A

A/C – Air conditioning; a system which dehumidifies and removes heat from the air.

Accumulator – A cylinder that stores refrigerant to accommodate changes in the volume necessary to run the A/C system.

Air Mix Control/Mode Control "Film" Dampers – Used on LS models since introduction. Sliding film covers or uncovers air distribution ports to control airflow.

Ambient Temperature – The temperature of the air around the outside of the vehicle.

Ambient Temperature Sensor – An NTC-type thermistor. Sends "temperature" signals to the A/C ECU by the resistance it produces when heated. Located behind grille at front of vehicle.

Amplifier – Sometimes referred to as the A/C ECU. A device that increases the strength of a signal; in an A/C system, the ECU controls compressor clutch operation based on various input signals. Also referred to as "A/C Control Assembly" and "A/C Amplifier."

ATC (Automatic Temperature Control) – A system that automatically controls HVAC outlet temperature, distribution pattern and fan speed. Also called "climate control" or "automatic air conditioning."

B

B+ – Battery voltage, typically controlled by the ignition switch; the positive terminal of a battery.

Bar – A metric unit for barometric pressure, 1 Bar = 1 kilogram per square centimeter = 14.5 psig.

Barometric Pressure – "Atmospheric pressure," pressure exerted on all surfaces of an object as a result of gravity acting upon the mass of the atmosphere, typically 14.5 pounds per square inch of gauge pressure (psig).

BEAN – Body Electronics Area Network is a multiplexing communications system where multiple signals for various body electrical accessories travel over a common electrical path.

Blend – A mixture of two or more refrigerant gases intended to replace some other refrigerant. (Not recommended.)

BTU (British Thermal Unit) – A British unit for measuring the heat energy of a process. One BTU = the heat energy which raises the temperature of one pound (one pint) of water by one degree Fahrenheit. One thousand calories = one KiloCalorie (Kcal).

Bus – A common conductor to which multiple circuits connect in an electrical system.

C

Calorie – A metric unit for measuring the heat energy of a process; a common unit for measuring energy (sugar content of food) which will raise the temperature of kilogram (one liter) of water by one degree centigrade. One thousand calories = one KiloCalorie (Kcal).

CAN – Controller Area Network is part of multiplex electronics on vehicles. See BEAN above.

Capillary Tube – A small passage tube and sensing bulb containing a refrigerant that expands and contracts according to temperature. The tube carries the temperature "signal" to the expansion valve.

Celsius – The name of the scientist who devised the metric temperature scale, see also Centigrade.

Centigrade (° C) – A name for the metric scale of temperature measurement which is based on the properties of water. Water freezes at 0° C and boils at 100° C at sea level pressure (1 Bar).

CFC (Chlorine, Fluorine and Carbon) – A family of chemical compounds also called "chlorofluorocarbons" which are suspected of contributing to a decline in the stratospheric zone. R-12 is a CFC. See dichlorodifluoromethane.

Change of State – The process where matter changes from a solid state to a liquid state or from a liquid state to a gas, usually caused by a great transfer of heat or a change in pressure.

Charge – The quantity of refrigerant necessary for efficient heat transfer by an air-conditioning system.

Clutch – A mechanical device for transmitting torque that allows for engaging and disengaging two shafts or rotating members.

Compressor – A pump that increases the pressure of a gas within a closed system.

Condensation – The process where a material changes state from a gas to a liquid following removal of heat or an increase of pressure.

Condenser – A heat exchanger through which a hot gas passes in order to remove heat from the gas and causing it to condense into a hot liquid.

Current – A measure of the flow of electrons through an electrical circuit. The unit of measurement is the "Ampere" or "Amp." See Ohm's Law.

Customize – A sensitivity or function adjustment capability using Techstream to adjust some sensor and automatic functions to meet customer expectations. On some models, the smog ventilation sensor, air inlet mode, temp. set shift, compressor control can be changed. See Repair Manual by model.

C

Cycling – The process of repeatedly turning a control device ON and OFF based on a prescribed pattern or input signal. See Cycling Clutch.
Cycling Clutch – A system of controlling A/C system operation by controlling the operation of a mechanical drive clutch on the compressor.

