity is defined in the metric system using the derived unit metre per second (m/s).

SYNONYMS: speed

Viscosity

Viscosity or the resistance to flow is exhibited by all fluids and many solids. There are two derived units in the International System of Units (SI) for viscosity. They are the pascal second (Pa-s) for expressing dynamic viscosity and the square metre per second (m^2/s) used for expressing kinematic viscosity.

Volume

Volume is defined as the amount of space occupied in three dimensions, cubic contents or cubic magnitude. The International System of Units (SI)standard unit for volume is the cubic metre (m^3).

SYNONYMS: capacity

Volume per Unit Time

Volume per unit time is measured by the quantity of matter, in mass or volume, which moves past a given point during a given period of time. For mass flow the generally accepted units are defined as mass per unit time and are the kilogram per pascal second square metre (kg/(Pa-s-m^2) or the kilogram per second (kg/s). For volume flow the unit is the cubic metre per second (m^3/s).

Synonyms: flow, mass per unit time

Work

The International System of Units (SI) standard unit for energy/work is the Joule (J), and is defined as the work done when the point of application of a force of one Newton is displaced a distance of one metre in the direction of the force. The Joule is equal to 1E+07 ergs.

SYNONYMS: potential energy, kinetic energy, energy

Installation

ProKon, the metric conversion utility, is installed to your system by SETUP.EXE. When Setup first starts, it will show the **Directory Dialog** to prompt for the directories that ProKon is to be installed from and the directory that ProKon's files will be installed into.

Normally, the directory to install from is shown in the **Installing From** window. This will usually be one of your floppy drives, e.g., **A:** or **B:**. There is usually no reason to change the default location that is shown in this window.

The destination directory is shown in the **Installing To** window. The default location is **C:\ PROKON**, but may be changed to any location you prefer. If you do not want to install ProKon to the default directory, you may type a new location path directly into the **Installing To** edit window. If the location you set does not exist, Setup will create the directory path as it installs the files, provided the path up to the directory you enter is valid.

Once you have the installation directory information correct, clicking on the OK button will begin the installation process. A small window will appear that will show the progress of the file copying process.

Once the files have been copied to the destination directory, file decompression will take place. Decompression will take one to several minutes, depending upon the speed of your computer. Then, Setup will present you with another window titled **Program Manager Group Installation**. This window prompt for the Program Manager Group into which the ProKon icons will be installed. The default group window will be titled **ProKon** but, if you prefer, you may enter a different name into the Program Manager Group edit window. Also, you may select an existing Program Manager group to install the ProKon startup icons into by clicking on the down arrow to the right of the edit window and selecting one of the existing groups.

NOTE: Keep in mind that you may change the default values to anything you prefer (within reason), but it is usually better to let SETUP select the defaults. Any of the items selectable from the **Program Manager Group Installation** window may be changed from Window's Program Manager later, if you prefer.

The second item shown in the **Program Manager Group Installation** window is the command-line entry that will be used to start ProKon from Program Manager. You may not alter the information shown in this window.

The third item is the ProKon icon description that will be shown beneath the ProKon icon in Program Manager. If you do not like the default shown, you may change to anything you prefer. Just remember, it shouldn't be too long.

Once everything is shown as you prefer in the **Program Manager Group Installation** window, clicking on **OK** will create the Program Manager group, add the necessary icons and SETUP will terminate.

If, instead of selecting **OK**, you select **EXIT**, SETUP will terminate without installing the necessary Program Manager items for running ProKon. In this case, you must install these items manually from Program Manager.

At this point the installation process has been completed and you will be returned to Windows. ProKon is ready to run.

Note that ProKon comes with a utility to remove the program from your computer. When ProKon is installed with the setup program, the uninstall utility is also installed and an icon for running the utility is installed into the same program group as the other icons necessary to run the program. During the uninstall process, you will be asked whether you wish to delete the CUSTOM.INI configuration file that is located in the folder where the ProKon program files are located. Be aware that allowing this file to be deleted will eliminate any custom conversions you have created in ProKon and will also delete any other custom configuration options you may have created, such as custom colors, digits, etc.

Printing

The results of any conversion can be printed. When a conversion has been completed in the Calculation Window, clicking on the **Print** button will print the result of the conversion to the default Windows printer. Also, while viewing a Material Density data window, a Periodic Table or Element entry data table, a Geometry page, or a Constant page, the data shown for the selected page can be printed by clicking the **Print** button in that window.

If you have multiple printers installed and configured in Windows, you may select a printer to receive the print job by selecting **Print - Printer Setup** from the main menu. The printer setup dialog may also be accessed by clicking on the **Printer Setup** button on the speed menu.

Menus

There are three types of menus used in ProKon.

The first is the type of menu that all Window's users have become accustomed to. This is the familiar row of drop-down menu items that appear across the top of the window in each application. Selecting these menu items either produces a drop-down menu from which further selections may be made or, in the case where there is no drop-down menu for that item, the action indicated by the menu item is initiated immediately. These menu items may be selected by clicking on them with the left mouse button or by selecting them with an **ALT-key** combination from the keyboard. For instance, the *'Help'* item could be selected with the keyboard by holding down the **ALT** key and pressing the **H** key.

The second type of menu is the Speed Menu. The Speed Menu consists of a row of buttons in the upper left of the main window. Each button face contains a picture to represent the action of the button. The use of the speed menu is to allow the user to select many of the items contained in the main menu across the top of the window more quickly than can be done by using the main menu. For example, the far left speed button has a door on its face. The door represents the Exit command and can be used at any time to exit ProKon quickly. The use of each button can be determined by slowly moving the mouse cursor across the face of the buttons. As the cursor passes across the face of each button, a small hint window will appear to give the use of the button. In addition, each hint will appear on the status bar at the bottom of the window.

The third type of menu is the Pop-Up menu. The Pop-Up menu is selected by placing the mouse cursor in the active window and clicking the right mouse button. A small, floating window will appear which contains the commands available for that window. The Pop-Up window offers a speedy way to initiate menu actions. Note that you may exit ProKon from nearly any place in the program by selecting the **Exit** command from a Pop-Up menu.

Preferences

There are three types of preferences or options that can be configured in ProKon. All of them can be set from the 'Preferences' menu item at the top of the Conversion Classes window.

Hints

The first is the *'Hint'* option. This option is toggled on and off by clicking it with the mouse pointer. When in the ***ON*** state, a check mark will be displayed to the left of the *'Hint'* menu item and pop-up hints will be displayed throughout the program (including in the calculator) when the mouse cursor is placed over various items. When in the ***OFF*** state, no check mark is displayed and pop-up hints will not be displayed. The only hint option this does not affect in the hint bar at the bottom of the main Conversion Classes window. This bar will always display a hint for the *'Class'* item the mouse cursor is over.

Center Windows

The second option is the *'Centering'* option. This option is also a *'toggle'* menu item. When *'Centering'* is enabled, a check mark will show to the left of the menu item. When disabled, no check mark will show. Enabling the *'Centering'* option causes all windows in ProKon to be displayed in the center of the screen, no matter what resolution your system is be set to display. When the *'Centering'* option is not enabled (not checked), each window will display at the location you last placed it on the screen. Each window position is saved between sessions so that each time you start ProKon the window position is *'remembered'*. If *'Centering'* is not enabled, the first time you view each window it will be shown in the upper left corner of the screen. Any window can be moved to a new location by placing the mouse cursor on the top-most bar of the window and, while holding down the left mouse button, dragging it to the new location. Alternatively, the **Move** item can be selected from the *'System'* menu at the upper left corner of each window via the mouse or keyboard and the window position changed by using the cursor keys.

Num Lock

When the **Num Lock** key is toggled ***'ON'***, the numeric keypad to the right of the keyboard is enabled for numeric data input.

This menu item allows the **Num Lock** key feature to be enabled or disabled. If the Num Lock feature is enabled (as indicated by a check mark to the left of the menu item), then when you start the program, the **Num Lock** key status is automatically toggled ***'ON'***. In addition, when you start the program, ProKon attempts to determine what the status of the Num Lock key was in the Windows environment and "remembers" how it was set. Then, if you switch from ProKon and go to another program in Windows, the Num Lock status will switch from the status you have set in ProKon to the status that was in effect when ProKon was started. ProKon will even attempt to determine if you change the status of the Num Lock key when you switch to another program and "remember" that you've changed the status outside ProKon. If you minimize ProKon to the task bar or tray area, the status will revert to what it was before you started ProKon. Then, when you maximize ProKon from the tray or task bar, the Num Lock key will be reset to the status indicated in the Preferences, Num Lock menu item. Note that you

can temporarily change the status while you are in ProKon by using the Num Lock key. Changing the status in this manner will not alter the status of the menu item so, if you leave ProKon and return, the status will revert to the status indicated by the menu.

Clean Screen

The **Clean Screen** option is enabled (checked) by default the first time you run ProKon. When this **Preferences** menu item is enabled, ProKon hides all of its windows except the window that you are using at that moment. In other words, when you select an item in the main window, the main window will disappear and the window you selected will appear. If that window requires you to select a further window (i.e., once you pick the units to convert), then it will disappear and the next window will appear for input or to display information. This option allows ProKon to present a more "uncluttered" appearance.

If the **Clean Screen** option is not enabled (is unchecked in the **Preferences** menu), then all windows will remain visible on the screen, although some windows may be partially or totally hidden behind the current active window. This option presents a more "cluttered" appearance but is preferred by some users.

After you run ProKon for the first time, the status of this menu item will be "remembered" the next time you start ProKon.

Decimal Places

The **Decimal Places** option allows the user to set the number of decimal places to be displayed in the result when calculations are performed in the Calculation Window. This value can be set in the range of 1 to 15. Selecting this menu item shows a dialog window which can be used to enter the desired number of decimal places.

The current value of this menu item is displayed in the menu in parenthesis just after the **Decimal Places** menu item. Keep in mind that setting the decimal places to a high value does not necessarily improve the accuracy of the computed result. In many cases, the conversion factors used are known to an accuracy of only five or six places. This effectively limits the true accuracy of any conversion result calculated with that factor. In most cases, six-place decimal accuracy is adequate.

Normally, ProKon will display converted results with 15 digits. This 15 digits is the total of digits before and after the decimal. For instance, if a converted result gives a value with 6 digits in front of the decimal place, 9 places will be shown after the decimal separator. Doing this ensures the best possible accuracy. However, if you have the number of decimal places set to a lower number, say 4 places, in the Decimal Places menu item, then only 4 places will display after the decimal separator. Keep in mind that the maximum of 15 digits displayed will always overide the setting in Decimal Places, if necessary.

After you run ProKon for the first time, the status of this menu item will be "remembered" the next time you start ProKon.

Color Selection

This option consists of various sub-menus for each type of window displayed in ProKon. Most sub-menu offers multiple window elements for which the color can be selected by the user. Selecting a window component from a sub-menu, i.e., the background color for the main window, will display a color dialog box for the selection of a new color for that window component. Use the mouse to click on a new color square to *'select'* that color, then click on **OK**. The color dialog will disappear and the component you selected from the menu (the background of the main window, in this case) will change to the color you selected. There are many window elements throughout the program that can be configured to a desired color in this manner.

Once the color of a window element is changed via the *'Preferences'* menu, it will stay that color, even if you quit ProKon and restart the program. Each color selected will be *'remembered'* the next time you run ProKon. Notice that in the color dialog you are offered a choice to configure your own colors. Even these colors are 'remembered' between sessions. Note also that ProKon will give the best capabilities to configure colors if your system is capable of 256 colors or more. Many systems are limited to 16 colors. In this case, the color dialog box in ProKon will select the closest color to the color you selected. Hint: When moving around in the color selection dialog box, use the right mouse button to pop up help hints on how to use the dialog.

An additional thing to keep in mind, ProKon will allow you to set background and text to the same color. For many elements (for instance, the scrolling tape in the pop-up calculator), **if you set both the background and the text to the same color, you will be unable to read the text. Black text on a black background is impossible to see**. You MUST configure contrasting colors for these elements.

If, at any time, you wish to return to the default color set for ProKon you may do so by selecting that option from the *'Preferences'* menu. Selecting this item will reset all colors to default values.

System Tray

The system tray menu selection in the Preferences menu allows the user to configure the Windows 95 or Windows NT system tray. The system tray is the small rectangular box to the right of the Windows task bar, usually located at the bottom of the screen in Windows 95 or NT.

Selecting System Tray from the Preferences menu brings up a sub-menu that contains four menu items. The first three, **Animation I** , **Animation II**, and **Animation III** can be activated to display an animated icon on the system tray (provided ProKon is configured to use the system tray, as described below). An 'Animation' item is enabled when there is a check mark displayed to the left of the menu item and is disabled if no check mark is displayed. Three different animated icons can be displayed, hence the items labeled **Animation I, Animation II**, and **Animation III**. When disabled, the standard ProKon icon is displayed on the tray.

The text shown for the third menu item depends upon the status of the item. If the menu item shows **Activate**, then no icon will show on the system tray. If the menu item shows **Deactivate**, this indicates that the system tray icon is enabled and should be displayed on the system tray. This menu item is toggled between the two states as it is 'pressed' with the mouse or selected as an 'Alt' key combination.

When the system tray icon in enabled, the system tray icon can be used to call up ProKon if the

program has been minimized. A single click with the left mouse button will call up ProKon. Clicking the system tray icon with the right mouse button will pop up a small menu that allows various actions, including enabling/disabling the system tray icon, as well as exiting ProKon entirely. Note that when the system tray icon is enabled, ProKon will not be shown on the Windows task bar. As soon as the system tray icon is disabled, ProKon's icon will again display on the task bar.

Calculator

ProKon features a pop-up calculator. The calculator is easy to use and is very similar to the desktop calculators to which all of us have become accustomed. It is a full-featured scientific calculator that is also capable of performing various financial calculations. Ten memory locations are available and memory contents are stored between uses of the calculator. Help is integrated into the function of each key and is accessed by pressing the **'Help'** key and then pressing the key for which help is needed. In addition, pop-up hints are available to help the new user.

The ProKon calculator has a couple of additional features not found in most software calculators. For one, it is a *tape* calculator. The right side of the calculator window consists of a tape with a function identical to a calculator with a paper tape. As each value is entered, the value appears on the tape and, as each calculation is performed, the result is shown on the tape. The tape may be cleared at any time and the entire tape or a portion of the tape may be printed or copied to the Window's Clipboard and to file. Note that only portions of the tape that have been *selected* can be printed or copied.

The **'Copy'** button in the pop-up calculator can be used to pass values back to ProKon for further processing. See the Calculation Window help topic for the uses for the multi-function **'Copy'** button in the pop-up calculator.

Saving to File

The results of any conversion can be saved to file. When you are in the Calculation Window, you may save the result of each conversion by clicking on the **Copy** button. Each time you select the button, the results of the conversion are saved to a file in the ProKon directory called CONVERT.TXT and also copied to the Window's Clipboard. CONVERT.TXT is a plain ASCII text file and may be loaded into a word processor for editing. As you make conversions and same them to file, the results are added to the end of the CONVERT.TXT file. The data shown in the *Material Density* dialog can be saved to file in the same manner.

Note that each time you start ProKon the size of CONVERT.TXT is checked. If CONVERT.TXT is greater than 125,000 bytes, the contents of the file are erased. This keeps the size of the file from getting overly large and taking up too much disk space. CONVERT.TXT will not be erased while you are in a session if it becomes larger than 125,000 bytes in size; erasure occurs only when first starting ProKon and activating the **COPY** feature.

The Menu bar of the pop-up menu may also be used to copy the results of the last conversion to file.

Periodic Table of the Elements

ProKon contains a description of the chemical elements. These element descriptions can be accessed in two ways, by element name or by its position and element symbol in the Periodic Table of the Elements.

The Conversion Class window contains a selection titled *Elements*. Choosing this selection will show a window with all of the elements listed by name. Any element may be selected from this list to give a window containing information on the element.

The Conversion Class window also shows a selection titled *Periodic Table*. Choosing this selection will show a periodic table of the elements. Clicking on any element in the table gives a window containing information on the element.

The information shown on each element includes:

- Element Name
- Element Symbol
- Atomic Number
- Atomic Weight
- Oxidation States
- Density
- Melting Point
- Boiling Point
- Description of Element

The element description contains a brief history of the element, the derivation of the element's name, where the element is found, the chemistry of the element, and the uses of the element.

In the lower left corner of the window is a navigator component that contains buttons that allow the user to navigate the database of chemical elements. These buttons can be used to move through the database one element at a time in either direction or to immediately move to the first or last element. Clicking on the navigator allows any of these actions.

In addition, any element that is displayed can be printed to the Window's Clipboard or sent to the Window`s default printer by clicking the appropriate button. Each time the **Copy** button is pressed, the information in the element window is sent to the Window`s Clipboard as well as a file called CONVERT.TXT. Pressing the **Print** button will cause the element information to be printed for hard-copy output.

Geometry

ProKon contains a library of common geometric formulae. Selecting the *Geometry* button in the Conversion Class window produces a window containing a tabbed notebook. This tabbed notebook contains a number of pages, each of which shows many of the common formulas for calculating such things as area, surface area, volume, etc. Each tab on the notebook represents a specific geometric figure. You may switch between the pages of the notebook by clicking on the tabs with the mouse or by shifting the focus from tab to tab by repeatedly pressing the **Tab** key.

Each page of the notebook contains a representation of the geometric figure for that page as well as a number of mathematical formulas that can be used to calculate various parts of the figure. The variables used in the formulas are keyed to the variables depicted on each geometric figure.

Any page of the notebook can be printed to the Window`s default printer. Note that printing may take a few moments since the data is in graphical form and so requires longer to print. A pop-up reminder appears in the lower left corner of the *Geometry* notebook window while printing is taking place.

Constants

ProKon contains a library of common constants used in the scientific field. Selecting the **Constants** button in the Conversion Class window produces a window containing a tabbed notebook. This tabbed notebook contains a number of pages, each of which shows many of the common constants used in mathematics and scientific calculations. Each tab on the notebook represents a class of constants. Tabs may be selected by clicking on the tab with the left mouse button or by moving the focus from tab to tab by repeatedly pressing the **Tab** key and selecting a page by pressing **Enter.**

Each page of the notebook contains a number of constants relating to the topic for that page. The Constant tabbed pages cover a number of topics, such as Pi, Numerical Prefixes, Physical Constants, Coefficient of Expansion, etc.

Any page of the notebook can be printed to the Window`s default printer. Note that printing may take a few moments since the data is in graphical form and so requires longer to print. A pop-up reminder appears in the lower left corner of the *Constants* notebook window while printing is taking place.

Custom Conversions

Unit conversions can be added to those already in ProKon. The user can add specific conversions to the Custom class by using the **Custom** menu item from the main menu or by selecting the Custom Setup menu item from the pop-up menu in the main Conversion Class window. Any conversions added will show in the Custom selection dialog when the **Custom** button is selected from the Conversion Class window.

Note that each time a custom conversion is added in the Custom Setup dialog, two additional units are added to the Custom dialog. This gives you the ability to convert to or from **either** of the units added to the companion unit. Also, when a unit is selected from the Custom dialog, the Calculation dialog window immediately appears with both the unit selected and its companion unit displayed. As with all other conversions, it is possible to convert in either direction in the Calculation dialog window by shifting focus to the entry area for either unit.

It is possible to add 40 pairs of custom units to the Custom dialog.

Custom Conversion Setup

Custom unit conversions can be added to ProKon in those cases where a particular conversion is not available. Custom conversions are added to the Custom class by using the **Custom Setup** dialog. Up to 40 pairs of units can be added to the Custom Class. The **Custom Setup** dialog is accessed by selecting the **Custom** menu item from the main menu or by selecting the **Custom Setup** menu item from the pop-up menu in the main Conversion Class window.

The **Custom Setup** dialog presents you with three edit windows to enter the data required for each set of custom unit conversions. The name of the units *to convert from* is entered in the topmost window titled **Enter unit to convert from:**, the units to *convert to* is entered in the bottom edit window titled **Enter unit to convert to:** , and the conversion factor is entered in the middle window titled **Enter conversion factor:**. Note that the conversion factor should be the number that the ***convert from*** unit is to be **multiplied by** the factor entered to convert to the ***convert to*** unit. A factor can be entered in simple decimal notation, for example 123.45678, or in "E-notation" or "Engineering notation", for example 1.2345678E+02. ProKon tries to determine if a legitimate factor has been entered and will ask you to re-enter it if the format in not correct. (If you are notified of a floating point error when attempting to use your newly entered conversion, you probably entered the factor incorrectly.)

Examples of **correctly entered factors** are:

123.456789
1.23456789E+02
0.000000123456
1.23456E-07
123456789
1.23456789E08
1E-333

When you run ProKon for the first time, there will be no custom unit available. As you add custom units, each pair will be saved in the same location as shown in the **Entry No.:** edit window displayed in the lower left corner of the **Custom Setup** dialog. Each entry can be displayed in the dialog by moving up or down through the entries by selecting the small up/down buttons just to the right of the **Entry No:** window. Any entry shown in the dialog can be deleted by selecting the **Delete** button and any entry can be overwritten with new values at any time. Once information has been added to the dialog, the information should be saved by selecting the **Save** button. Selecting **Save** stores the information displayed in the window to file.

Up to 40 pairs custom conversion units can be entered and saved in the Custom Setup dialog.