D

Dehumidifying – The process of removing water vapor (moisture) from the air; another result of removing heat from the air.
Desiccant – A chemical or structure that absorbs moisture by forming molecular bonds with water molecules. Located in the receiver-drier or modulator portion of a subcooling condenser.
Dichlorodifluoromethane – CFC-12 or R-12; a nontoxic, nonflammable chemical compound of chlorine, fluorine and carbon; a colorless, odorless gas formerly used as a refrigerant. Replaced in vehicles by HFC-134a (R-134a).
D.O.T. (U.S. Department of Transportation) – Regulates interstate transportation of cylinders containing pressurized gas.
DTC (Diagnostic Trouble Code) – Fault codes generated by the ECU that indicate to service personnel the source of a system malfunction. A self-diagnosis feature that stores operation failures in memory. DTCs can be displayed by operating switches on the A/C control panel. DTCs remain in memory even when the ignition is OFF.
Duct Air Temperature Sensor – Works with solar sensor and ECU to set outlet temperature toward face a bit cooler than the floor outlet in bright sunlight.
Dynamic Pressure – The pressures measured from a stabilized and operating A/C system.
Dyes – Leak detection substance added to system to locate leaks in fittings or components. Not recommended by Toyota or Lexus due to long term durability issues.

E

Evacuation – The process of removing all gases from a closed system with a vacuum pump.
Evaporator – A heat exchanger that accepts a spray of hot liquid in order to absorb heat from air surrounding the evaporator. In this process, the liquid evaporates and changes into a gas.
Evaporator Temperature Sensor – A thermistor that outputs an electrical signal according to temperature. This is an input to the A/C ECU which controls the A/C compressor clutch in order to prevent evaporator icing and to regulate cooling temperature output.
Expansion Valve – Flow control valve in refrigeration system that opens and closes an orifice that releases refrigerant into the evaporator.

F

Fahrenheit – The name of the scientist who devised the British temperature scale in which water freezes at 32° F (0° C) and boils at 212° F (100° C) at sea level pressure.

Filters – Many models have a fresh air filter located behind the glove box which must be replaced periodically to reduce odors and maintain airflow into the cabin. Some models with rear A/C also have a filter located in the trunk area. Internal filters are located in the filter-drier portion of the sub-cool condenser. Toyota and Lexus do not recommend the use of inline aftermarket refrigerant filters.

Fusible Plug – A special bolt with a hollow center filled with a soft, low temperature solder. It is designed to melt under high pressure or high temperature to relieve pressure and protect the system from an explosion. This item is no longer used. A pressure switch now controls system pressure by de-energizing the compressor.

G

Gaseous – The hottest state of matter in which the material is the least dense and is able to flow and expand or contract to fill an area. Heat is absorbed as a liquid changes to a gas.

Gateway ECU – A link between systems on a LAN (LS430). It connects the A/C ECU and the rear A/C controls over the AVC-LAN and the rear A/C amplifier over the BEAN (steering column bus).

H

Heat Energy – The force that changes the measurable heat of an object; units for heat energy are the BTU and calorie.

Heat Exchanger – A device that allows heat to be transferred between two liquids or gases without the materials coming into direct contact with each other.

Heat Load – The total of all sources of energy acting to change the temperature of an object. Examples are sunlight, ambient temperature and passenger body temperature.

Heater Core – The heat exchanger that uses engine coolant to heat the air in the passenger compartment.

High Pressure Side – The section of the refrigerant system between the compressor and the expansion valve (including condenser and receiver-drier) where the refrigerant is under high pressure.

HVAC – Heating, Ventilation and Air Conditioning system.

Humidity Sensor – Measures relative humidity inside cabin from 0% to 100% and signals ECU to increase or decrease cooling effort for maximum efficiency and fuel economy. If equipped, the humidity sensor is incorporated into the in-car room temperature control.

H

Hydrochloric Acid – A mild acid that can erode metal components. It forms inside an A/C system when hydrogen from water combines with chlorine from the CFC refrigerant.

Hygroscopic – A property of some liquids to absorb moisture from the air.

I

IDL (Idle) – An input to the ECU when the throttle is at the idle position.

IG (Ignition) – An output signal from the ECU to the ignitor or coil in the ignition system.

Impermeable – A barrier that cannot be penetrated. This refers to moisture-proof liners in flexible refrigerant hoses.