Miscellaneous

The Miscellaneous class contains several conversion and calculation modules that are different than the standard unit conversion classes. Some of these modules simply provide information while others allow the calculation of various related values. Selecting the *'Miscellaneous'* class will offer a sub-menu with numerous sub-classes, as listed following:

Abbreviations
Concrete
Conductors
Date Finder
Drill Size
Electricity
Electrical Symbols
Emergent Stem
Emissions
Exchange Rate Calculator
Formula Weight
Fractions
Fuel Economy
Function Parser
Inorganic Chemicals
Irrigation
Lumber
Mechanical Advantage
Meteorology
Moon Phase
Number Base Conversion
Nutrition
Paint
Resistor/Capacitor
Roman Numerals
Sieve Sizes
Solutions
Sound
System Information
Wire/Sheet Gauge

Electricity

Selecting the Electricity item brings up a window with a tabbed notebook with several pages that can be selected for help in calculating various electrical-related values. Pages of the note book can be selected by clicking the mouse on the tabs or by using the **Tab** key to move from tab to tab, then pressing **Enter** to select the page. Each page contains simple help text on the left side of the page with edit windows to enter values for the various parameters. When your data has been entered, click the **Solve** button to perform the calculation.

Available are Energy Cost, Ohm's Law, Horsepower (Direct Current), Horsepower (Single Phase), Horsepower (Two Phase, Two Wire), and Horsepower (Three Phase).

Energy Cost

The Energy Cost tab allows calculation of the cost of electrical energy use. Enter any three known values and press '**Solve**' to calculate the unknown value. Available entries are Kilowatts of electricity being used, hours of electrical use, cost per kilowatt-hour for electricity (what the power company charges you), and total cost for using that amount of electricity (what you pay the power company).

Ohm's Law

Allows calculation of electrical units using Ohm's Law. Enter any two known values and press '**Solve**' to calculate the two unknown values. Available entries are volts, amperes, resistance, and watts.

Horsepower (Direct Current)
Horsepower (Single Phase)
Horsepower (Two Phase, Two Wire)
Horsepower (Three Phase)

The Horsepower tabs allow calculation of various horsepower-related values. The four horsepower tabs offer calculations for various types of electrical motors, direct current motors, and motors powered by single phase, two phase, and three phase alternating current. Enter any three known values and press 'Solve' to calculate the unknown value. Available values are % Efficiency, volts, amperes, and horsepower. Note that alternating current motors also require a value for power factor.

As with most calculation windows in ProKon, the results of any calculation can be copied to the clipboard or to the file CONVERT.TXT by pressing the **Copy** button or sent to the Windows printer by pressing the **Print** button.

Inorganic Chemicals

Presents a list of inorganic chemicals which allows selection of specific chemicals. Select a chemical by clicking the mouse on a chemical or by using the arrow keys and the **Page Up** and **Page Down** keys to move through the list. Clicking **OK** or pressing the **Enter** key will show a window containing pertinent data on the chemical selected. Formula weight, solid form, color, approximate density, and melting point and boiling point. If no data is shown for a parameter, then no data is available for that element.

The list of element is *very* long, containing over a thousand inorganic compounds. To ease searching for a specific chemical, you may move through the list by progressively typing the name of the chemical. The letters already typed are shown in the small window at the bottom of the window. Pressing the **Esc** key will clear the search window. Using this feature allows you to move rapidly up and down the list.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Meteorology

Selecting the Meteorology class shows a window containing a tabbed notebook with various weather related calculations. As with the Electricity module, pages are selected with the mouse or keyboard. Also, to the left of each page are simple instructions prompting for the necessary data to perform a calculation. Enter the known data in the edit windows provided and press Solve to perform the calculation.

Available are Relative Humidity, Wind Chill, Dew Point, and Heat Index. Note that each window allows calculation in either degrees Celsius or degrees Fahrenheit. The list of element is *very* long, containing over a thousand inorganic compounds. To ease searching for a specific chemical, you may move through the list by progressively typing the name of the chemical. The letters already typed are shown in the small window at the bottom of the window. Pressing the **Esc** key will clear the search window. Using this feature allows you to move rapidly up and down the list.

Dew Point

Allows calculation of the dew point temperature if the percent relative humidity and the temperature are known. Enter the percent relative humidity and the air temperature in either degrees Celsius or degrees Fahrenheit to calculate the dew point in both degrees Celsius and degrees Fahrenheit.

Heat Index

Allows calculation of what is popularly known as the Heat Index. Heat index values are intended to approximate the effect of high temperatures and humidity on the human body. Also calculates the Summer Simmer Index, also intended to gauge the same effect of temperature and humidity. Both indices are often used to assess the effect of strenuous activity when the air temperature and/or humidity are high. Enter the percent relative humidity and the air temperature in either degrees Celsius or degrees Fahrenheit to calculate the heat index and summer simmer index.

Relative Humidity

Allows calculation of the approximate percent relative humidity if the dry bulb temperature (air temperature) and the wet bulb temperature are known. Select degrees Celsius or degrees Fahrenheit from the drop-down list at the left of the window, enter dry bulb and wet bulb temperatures. Percent relative humidity is calculated automatically. If the barometric pressure is known and is different from 760 mm Hg, it may be entered in the edit window at the lower left. (NOTE: Obtaining accurate wet bulb temperatures depend upon a number of important factors. Consult your hygrometer manual or a good text on technique.)

Wind Chill

Allows calculation of the Wind Chill. Wind chill is a measure of the effect of wind and cold temperatures on exposed flesh. As wind speed increases at low temperatures, the cooling effect on exposed flesh increases. Enter the wind speed (in miles per hour or kilometres per hour) and the temperature in either degrees Celsius or degrees Fahrenheit to calculate the wind chill in the selected temperature units and wind speed units. Select the temperature units and wind speed units from the drop-down menus at the left of the window. Note that wind speeds below 4 miles per hour or above 50 miles per hour give meaningless results. In addition, wind speeds below 8 kilometres per hour or above 80 kilometres per hour will also give meaningless

results.

In addition to calculating wind chills based on miles per hour wind speed, this module also allows wind speed to be entered in kilometres per hour. Select the wind speed units from the drop-down menu at the lower left of the window. This selection can be made at any point in the calculation, before or after the data has been entered in the appropriate spaces. If the data is already entered, the calculated wind chill will be updated corresponding to the wind speed units selected in the drop-down.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Nutrition

Presents a list of common food items. Each item can be selected with the mouse or keyboard and, as with the Inorganic Chemical module, the list allows sequential searches by simply typing the first few letters of the food item sought. Selecting a food item will show a window giving various nutritional information about the item.

Information shown on each food item includes portion size, portion weight, calories per portion, calories per gram, carbohydrates per portion, carbohydrates per gram, protein per portion, protein per gram, fat per portion, and fat per gram.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Sieve Sizes

Selecting this item shows a list of the common sieves used in testing materials, such as aggregates, sands, etc. Various parameters are given for each sieve size, such as the actual designation in the U. S. Standard Sieve Series, an alternate designation (in Imperial units), the opening size, and the size of the wire used to manufacture the sieve.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting the **Print** button sends the results to the Windows printer.

Wire/Sheet Gauge

Shows a window which allows display of the actual thickness in metric and Imperial units for many wire and sheet metal gauge systems. To the left of the window is a list which can be scrolled to display the various gauge designations. Selecting an item using either the mouse or keyboard will display the pertinent information in the panels to the right. Gauge systems shown are Brown and Sharpe, British Standard (Imperial), Birmingham, Washburn and Moen, Stubbs Wire, Stubbs Steel, and U. S. Standard Plate. The top panel shows Imperial data and the bottom panel shows metric data.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting the **Print** button sends the results to the Windows printer.

Number Base

The Number Base module allows conversion between number bases. Number formats available are decimal, hexadecimal, binary, and octal. Any number can be converted to any other base by simply entering the value in the edit window for the base that is known. As the number in entered, it is converted to the other bases automatically. There is a limit on the size of the number that can be converted for each base. The decimal size limit is 4,294,967,295, the hexadecimal size limit is FFFFFFFF, the binary size limit is 32 places, and the octal size limit is 37777777777. A warning is shown if the size limit is exceeded.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting the **Print** button sends the results to the Windows printer.

Solutions

The Solutions module permits easy calculation of various parameters for aqueous solutions. Selecting the Solutions button shows a tabbed notebook containing several pages that help in determining the amounts of solution (water) or solute (dissolved substance) required to prepare solutions of specific strength. Note that these calculations are intended for aqueous (water) solutions. The following notebook pages are available:

Concentrating - Solute to add

The Concentrating page allows the calculation of the amount of solute required to prepare a more concentrated solution from a less concentrated solution. If you have a weaker solution of some substance and wish to prepare a stronger solution of the same substance, a certain amount of data about the weaker solution is necessary. You must know the strength of the starting solution in percent, the weight of the weaker solution in pounds per gallon, the percent strength of the stronger solution you wish to prepare, and the purity of the substance (the solute) you will dissolve in the weaker solution to increase its strength. With this data available, enter it in the appropriate places on the page and press **Solve** to compute the amount of substance to dissolve in the weaker solution to make the stronger solution.

Diluting - Water to add

There are two Diluting pages in the Solution notebook. The Diluting - Water to add page allows the calculation of the amount of water that must be added to a solution of known strength in order to prepare a solution of known weaker strength. In order to perform this calculation, you will need to know how many gallons of the strong solution you have to dilute and the percent strength of the strong solution, the percent strength of the weaker solution you want to make, and the specific gravity of the strong solution. Enter this data in the appropriate spaces and press **Solve** to calculate the number of gallons of water you must add to the strong solution to make the weaker solution.

Diluting - Amount needed

This is the second of the Diluting pages in the Solution notebook. This page is used to determine the number of gallons of a more concentrated solution needed to produce a required number of gallons of a weaker or less concentrated solution. This calculation requires that you know the number of gallons of less concentrated solution you want, the specific gravity of this weaker solution, the specific gravity of the stronger solution you wish to create, the percent strength of the less concentrated solution, and the percent strength of the more concentrated solution. Entering this data and pressing **Solve** will calculate the gallons of stronger solution required.

Make Up - Water to add

This page of the Solution notebook allows the calculation of the amount of water to add to a given amount of solute (substance you are dissolving). Data required is the pounds of solute to dissolve, the percent strength of the solute, i.e., the purity of the substance you are dissolving, and the strength, in percent, of the solution you wish to make. Enter this data in the spaces provided and press Solve to calculate the amount of water to add to produce the required solution. Keep in mind that many substances will warm or cool water as they dissolve, so the volume of the solution will be affected until the solution cools.

In general, note that the solution strength being calculated in the Solutions notebook are on a

weight/weight basis and that the temperature of the solutions must be maintained, where noted. The edit windows where data is entered are purposely limited in the values that may be entered. This does not mean that data can't be entered that will compute to nonsense values. In many cases, computed values that make no sense are flagged to the user, but not necessarily in all cases. For example, it makes no sense to enter percent strength for a weak solution that is greater that for the strong solution.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting the **Print** button sends the results to the Windows printer.

Concrete

The Concrete Calculator allows the calculation of the amount of concrete in cubic yards or cubic meters required to pour a given size of structure. The data required to perform the calculation is entered into the appropriate spaces and the amount of concrete mix required is automatically calculated when sufficient data has been entered.

There are two pages available in the tabbed notebook, Imperial (English) or Metric. Select the desired tab to calculate the quantity of concrete required in the preferred units.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Fuel Economy

This selection allows the calculation of fuel economy in either Imperial (English) or metric units. Enter the number of miles and the number of gallons used to automatically calculate the fuel economy. Alternatively, enter the number of litres and the number of kilometers to perform the calculation. Entry of these two values can be mixed, for example, you may enter number of miles and number of litres used. The Imperial and metric calculations are performed simultaneously and automatically as the data is entered.

The lower part of the window allows calculation of the amount of fuel required for an entered number of miles based on the fuel consumption calculated in the upper part of the window. In other words, enter the number of miles (or kilometers) and number of gallons (or number of litres) used in the upper part of the window. Then, enter the number of miles (or kilometers) in the lower part of the window to calculate the amount of fuel required for that distance.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Lumber Measure

This selection allows the calculation of the number of board feet of lumber contained in a given quantity of dimension lumber and allows the calculation of the cost of a given quantity of lumber of various sizes. Selection of these types of calculations is made by selecting one of the two tabs at the top of the screen.

To make Board Feet calculations, select the proper tab. Enter the nominal thickness in inches (or centimeters), the nominal width in inches (or centimeters), and the actual length of the lumber. The number of board feet of lumber is calculated automatically when sufficient data has been entered in the spaces provided to perform the calculation.

The number of board feet contained in a number of pieces of lumber of a given dimension can be calculated by entering the number of pieces in the lower space provided. The total number of board feet will be calculated based on the nominal dimensions entered in the upper part of the window and the number of pieces of that dimension entered in the lower part of the window.

Lumber costs are computed by selecting the Lumber Cost tab. Enter the length, cost per board foot, and number of pieces for each lumber size required. As you enter the data, the Total Cost at the upper left of the window is updated. The Total Cost shown is the total cost for all lumber for which data is entered. If no data is entered for a given dimension of lumber, no cost is totaled for that dimension. All data entered can be cleared by selecting the **Clear** button.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Paint Calculation

This selection allows the calculation of the amount of paint required to coat a given number of square feet (or square meters) at a given wet or dry film thickness in mils or millimeters. First, the units to be calculated must be selected. Do this by checking the appropriate check box next to the units you desire to calculate. Then, enter the data into the appropriate spaces to perform the calculation.

For example, if you desire to calculate the gallons of paint required to achieve a wet film thickness of 3 mils over 500 square feet of surface, check the box to the left of the "Gallons Required" item and then enter the wet film thickness and the number of square feet in the appropriate spaces. When sufficient data has been entered, the number of gallons will be calculated automatically.

In order to calculate the amount of paint required or the surface area that can be covered with a given amount of paint, based on the dry film thickness, you must know the percent volume solids of the paint you are using. This can usually be obtained from the paint manufacturer, the store where you purchased the paint, or may be listed on the paint container. When you enter the percent volume solids in the appropriate space, ProKon will attempt to calculate the remaining values based on the order that you enter the values.

Note that Imperial (English) and metric values may be entered interchangeably. When you enter a number of square feet, the number of square meters is calculated and displayed automatically. The same is possible for mils/millimeters and gallons/litres.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Fractions

The Fraction module allows calculations between common fractions and their decimal values. Given a decimal value, the fractional representation can be calculated to the desired accuracy. Given a fractional value, the corresponding decimal value can be easily calculated.

For example, if you desire to determine the fractional value, to the nearest 1/64 inch, of the decimal value 6.12345, simply set the drop-down box to the left of the Fraction window to 1/64 and enter the value 6.12345 in the ‘Decimal value:’ edit box. As you enter the decimal value, the fractional value will be displayed in the ‘Fraction:’ edit box. Note that to the right side of the ‘Fraction:’ edit box any remainder from the conversion to a fraction will be displayed. If a remainder is displayed, this indicates that the decimal value could not be converted evenly to the fractional accuracy selected. The above conversion would give a fractional value of 6 7/64 with a remainder of 0.014075.

Alternately, if you desire to determine the decimal value of 6 7/64, simply enter the value as shown in the ‘Fraction:’ edit box. (There should always be one space between the whole number part and the fractional part.) The converted value will appear in the ‘Decimal value:’ edit box as you type the fractional value. In this example, the value shown will be 6.109375 Note that when entering fractional values, the drop-down box value is ignored and fractions with any denominator can be entered.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Roman Numerals

This module allows the calculation of Roman numerals from decimal values and the reverse. As an added bonus, simple math (+, -, x, and ÷) can also be performed on Roman numerals.

As an example, if you desire to calculate the Roman numeral equivalent of the decimal value 1998, simply enter the value 1998 in the either of the top two 'Decimal value:' edit boxes on the right side of the window. As you enter the decimal value, the Roman numeral representation will be automatically displayed in the corresponding 'Roman Numeral:' edit box on the left of the window.

In the same manner, the equivalent decimal value of a given Roman numeral can be calculated. Simply enter the Roman Numeral value in either of the top two 'Roman Numeral:' edit boxes on the left side of the window. As you enter the Roman numeral, the decimal value will be displayed in the corresponding 'Decimal Value:' edit box on the right side of the window.

Simple math operations can be performed on either Roman numeral or decimal values. Enter a Roman numeral in the top left 'Roman Numeral:' edit box, set the drop-down box in the center of the window to the desired math operation, then enter the second Roman numeral in the other 'Roman Numeral:' edit box. As you enter the second value, the operation will be performed and the result will be displayed in the bottom edit boxes. It is also possible to enter in mixed format, entering one value in Roman numeral form and the other in decimal form.

There are certain conventions used to represent Roman numerals in ProKon. Normally, values greater than 1000 are shown as a Roman numeral with a bar over the top of the numeral. Since ProKon cannot show a numeral of this type, a lower case letter is substituted instead. For example, if you wish to enter the value 1,000,000, the equivalent Roman numeral would be an M with a bar over the top. ProKon will accept this as a lower case letter 'm'. Essentially, the bar over the Roman numeral indicates a multiplier of 1,000, so an 'M' with a bar over the top is equivalent to 1,000 X 1,000 which equals 1,000,000.

There are limitations in representing Roman numerals. Very large Roman numerals are difficult to represent. Therefore, ProKon limits you to Roman numerals no greater than mmmmmmmmmcmxcMxCMXCIX (equivalent of decimal 9,999,999) and to decimal values no greater than 9,999,999.

Note also that ProKon attempts to follow convention when showing Roman numerals. When the user enters a Roman numeral in a way that does not follow convention, ProKon will attempt to make the conversion. However, be aware that ProKon cannot always make sense of what you enter if you stray too far from convention. For those who wish to know more regarding convention for showing Roman numerals, an explanation follows.

In Roman numerals, I = 1, V = 5, X = 10, L = 50, C = 100, D = 500, M = 1000. A lesser number before a greater number is negative. For example, an I before V, is -1, not +1. Therefore, IV = 4, IX = 9, XC = 90, CD = 400, etc. Things like IIX or IC are not allowed. You are only allowed one consecutive negative symbol and the negative I can only occur before a V or an X. Likewise, an X cannot occur before a D or an M. Also, a VX would be illogical since it is also written as V, which is simpler.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Formula Weight Calculation

This module allows the calculation of the formula weight of a chemical element or chemical compound. By simply entering the chemical formula for the compound using standard chemical notation, the formula weight can be calculated.

As an example, if you desire to calculate the formula weight of the compound Aluminum Ferrocyanide hydrate, enter the formula in the 'Chemical Formula:' edit box as Al4(Fe(CN)6)2 • 17H2O. As you enter the formula, ProKon will calculate the formula weight of the compound and display the value in the 'Formula Weight:' edit box.

Note that ProKon follows some simple conventions for the entry of chemical formula. Basically, formulae must be entered using standard chemical notation. As shown in the example above, the entry of waters of hydration are allowed. Waters of hydration should always follow the 'dot' notation as shown in the above example. When using the Formula Weight Calculation module, 'dot' notation is entered with the period key on the keyboard and up to one space is allowed before and after the dot.

Standard chemical notation numbers with subscripts are entered using the numbers on the keyboard or number pad. ProKon determines if a number with subscripts is needed and will substitute the subscript when appropriate. Up to two levels of parenthesis are allowed in ProKon and should be sufficient for nearly any normal chemical formula. You should **always** use a subscript after a closing parenthesis so that ProKon can establish the correct multiplier for the total value inside the parenthesis, even if the multiplier is a 1. This is not usually a problem since you would only use a pair of parenthesis if your intent is to show a multiple quantity of the chemical species inside the parenthesis. However, some do not follow this rule explicitly.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Twist Drill Sizes

The Twist Drill Size module gives information on various sizes of drill bits, both letter drills and number drills. On the left of the window is a scrolling list that can be used to select the drill bit size to show information on that bit in the windows to the right side of the screen. Information such as diameter, area of bit cross section, and the SAE screw size for which that particular bit would be used to produce a pilot hole for tapping.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Resistor/Capacitor Calculation

This module allows the calculation of resistance and capacitance values for tubular resistors and capacitors from standard color coding. Across the center of the window are groups of color coded selection buttons. The buttons in each group represent the possible color bands for a section of a resistor and/or capacitor.

For instance, the first group of color buttons on the left is labeled 'Temperature Coefficient'. Each color button in the Temperature Coefficient group is connected to a specific color band on the graphical depiction of a tubular capacitor on the lower section of the window. By clicking one of these color buttons with the mouse, the corresponding band on the capacitor will become the selected color. In the case of the Temperature Coefficient group, the small window to the left of the capacitor indicates the temperature coefficient corresponding to the color band selected. (Note that resistors do not have color bands for temperature coefficient, therefore, this group does not connect to the graphical depiction of the resistor at the top of the window.)

Working from the Temperature Coefficient group on the left of the window toward the last group on the right of the window, the color coding can be developed for a resistor or capacitor. The second group is used to select the first significant figure of the actual resistor or capacitor value, the third group selects the second significant figure, the fourth group selects the multiplier, and the last group selects the 'Tolerance' color band. As the color bands are built onto the resistor or capacitor, the resistance value in ohms and/or the capacitance value in picofarads (pF) is show in the corresponding windows. The last band on either a resistor or capacitor is usually the tolerance indicator. (There are some resistors that do not show a tolerance color band - these default to a +/- 20% tolerance.)

Note that not all colors are possible on both resistors and capacitors. In these cases, the corresponding color coded buttons do not connect to the resistor or capacitor. No connection indicates that the color is not possible and, in that case, the value will become the default for that item.

Following are tables showing the possible resistance and capacitance color codes:

Resistor

Color	1st & 2nd Sig. Fig.	Multiplier	+/-Tolerance
No Color			20
Black	0	1	20
Brown	1	10	---
Red	2	100	---
Orange	3	1,000	---
Yellow	4	10,000	---
Green	5	100,000	5
Blue	6	1,000,000	---
Violet	7	10,000,000	---
Gray	8	0.01	---
White	9	0.1	10

Silver	--	0.01	10
Gold	--	0.1	5

Capacitor

Color	Temp. Coeff .	1st & 2nd Sig. Fig.	Multiplier	+/- Tolerance*
Black	0	0	1	20 / 2.0
Brown	-30	1	10	1 / 0.1
Red	-80	2	100	2 / ---
Orange	-150	3	1,000	--- / ---
Yellow	-220	4	---	--- / ---
Green	-330	5	---	5 / 0.5
Blue	-470	6	---	--- / ---
Violet	-750	7	---	--- / ---
Gray	+30	8	0.01	--- / 0.25
White	+500	9	0.1	10 / 1.0

* Second % Tolerance values apply if capacitance value is less than 10 pF.

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Irrigation Calculation

The Irrigation module allows the calculation of various values related to irrigation or the application of water to crops, pastures, yards, etc. Possible irrigation parameters are grouped into four general classes of information. Three of these values must be know in order to calculate the fourth.

The first group consists of various values related to the rate of delivery of the irrigation water. For instance, the gallons per hour that the irrigation system is capable of delivering or the cubic feet per minute that the system can deliver. The second group consists of 'area' related values and correspond to the area that is being irrigated. For instance, the number of square feet or acres to be irrigated. The third group gives the amount of water to be applied to the area shown in the 'Area' group. Possible values are inches of water or centimetres of water. The fourth and last group gives the amount of time (how may minutes) required to deliver the amount of water shown (how many inches of rain) to the area shown (how many acres) at the rate of water delivery that the irrigation system is capable of delivering (for instance, gallons per hour).

Note that only one value must be enter in a group. For instance, if you enter a value for gallons per hour in the Rate of Water Delivery group, all of the other values in that group will be automatically calculated as you enter a value for gallons per hour. The same is true for the other groups. Once you have entered one value in any three of the groups, by clicking on the 'Solve' button, the values in the fourth group will be calculated.

For example, by entering a value of 3630 cubic feet per hour in the 'Rate of Water Delivery' group, a value of 3630 square feet in the 'Area to Water' group, and a value of 12 inches in the 'Amount of Water to Apply' group, and then clicking the 'Solve' button, the three values in the 'Irrigation Time' group will be automatically calculated giving 1 Hour, 60 Minutes, and 3600 Seconds.

NOTE: The 'Clear' button is used to clear all values from all groups. In order to perform a calculation, three groups must have at least one value entered in each group and the fourth group (the one you wish to calculate) must show zero (0).

As with other calculation windows in ProKon, selecting the **Copy** key sends the results of the calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the results to the Windows printer.

Moon Phases

The Moon Phase module shows a considerable amount of data about the moon, as well as a few other aspects of the relationship of the earth and sun. When the module is opened, the system time and date is shown in appropriate spaces and the phase of the moon for that date and time is displayed graphically and as a percentage at the top left of the window. The date may be changed by either entering a date in the space provided or by using the drop-down calendar to change the date. The time may be changed by entering a specific time in the space provided or by changing the time incrementally with the spin control to the right of the time entry field. The time is shown in standard notation as well as in Julian time and universal time (Greenwich Mean Time).

Part of the lunar calculation uses the longitude and latitude of the location you prefer. You may change the longitude and latitude to values which you prefer and the values will be saved between sessions. Immediately to the right of the longitude entry window is a "radio button" for selecting the direction from zero degrees longitude, East or West.
Likewise, immediately to the right of the latitude entry window is another set of "radio buttons" for selection of direction of the latitude from the equator, North or South. A combination of the longitude and latitude and direction "radio buttons" allows you to select any location on earth. Latitude and longitude can be entered in degrees and minutes. You will notice that seasons as well as the appearance of the lunar phase are reversed for locations south of the equator.

The lunar and solar data displayed is as follows:

Last new moon
Next new moon
First quarter
New moon
Last quarter
Last lunation
Next lunation
Age of moon
Spring equinox
Autumn equinox
Summer solstice
Winter solstice
Time of moon rise
Time of moon transit
Time of moon set
Time of sun rise
Time of sun transit
Time of sun set
Next lunar eclipse
Type of next lunar eclipse
Next solar eclipse
Type of next solar eclipse
Next perigee of moon
Next apogee of moon
Distance of moon from earth in kilometres

Distance of moon from earth in miles
Distance of moon from earth in earth radii
Time that moon subtends
Distance of sun from earth in kilometres
Distance of sun form earth in miles
Distance of sun from earth in earth radii
Time that sun subtends

Note: The above times are normally displayed in universal time. The algorithms used to perform lunar calculations are accurate enough for most practical uses. However, slight errors in lunar and solar positions are possible and are due to limitations in data input. Toward the center of the Moon Phase window is a drop-down list for selecting how you wish the time to be displayed. Possibilities are Julian time, Universal time (Greenwich Mean Time), or Standard Time.

Times are corrected for the time zone corresponding to the longitude and latitude entered. Times are also corrected for daylight savings time. In order for both of these corrections to be displayed accurately, you must have the time zone and daylight savings time information entered into Windows correctly. This information is entered in the Windows Control Panel, Date/Time configuration utility. Date/Time can be accessed by first selecting ‘‘Settings’’ from the Start menu, then select Control Panel, and finally Date/Time. See your Windows documentation or help for further details.

As with other data windows in ProKon, selecting the **Copy** key sends the information currently displayed in the module to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the information to the Windows printer.

Abbreviations and Acronyms

The Abbreviations and Acronyms module shows the correct abbreviation or acronym for a number of scientific words and phrases. A word or phrase can be selected from the list at the top and the corresponding abbreviation or acronym will automatically be shown in the list at the bottom. Alternatively, an abbreviation or acronym may be selected from the lower list and the upper list will give the word or term corresponding.

An item may be selected from either list by beginning to type the abbreviation or term sought. As you enter the characters, the selection bar will move to the closest match in the list.

The term and abbreviation or acronym currently selected will always be displayed in the upper part of the window.

As with other data windows in ProKon, selecting the **Copy** key sends the abbreviation or acronym currently selected in the lists to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the information to the Windows printer.

Function Parser

The Function Parser module allows you to enter and compute complex mathematical equations. Using a large number of built-in mathematical operators, the user can develop simple or very complex equations, using a large number of predefined or user-defined variables. Equations are entered into the uppermost edit area provided and clicking the 'Solve' button automatically calculates the result and displays it in the space provided. Following is an alphabetical listing of the mathematical operators that can be used in equations:

-	Subtract
*	Multiply
/	Divide
+	Add
abs()	Absolute value
acos()	Arccosine
acosec()	Arccosecant
acosech()	Hyperbolic arccosecant
acosh()	Hyperbolic arccosine
acot()	Arccotangent
acoth()	Hyperbolic arccotangent
asec()	Arcsecant
asech()	Hyperbolic arcsecant
asin()	Arcsine
asinh()	Hyperbolic arcsine
atan()	Arctangent
atanh()	Hyperbolic arctangent
ceil()	Ceiling function
cos()	Cosine
coscube()	Cosine cubed
coscuberad()	Cosine cubed of radians
cosec()	Cosecant
coseccube()	Cosecant cubed
coseccuberad()	Cosecant cubed of radians
cosech()	Hyperbolic cosecant
cosechcube()	Hyperbolic cosecant cubed
cosechsq()	Hyperbolic cosecant squared
cosecrad()	Cosecant of radians
cosecsq()	Cosecant squared
cosecsqrad()	Cosecant squared of radians
cosh()	Hyperbolic cosine
coshcube()	Hyperbolic cosine cubed
coshsq()	Hyperbolic cosine squared
cosrad()	Cosine of radians
cossq()	Cosine squared
cossqrad()	Cosine squared of radians
cot()	Cotangent
cotcube()	Cotangent cubed
cotcuberad()	Cotangent cubed of radians
coth()	Hyperbolic cotangent

cothcube()	Hyperbolic cotangent cubed
cothsq()	Hyperbolic cotangent squared
cotrad()	Cotangent of radians
cotsq()	Cotangent squared
cotsqrad()	Cotangent squared of radians
diff(,)	Difference (requires two values)
divis(,)	Division (requires two values)
exp()	Exponential
floor()	Floor function
fth()	Fourth power
heav(,)	Heaviside function (requires two values)
hypot(,)	Hypotenuse (requires two values)
idiv(,)	Division of integers (requires two values)
int()	Truncate (delete decimal portion)
intpower(,)	Integer power (requires two values)
leg(,)	Leg (requires two values)
ln()	Natural logarithm
log()	Logarithm base 10
log2()	Logarithm base 2
logn(,)	Logarithm base 'n' (requires two values)
max(,)	Maximum value (requires two values)
min(,)	Minimum value (requires two values)
mod(,)	Modulo (requires two values)
neg()	Negate
ph()	Phase function
pi	Returns pi (3.14159...)
power(,)	Power (requires two values)
prod(,)	Product (requires two values)
radacos()	Arccosine returned in radians
radacosec()	Arccosecant returned in radians
radacot()	Arccotangent returned in radians
radasec()	Arcsecant returned in radians
radasin()	Arcsine returned in radians
radatan()	Arctangent returned in radians
random()	Random function
rnd()	Random (plus argument)
rndlim()	Random (with limit)
root(,)	Root (required two values)
sec()	Secant
seccube()	Secant cubed
seccuberad()	Secant cubed of radians
sech()	Hyperbolic secant
sechcube()	Hyperbolic secant cubed
sechsq()	Hyperbolic secant squared
secrad()	Secant of radians
secsq()	Secant squared
secsqrad()	Secant squared of radians
sign()	Sign function
sin()	Sine
sincube()	Sine cubed
sincuberad()	Sine cubed of radians

sinh()	Hyperbolic sine
sinhcube()	Hyperbolic sine cubed
sinhsq()	Hyperbolic sine squared
sinrad()	Sine of radians
sinsq()	Sine squared
sinsqrad()	Sine squared of radians
sqr()	Square
sqrt()	Square root
sum(,)	Sum (requires two values)
tan()	Tangent
tancube()	Tangent cubed
tancuberad()	Tangent cubed of radians
tanh()	Hyperbolic tangent
tanhcube()	Hyperbolic tangent cubed
tanhsq()	Hyperbolic tangent squared
tanrad()	Tangent of radians
tansq()	Tangent squared
tansqrad()	Tangent squared of radians
thr()	Third power
trunc()	Truncate (delete decimal portion)
zero()	Returns logical 0 or 1

Note that all operators are shown with a set of parenthesis or brackets. This set of brackets indicates that each operator will perform the mathematical operation indicated on the value placed inside the brackets. This value can be a constant value, such as a number, a variable value defined as a 'Predefined Variable' or a 'User Defined Variable', or another operator. For example, an equation such as

sin(45)+ tan(min(sqr(23.45),thr(a))*sum(b,tansq(c))

would be a valid equation. As you can see, nesting of operators is permitted and can be used to a considerable extent. Equations entered in the function parser are limited to 255 characters, including spaces. Spaces are not required in any equation and, in fact, while spaces may make some equations more readable and they can be used, they are not required by the parser and are deleted from the equation internally when the equation is solved. If you need to enter an equation that reaches the 255 character limit, try to eliminate the use of any spaces in order to allow for the maximum length equation.

Most errors in constructing an equation, as well as errors in syntax, errors that occur when a value computes to an impossible result, and errors that are the result of illegal math operations, will be reported when the user attempts to 'Solve' the equation. At times, the error message will give an exact description of where the problem is, at other time the error message will only tell you what type of error has occurred and will leave it up to the user to find and correct the condition that caused the error. For instance, entering a function in an equation such as acos(-555) will trigger an error message telling you that you cannot determine the inverse cosine or arccosine of a number outside the allowed range for cosine. It is up to the user to determine where this error is occurring in the equation entered. Be aware that the function parser cannot catch all errors and it is up to the user to use good math practice when developing an equation.

The function parser in ProKon will accept a large variety of functions, as shown above. Once a user becomes familiar with the module, the syntax of many of the functions will become familiar

and easy to remember. When first using the parser module, it is best to use the "Select Operators" drop down list just below the equation editing window. Clicking the small down arrow to the right of the list will drop down a scrollable list of all of the functions available within the parser. Simply scroll down to the function you wish to enter into the equation and click on that function. The function will automatically be added to the equation at the spot where the edit cursor is located. Usually this will be at the end of the equation but may be at any point in an equation that has already been entered. It is important to be sure the cursor is at the location in the equation where you want the function to appear before you select the function from the drop down list.

When the function is added, the space(s) where the argument(s) are entered will be empty and it is up to the user to supply the necessary values in these areas. Values placed here may be constants (i.e., 25.678) or variables (i.e. x where "x" has been defined and given a value in the variable lists, or another function itself, as in power(sin(a), sqr(cos(b))). If function arguments are left blank or are entered incorrectly, an error will result. NOTE: Some functions require one argument and some functions require two arguments. If a function requires two arguments, the drop down list will indicate this, both in the description as well as in the template by showing a comma in the value area, such as power(,). The comma indicates that the function requires two arguments which must be separated by a comma.

Clicking on any of the functions listed above will give a brief description of that function.

As with other data windows in ProKon, selecting the **Copy** key sends the equation, the result of the calculation, and the values of each variable to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the same information to the Windows printer.

Calculates the absolute value. Absolute value is the non-negative value sometimes denotes as |n|.

Calculates the inverse cosine of the argument and returns degrees. (If y is the cosine of theta, then theta is the arccosine of y)

Calculates the inverse cosecant of the argument and returns degrees. (If y is the cosecant of theta, then theta is the arccosecant of y)

Calculates the inverse hyperbolic cosecant of the argument. (If y is the hyperbolic cosecant of theta, then theta is the hyperbolic arccosecant of y)

Calculates the inverse hyperbolic cosine for a value. (If y is the hyperbolic cosine of theta, then theta is the hyperbolic arccosine of y)

Calculates the inverse cotangent for a value. (If y is the cotangent of theta, then theta is the arccotangent of y)

Calculates the inverse hyperbolic cotangent for a value. (If y is the hyperbolic cotangent of theta, then theta is the hyperbolic arccotangent of y)

Calculates the inverse secant for an argument and returns degrees. (If y is the secant of theta, then theta is the arcsecant of y)

Calculates the inverse hyperbolic secant for an argument. (If y is the hyperbolic secant of theta, then theta is the hyperbolic arcsecant of y)

Calculates the inverse sine of an argument and returns degrees. (If y is the sine of theta, then theta is the arcsin of y)

Calculates the inverse hyperbolic sine for a value. (If y is the hyperbolic sine of theta, then theta is the hyperbolic arcsine of y)

Calculates the inverse tangent for a value and returns degrees. (If y is the tangent of theta, then theta is the arctangent of y)

Calculates the inverse hyperbolic tangent of the argument. (If y is the hyperbolic tangent of theta, then theta is the hyperbolic arctangent of y)

Calculates the ceiling function for the argument. Returns the integer value that is at least as large as the value given. Example: ceil(1) = 1, ceil(0.01) = 1, ceil(1.1) = 2, ceil(23.15) = 24.

Calculates the cosine of the argument given in degrees.

Calculates the cube of the cosine of the argument given in degrees. Example: coscube(x) = cos(a) x cos(a) x cos(a).

Calculates the cosine cubed of the argument given in radians.

Calculates the cosecant of the argument given in degrees.

Calculates the cube of the cosecant of the argument given in degrees.

Calculates the cube of the cosecant of the argument given in radians.

Calculates the hyperbolic cosecant of the argument.

Calculates the cube of the hyperbolic cosecant of the argument.

Calculates the square of the hyperbolic cosecant of the argument.

Calculates the cosecant of the argument given in radians.

Calculates the square of the cosecant of the argument given in degrees.

Calculates the square of the cosecant of the argument given in radians.

Calculates the hyperbolic cosine of the argument.

Calculates the cube of the hyperbolic cosine of the argument.

Calculates the square of the hyperbolic cosine of the argument.

Calculates the cosine of the argument given in radians.

Calculates the square of the cosine of the argument given in degrees.

Calculates the square of the cosine of the argument given in radians.

Calculates the cotangent of the argument given in degrees.

Calculates the cube of the cotangent of the argument given in degrees.

Calculates the cube of the cotangent of the argument given in radians.

Calculates the hyperbolic cotangent of the argument.

Calculates the cube of the hyperbolic cotangent of the argument.

Calculates the square of the hyperbolic cotangent of the argument.

Calculates the cotangent of the argument given in radians.

Calculates the square of the cotangent of the argument given in degrees.

Calculates the square of the cotangent of the argument given in radians.

Calculates the difference between two arguments. For example, diff(a,b) where a = 29 and b = 25 computes to the value 4. This function requires two values.

Calculates the quotient of two arguments. For example, divis(a,b) where a = 25 and b = 100 computes to the value 0.25. This function required two arguments or values.

Calculates the exponential of the argument, x. The exponential is the value of e raised to the power of x, where e is the base of the natural logarithms.

Calculates the floor function for the argument. Returns the largest integer that is less than or equal to the argument. For example: floor(1) = 1, floor(0.01) = 0, floor(1.1) = 1, floor(23.15) = 23.

Calculates the fourth power of the argument

Calculates the Heaviside function for the argument. For example, if $x < 0$ then heav(x) = 0, if $x = 0$ then heav(x) = ½, and if $x > 0$ then heav(x) = 1.

Calculates the hypotenuse for the arguments. Given two arguments for the length of the shorter legs of a right triangle, a and b, then hypot(a,b) computes to the length of the hypotenuse.

Calculates the integer division of the two arguments. If the arguments are not whole numbers, they are truncated to the integer portion and the quotient is computed. For example, idiv(1.2,2.3) = ½ = 0.5.

Returns the integer portion of the argument by truncating any decimal portion.

Calculates the integer power of two arguments. For example, intpower(4.333,2.123) = 16.

Calculates one short leg of a right triangle given the length of the hypotenuse and the length of the other leg. This function requires two arguments and the hypotenuse must be given in the first position.

Calculates the natural logarithm of the argument.

Calculates the logarithm to the base 10 of the argument.

Calculates the logarithm to the base 2 of the argument.

Calculates the logarithm of the arguments to the base given. The base required must be given in the second position. For example, logn(23.45,10) = 1.3701428.

Returns the maximum of the two arguments given. For example, max(sqr(3),sqr(2)) = 9.

Returns the maximum of the two arguments given. For example, max(sqr(3),sqr(2)) = 9.

Calculates the minimum of the two arguments given. For example, min(sqr(3),sqr(2)) = 4.

Calculates the modulo of the argument. Mod returns the remainder obtained by dividing its two arguments. For example, I mod J = I - (I div J) * J.

Calculates the negative of the argument. For example, neg(5) = -5, neg(-8) = 8, or neg(0) = 0.

Calculates the phase of the argument.

Returns the value of pi (3.14159...). This function requires no arguments.

Calculates the value of the first argument raised to the power of the second argument. For example, power(4,3) = 64.

Calculates the product of the two arguments given. For example, prod(sqr(3),sqrt(16)) = 36.

Calculates the arccosine of the argument and returns radians.

Calculates the arccosecant of the argument and returns radians.

Calculates the arccotangent of the argument and returns radians.

Calculates the arcsecant of the argument and returns radians.

Calculates the arcsine of the argument and returns radians.

Calculates the arctangent of the argument and returns radians.

Returns a random number within the range 0 <= a < 1.

Returns a random number within the range 0 <= a < 1 multiplied by the argument given.

Returns a random number within the range 0 <= a < range, where range is given by argument.

Calculates the root of the first argument to the degree given in the second argument. For example, root(64,3) = 4.

Calculates the secant of the argument given in degrees.

Calculates the cube of the secant of the argument given in degrees.

Calculates the cube of the secant of the argument given in radians.

Calculates the hyperbolic secant of the argument.

Calculates the cube of the hyperbolic secant of the argument.

Calculates the square of the hyperbolic secant of the argument.

Calculates the secant of the argument given in radians.

Calculates the square of the secant of the argument given in degrees.

Calculates the square of the secant of the argument given in radians.

Calculates the sign of the argument. For example, sign(-4.56) = -1, sign(4.56) = 1, and sign(0) = 0.

Calculates the sine of the argument given in degrees.

Calculates the cube of the sine of the argument given in degrees.

Calculates the cube of the sine of the argument given in radians.

Calculates the hyperbolic sine of the argument.

Calculates the cube of the hyperbolic sine of the argument.

Calculates the square of the hyperbolic sine of the argument.

Calculates the sine of the argument given in radians.

Calculates the square of the sine of the argument given in degrees.

Calculates the square of the sine of the argument given in radians.

Calculates the square of the argument.

Calculates the square root of the argument.

Calculates the sum of the two arguments.

Calculates the tangent of the argument given in degrees.

Calculates the cube of the tangent of the argument given in degrees.

Calculates the cube of the tangent of the argument given in radians.

Calculates the hyperbolic tangent of the argument.

Calculates the cube of the hyperbolic tangent of the argument.

Calculates the square of the hyperbolic tangent of the argument.

Calculates the tangent of the argument given in radians.

Calculates the square of the tangent of the argument given in degrees.

Calculates the square of the tangent of the argument given in radians.

Calculates the third power of the argument.

Returns the integer portion of the argument by truncating the decimal portion (if any). The returned value is not rounded. For example, trunc(1.1111) = 1, trunc(1.99999) = 1, and trunc(5) = 5.

Returns 0 if argument equals zero, returns 1 if argument equals any other value. For example, zero(-2.5) = 1, zero(6.7) = 1, zero(0.234) = 1, zero(-0.0001) = 1, and zero(0) = 0.

System Information

The System Information module displays various kinds of information about your computer system. Nearly any type of information you might need is available in this module.

The System Information window contains a familiar tabbed notebook type of display. Each tabbed page contains related information regarding the topic shown on the tab. Select tabs by clicking on the tab with the mouse. A short synopsis of the information available in this module is as follows:

Workstation

The Workstation page displays the machine name and name of the user which identifies the computer or workstation. The name, copyright, date, and extended information is retrieved from the BIOS chip. Also, the time the computer or workstation was last booted (started) and the length of time the computer has been running since the last time it was booted.

Three buttons titled "Num Lock", "Caps Lock", and "Scroll Lock" show the status of these keyboard toggle keys. If one of the keys is toggled in the "on" position, that button will be lime green; if toggled "off", the button will be a normal gray. This might come in handy if the small indicator lights on your keyboard were defective and you needed to determine the status of any of the keys.

Window 95/Windows NT

The Windows tab itself will display which operating system is running on the computer. For instance, if you are running Windows 95, the tab text will indicated this. The same goes for Windows NT.

At the top of the tab page, the Windows version number is displayed. Just below the version is displayed the serial number, registered user name, organization the operating system is registered to, and the time zone that the computer is set to operate in. The "Folder" group shows the folder the operating system is installed into, the location of the system folder, and the location of the Windows temp folder.

There is also available a button titled "Environment". Pressing this button will pop up a small window which displays the settings for various environment variables such as the path, the comspec, sound card settings, and the prompt string/

CPU

The CPU page displays the type of central processing chip installed in the computer as well as the model identification of the CPU. A scrollable list at the bottom of the page shows various features of the CPU and indicates whether these features are turned on or available on your computer.

Memory

The group box at the top of the Memory notebook page shows totals for physical, page file, and

virtual memory. Also, the amount of free memory for all three types of memory is displayed.

In the center of the page a Memory utilization colored indicator bar gives a graphical representation of the percentage of available memory types that is being used on your system. This indicator can be used to judge how much of your available memory resources is being consumed by the programs (including the operating system) that you are running on your system.

At the bottom of the page, additional memory properties are displayed, such as the allocation granularity, the application address range, and the page size of memory in bytes.

Display

The Display page gives information about the type of video display used on your computer. The type of adapter, the adapter properties, BIOS, and display capabilities are shown.

At the bottom of the notebook page are five buttons titled "Curve", "Line", "Polygon", "Raster", and "Text". Pressing one of these buttons will pop up a small window containing a large amount of information regarding the capabilities and settings of your video system.

APM

APM stands for Advanced Power Management. This information is primarily for use with laptop systems which may operate on battery power. Battery charge status, battery full life time and battery life time remaining are shown.

The amount of power remaining in the battery is also shown graphically with a colored progress indicator bar.

Drives

The Drives tab page presents useful information regarding the disk drives available on your system. Information is retrieved on removable disks, i.e., floppy drives, hard disk drives, and CD-ROM drives. If it's assigned a drive letter, the drive will be included as an entry in the drop-down list at the top of the page. If a label has been assigned to the drive, the label text will be shown within the brackets to the right of the drive letter in the list.

By clicking on the down arrow to the right of the drop-down list and selecting one of the drive letters shown on the list, information for that drive will be displayed in the lower portion of the page. The properties for the selected drive are shown just below the drop-down pick list and indicate the type of drive, the UNC, and the serial number of the drive. Information is displayed for the capacity of the drive, the free space on the drive, the number of bytes per sector, the number of sectors per cluster, the total number of clusters on the drive and the number of free clusters on the drive. Also, the amount of free space is shown graphically in the bar graph at the center of the page.

The lower section of the page shows various parameters associated with the drive selected. If support is available on the drive for a specific parameter, the check box to the left of the parameter will be checked.

Engines

The Engines page shows which database engines are installed and operating on your computer as well as the DirectX version and implementations that have been installed.

Printers

The Printers page displays a list of the printers installed on your system. Pressing the "Properties" button with one of the printers on the list highlighted displays a printer setup window which enables the user to view and alter the printer settings for the associated printer.

Devices

This page shows two lists, the first of which gives all of the devices that are connected to your system. Examples of devices listed are: the type of keyboard, the type of mouse, brand of modem, and printer (parallel) and communication (serial) ports.

The second list shows the devices that are connected to your system and that could be considered internal devices such as: the PIC, or programmable interrupt controller, DMA, or direct memory access, clock, timer, speaker, numeric processor, plug and play BIOS, device which enables the advanced power management support, AGP bridge, if installed, and USB (Universal Serial Bus) root hub.

Network

The Network page shows the type of network adapters installed on your system, whether a dial-up adapter, and VPN (virtual private networking) adapter, or another type of network card or adapter.

Media

The Media page shows the available devices installed and operating on your system. Items shown are the type of sound system, the type of modem or a game port joystick, if installed.

The lower part of the window shows four sound device drop-down lists which show the type of Wave, MIDI, AUX, or Mixer devices installed on the system.

At the bottom of the System Information notebook window are two additional buttons. The button labeled "Report" allows the user to print a hard copy report of the system information that ProKon has extracted from the system. Pressing the "Report" button gives the user the option of printing only the information displayed in the currently displayed window or printing the information displayed on all of the tab pages of the System Information module.

The button titled "Windows" will display a second window containing another notebook tabbed page control. One tab is titled Windows and shows an extensive list of the memory location of each window in use by the Windows operating system at the time. Note that the term window applies to each type of control used and not just the actual window itself. The list of windows (or controls) is displayed in the form of a hierarchical tree. Thus, the parent/child relationship of each window is graphically displayed. For instance, if a window has two buttons inside the window, the tree display will show that window's memory location and description in the list with a small "+" sign to the left of the description text. Clicking on this "+" sign with the mouse will expand the tree structure and display the child controls of the parent. This hierarchical

relationship can continue to many levels within the tree and gives a good graphical display of all of the controls and windows in use by Windows at any given time.

The button titled ‘‘Properties’’ shows a page with three additional tabs, ‘‘General’’, ‘‘Style’’, and ‘‘Class info’’. The General page shows the programmers name for the window highlighted in the ‘‘Windows’’ list when the ‘‘Properties’’ tab was clicked. The title text of the window is also displayed. Most of the information presented on the ‘‘Windows’’ and ‘‘Properties’’ pages is of interest to programmers and is of little interest outside of that scope. Detail such as top left, bottom right pixel location, window width and height, and window handle are shown.

The information displayed by the System Information module can be refreshed at any time by pressing the ‘‘Refresh’’ button at the bottom left of the window. Note that the process of retrieving the extensive information displayed in the window can take a considerable amount of time, depending upon the complexity and speed of the system being examined. Be prepared to wait for as much as two minutes each time the information is refreshed. In addition, this same length of time is required when you first enter the System Information window and is indicated by the message that shows on the lower left of the ‘‘Miscellaneous’’ window.

Emission Calculator

The Emission Calculator module is used to convert gaseous emissions from weight concentration to volume concentration. Often, in environmental work it is necessary to perform calculations for a given pollutant in gaseous emissions. For instance, the stack gasses from a manufacturing plant are known to contain 20 parts per million (ppm) by weight of nitrous oxide (NO) in the gas and you need to know what the equivalent concentration of nitrous oxide by volume would be. The Emission Calculator makes the calculation easy.

Using the Emission Calculator, you don't need to know the molecular weight of the chemical species. Using the built-in formula weight (molecular weight) calculator, you only have to know the chemical formula for the material. By entering the chemical formula, NO, into space provided, the formula weight is automatically calculated and placed in the required space. Of course, you are not required to use the formula weight calculator; if you know the formula weight of the chemical, you can enter the value directly into the formula weight space. For complete instructions on using the formula weight calculator, see the Formula Weight Calculation help section.

Values do not have to be entered in any specific order. If you enter information in one of the spaces in the Volume Concentration area of the calculator, you'll notice that all of the additional spaces are filled in as you type. For instance, if you enter a value for parts per million (ppm) by volume, parts per hundred (pph), parts per thousand (ppt), and parts per billion (ppb) are completed automatically.

There are a number of units that can be selected for the concentration by weight entry. A drop-down list is provided for selection of the desired concentration by weight. The units can be selected either before or after the actual value is entered in the weight concentration space provided.

The Emission Calculator attempts to determine which direction you wish to calculate. If you last entered a value in the volume calculation area, the module will assume that you want to calculate a weight concentration and will attempt to use the value in the formula weight area to make the calculation. The reverse is also true; an entry in the weight concentration area will automatically attempt to use the value in the formula weight area to perform the calculation. If no value is available in the formula weight area and you enter one in that space (or use the formula weight calculator to cause one to be placed there), the Emission Calculator will determine which area you last entered data into and calculate the other value. Of course, if you prefer you may click the "**Clear**" button and all spaces will be cleared for the next calculation.

As with other data windows in ProKon, selecting the **Copy** key sends the current calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the information to the Windows printer.

Date Finder

The Date Finder module is used for calculating dates into the future or into the past. It is most useful when you know a starting date for some event and wish to know what the day, date, and time will be for a given period of time into the future or into the past. For instance, if you need to know what the date will be 200 months from today, the Date Finder can easily calculate it for you.

The first step in making a date calculation is to select a direction in time from the drop down list at the top of the window. There are only two possible selections: forward in time or back in time. Once a direction has been selected, notice that the titles of the various areas in the Date Finder window change to show the appropriate values to be entered.

To the right of the window is an area for entering the period of time to add or subtract to the starting date. Possible entries are years, months, weeks, days, hours, minutes, and seconds. Note that you may enter values in as many of these areas as appropriate. For example, you might enter 10 years, 7 weeks and 23 hours if you want to make a calculation for that period of time into the future or into the past.

Once you make a selection from the Direction to Calculate, data may be entered in any order you wish. You may enter the Time to Add or Time to Subtract first or you may enter it last. When entering a starting date, there is a drop-down calendar available by clicking on the small arrow to the right of the entry area. This drop down calendar is convenient for selection of a starting date for the calculation.

Clicking the "**Clear**" button at the bottom of the window clears all entries and rests the dates to the current date. As with other data windows in ProKon, selecting the **Copy** key sends the current calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the information to the Windows printer.

Conductors

The Conductor module is used for calculating the resistance and conductance of electrical conductors made from various types of metals. In order to calculate the resistance (in ohms) or the conductance (in siemens) of a given length of conductor, three types of information are required. Each type of metal used to make the conductor has a specific resistivity, commonly given in units of ohm-metres. In addition, the length of the conductor and the cross sectional area of the conductor must be known. Each of these items can be entered in the appropriate areas of the Conductor module window.

At the top of the window is an area for entering the resistivity of the conductor. There are two options for entering this value - if you know the resistivity in ohm-meters, it may be entered directly. If you know what type of metal the conductor is made of, you may select the appropriate metal from the drop-down list just above the resistivity area.

Next down in the window is an area for entering the cross sectional area of the conductor. If you know the cross sectional area in circular mils or square inches, you can enter it directly in the space provided. If you know the American Wire Gauge (A.W.G.) of the conductor, you may select it form the drop-down list to the left. Notice that as you enter a value in any area, the remaining values are calculated automatically for you.

Further down is an area for entering the length of the conductor. Appropriate units for length are metres, feet, or inches. Again, note that if you enter a value in one area, the other units are automatically calculated as you type.

Once you enter data in three of the areas of the Conductor window, ProKon "knows" that it has enough data to perform the calculation and, as you enter data in the third area, the fourth data value(s) will be calculated automatically.

It is important to note that you may enter ANY three types of data to perform a calculation. For instance, if you know the resistance desired, the type of metal the conductor is made of, and the gauge of the conductor, entering data for these three values will automatically calculate the fourth, the length of the conductor. Be aware, also, that after making a calculation, you must "Clear" all values prior to performing another calculation. Failure to do so can confuse ProKon so that it does not know which of the four values you wish to calculate.

Clicking the "**Clear**" button at the bottom of the window clears all entries and rests the module for another calculation. As with other data windows in ProKon, selecting the **Copy** key sends the current calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the information to the Windows printer.

Sound

The Sound module is used for calculating the relative intensity of sound. Sound intensity is measured by instrumental methods and does not depend on the hearing of a listener. The sound intensity is related to the intensity of the average faintest audible sound at 1000 Hz. This intensity is referred to as the Threshold of Hearing and is defined as 1E-12 Watts per square metre. When expressing the intensity of sound, it is compared to this Threshold of Hearing so that the relative intensity, expressed in decibels, is given by the ratio of the sound measured to the sound intensity at the Threshold of Hearing. Because of the great range of sound intensity over which the human ear is sensitive, a logarithmic scale is used rather than a simple arithmetic scale.

ProKon requires two values to calculate the relative intensity of sound in decibels, the power of the sound and the distance from the sound source. In the area at the top of the Sound window, enter the power of the sound in watts or kilowatts. Then enter the distance of the hearer from the sound source in metres, feet, kilometres, or yards. ProKon "knows" when sufficient data has been entered and will automatically calculate the relative intensity in decibels or bels.

At the bottom of the Sound window is a separate area for displaying the sound intensity directly in watts per square metre. This is a calculated value only and cannot be used for entering data.

It is important to note that you may enter ANY two types of data to perform a calculation. For instance, if you know the decibels or bels and the distance from the sound source, this data may be entered to calculate the sound power in watts and kilowatts.

All data entry areas should be cleared with the "Clear" button between calculations. Failure to do so can confuse ProKon so that it is not sure which value you wish to calculate. Clicking the "**Clear**" button at the bottom of the window clears all entries and rests the module for another calculation. As with other data windows in ProKon, selecting the **Copy** key sends the current calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the information to the Windows printer.

Mechanical Advantage

The Mechanical Advantage module is used for calculating the theoretical relative mechanical advantage of various types of simple machines that are used to multiply force. Eight types of simple machines are shown on separate tabbed pages of the module. Selecting the appropriate tab allows the user to calculate the theoretical mechanical advantage of the various machines. Following are the types of machines given and the data required to calculate the theoretical mechanical advantage:

Differential Pulley
: Requires the radius of the large and small pulleys.

Gears
: Requires the number of teeth on the large and small gears.

Inclined Plane
: Requires the length and height of the inclined plane.

Lever
: Requires the length of the lever on the side force is applied to and the length of the lever on the side used to lift.

Piston
: Requires the radius of the large and small pistons.

Screw
: Requires the length of the lever used to apply force to the screw and the height of one thread of the screw.

Wedge
: Requires the length and thickness of the wedge.

Wheel and Axle
: Requires the radius of the wheel and axle.

Operation of each machine can be seen in the graphic representation of the machine to the left of the page. To the right of each page are entry areas that allow the calculation of the theoretical mechanical advantage. In each case two data values must be entered to calculate the third value. ProKon knows when you have entered sufficient data to allow the calculation of the third value and will do so automatically as you enter the data.

Note that the theoretical mechanical advantage assumes a frictionless system.

It is important to note that you may enter ANY two types of data to perform a calculation. For instance, if you know the theoretical mechanical advantage required and the length of one side of a lever, the required length of the other side can be calculated.

All data entry areas should be cleared with the "Clear" button between calculations. Failure to do so can confuse ProKon so that it is not sure which value you wish to calculate. Clicking the "**Clear**" button at the bottom of the window clears all entries and rests the module for another

calculation. As with other data windows in ProKon, selecting the **Copy** key sends the current calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the information to the Windows printer.

Exchange Rate Calculation

The Exchange Rate Calculator module allows the conversion of monetary units from one country to monetary units from another country. Conversion of monetary units is possible between 222 different currencies used around the world. Units in one currency can be converted to units in any other currency. This allows over 49,000 different currency combinations.

The exchange rates (conversion factors) used by the Exchange Rate module can be updated to the latest rates available, provided you have an Internet connection available on your system. A simple click of a button brings all 222 rates directly to your computer from the PACIFIC Exchange Rate Service ©. The PACIFIC Exchange Rate Service specializes in Policy Analysis in Computing and Information Facility in Commerce. Professor Werner Antweiler of the University of British Columbia located in Vancouver, Canada provides the site. Prof. Antweiler's site is "dedicated to the support of academic research in the area of exchange rate economics." A wealth of current and historic currency data is available thorough this Internet site.

As you use the Exchange Rate Calculator, you'll find that an important advantage is that you are able to maintain current exchange rate information at your disposal even though you may not be able to remain connected to the Internet at all times. This is especially useful for laptop users since they can download current exchange rate data while in the office, then take the rates "on the road" where an Internet connection may not be available.

The first time you use the Exchange Rate Calculator, you will need to download the latest rates from the above site. Downloading the rates can be as simple as clicking on the download button provided. When you click the button, ProKon will first check to see if you are connected to the Internet. If you are not, ProKon will then attempt to bring up your Winsock program and connect you to the Internet automatically. Of course, accomplishing any of this means that you must have your computer set up to access the Internet. If ProKon cannot automatically connect you to the Internet with your Windows Winsock program, it is advisable that you manually establish your Internet connection prior to clicking on the download button.

If you have problems downloading the rate information from within ProKon, then you probably have a non-standard Internet connection, for instance, you may be running behind a firewall that prevents you from accessing or downloading certain content. If this is the case, you may still obtain the latest exchange rates by following this procedure:

Go to the PACIFIC Exchange Rate Service Internet site with your favorite browser and select the "Supplementary Issues" link. PACIFIC Exchange Rate Service can be accessed at the following Internet URL:

http://pacific.commerce.ubc.ca/xr/

When the page is displayed in the browser, save the page source to the folder where ProKon is installed. This file will be named "rates.html. When you have completed this process, the rates should be available when you next run the Exchange Rate Calculator. If you do not know how to use your Internet browser to save a web page to your hard drive as the html file, consult your browser help for instruction. In Netscape or Internet Explorer, the procedure would be to

select "File" and "Save" or "Save As" when viewing the "Supplementary Issues" page. ProKon also provides a button on the Exchange Rate Calculator page to go directly to the PACIFIC site. Clicking this button should call up your default Internet browser and take you directly to the site. NOTE: It is essential that the file you download from the above Internet page be named "rates.html". "Rates.htm" or "rate.html" will not work correctly. If you download the web page and you do not save it by the correct name, you will need to manually rename it.

The exchange rate conversion capability of this module is bi-directional. This means that conversions can be made in either direction and between any two units. Conversions are also "live", meaning that the conversion to the opposite currency unit is made automatically as you enter the currency amount in the currency edit area. First select both currency units desired in the drop-down selection boxes, then enter the known currency amount in the edit area next to that currency unit. As you enter the amount, the converted amount is automatically updated to the opposite units. Also, once the known currency amount has been entered, it is possible to select different currency units in either drop-down to make a different rate conversion. Note that the ISO-4217 designation for each currency is shown at the far right of the currency selection window.

Most connections to the Internet are made through a dial-up line. In the event that your connection is made through a proxy server, ProKon's Exchange Rate Calculator module allows you to enter the address of the proxy host and proxy port to enable the connection. (If you're not sure what these values should be, contact your system administrator.) ProKon will "remember" these settings between sessions.

All data entry areas can be cleared with the "Clear" button between calculations. Clicking the "**Clear**" button at the bottom of the window clears all entries and resets the module for another calculation. As with other data windows in ProKon, selecting the **Copy** key sends the current calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the information to the Windows printer.

Emergent Stem Correction

The Emergent Stem module allows the calculation of correction factors for the emergent stem of liquid-in-glass thermometers. Most precision liquid-in-glass thermometers are calibrated with full immersion of the column in the fluid bath (whether the bath is a liquid or air). It is often necessary to use these thermometers in situations in which the liquid thermometer column is not fully immersed in the bath. This partial immersion condition causes an error in the temperature indicated by the thermometer since the portion of the thermometer fluid (often liquid mercury) that extends above the level of the bath being measured is not at the same temperature as the rest of the column. This requires that a correction be made to the indicated temperature in order to determine the true temperature. The correction can be small or large depending upon how much of the thermometer column extends above the bath level and how much temperature differential exists between the immersed column and the exposed column.

First, select the temperature scale used on the thermometer from the drop-down selection box at the top of the window. This drop-down allows selection of either Celcius or Fahrenheit temperature scale. Then, three values are required in order to calculate the emergent stem correction and the true temperature. These three values are entered into the appropriate places in the Emergent Stem module to make the calculation:

Degrees of mercury above liquid level - Enter the number of degrees read on the thermometer that extend above the bath level. For instance, if 23 degrees of mercury extend above the bath level, enter 23.

Actual temperature reading of thermometer - Enter the actual temperature read on the thermometer.

Average temperature of emergent stem - Using a second thermometer, determine the temperature of the air (or other fluid) surrounding the emergent stem. Make this measurement at the midpoint of the emergent thermometer fluid.

Note that calculations are performed automatically as you enter the data in the required fields. Both the thermometer stem correction and the true temperature are displayed toward the bottom of the window.

All data entry areas can be cleared with the "Clear" button between calculations, however, it is not absolutely necessary to clear the data from a previous calculation. You may simply enter new data to perform a new calculation. As with other data windows in ProKon, selecting the **Copy** key sends the current calculation to the clipboard and to the file CONVERT.TXT. Selecting **Print** sends the information to the Windows printer.

Architectural Electrical Symbols

The Architectural Electrical Symbol module shows the more common electrical symbols used on architectural plans and drawings for various electrical devices used in building construction. All of the symbols can be viewed by scrolling the window up and down.

Selecting **Print** sends the information to the Windows printer.