Inches of Mercury (in. Hg) – A measure of the strength of a vacuum. This refers to the ability of a vacuum to lift a column of mercury from a reservoir up a narrow tube.

In-car sensor (room temperature sensor) – Thermistor located near the driver's knee area that signals ECU of actual in-car temperature to determine heat load and cooling requirements. Connected to hose from air aspirator on cooling unit to draw cabin air over sensor. The in-car sensor contains a humidity sensor on some models.

L

LAN (Local Area Network) – A multiplex path for serial data or a wiring path that carries more than one signal to a number of different components in an electrical circuit.

Latent Heat – The additional energy necessary to cause a material to change state. This is fundamental to efficient heat exchange processes.

Liquid – The middle state between a material being a solid or a gas. A liquid can flow to fill a space but cannot expand or be compressed.

Lock sensor – Sends compressor rotation signals to the A/C ECU which then compares compressor speed to engine speed to determine if compressor has locked. ECU then disengages the A/C clutch to prevent drive belt failure.

Low Pressure Side – The portion of the refrigerant circuit between the evaporator and the compressor where refrigerant is at a low pressure.

M

Magnetic Valve – An electrically operated solenoid mounted on some rear expansion valves to control refrigerant flow to rear A/C in some dual A/C systems.

Manifold Gauge – A set of two pressure gauges mounted on a common valve body. The manifold has two pressure paths that can be connected together for service operations.

M

Microbes – Single-cell living organisms (bacteria, mold).
Mode Control "Film" damper – Sliding film covers and uncovers air distribution ports to control airflow to registers and vent outlets.
Molecular Sieve – An open-cell structure designed to trap specific materials or compounds; used as a desiccant in A/C systems.
Multiplex – A method of sending and receiving digital signals through a single wire conductor. Often used to control satellite control units from a master ECU.

N

Ne – An engine speed input signal to the ECU.
Neural Network Control (NNC) – Control system which uses the temperature, solar and humidity sensors to determine driver and passenger actual cooling needs.
Noncondensable Gas – A gas that cannot be easily condensed into a liquid state at room temperature; typically refers to air.
Normally Closed – An electrical circuit or component where the path is connected under "normal" conditions (e.g. engine OFF, cold and stationary vehicle; a resistance of zero until activated).
Normally Open – An electrical circuit or component where the path is not connected (open) under "normal" conditions (e.g. engine OFF, cold and stationary vehicle; a resistance of infinity until activated).
NTC (Negative Temperature Coefficient) – Describes the relationship between temperature and resistance of most automotive thermal sensors.

O

O2 (Oxygen) – The naturally occurring molecule made up of two oxygen atoms, a clear, odorless gas that is crucial to respiration (breathing) of all animals.
O3 (Ozone) – The molecule made up of three oxygen atoms, a poisonous, blue gas formed when oxygen is subjected to electrical energy or intense visible radiation (light).
Ohm's Law – A rule which describes the relationship between voltage, current and resistance within electrical circuits, Voltage = Current x Resistance.
One-Pass Machine – A machine that recycles refrigerant as it is recovered from a vehicle A/C system. No additional process is necessary before returning the refrigerant to service. See also Two-Pass Machine.
Oxygen – The most common element on Earth, present in most organisms and organic chemicals. Essential to life.

P

PAG (Polyalkylene Glycol) – A synthetic lubricant oil (nonmineral-based) developed as a substitute for mineral oil for use with HFC refrigerant R-134a. Hybrid electric compressors use ND-11 PAG oil for HV insulation. DO NOT use any other lubricants other than ND-11 in Hybrid electric compressor systems.

Peltier Element – Used in climate-controlled seats for heating or cooling. Consists of two different types of metals joined together which either produce or absorb heat depending upon the direction current passes through the element.

Phosgene (Carbonyl Chloride) – A toxic gas also called "mustard gas" produced as a byproduct during combustion of CFC-12. Old, flame-type leak checker is not recommended due to this danger.

Photodiode – A single-pole semiconductor which normally blocks the flow of current in both directions; when subjected to light, it allows the current to pass in one direction.

Plasmacluster™ Generator – A high voltage device that takes water and oxygen molecules from the air and produces positive and negative ions which circulate and helps reduce airborne germs.

Plenum – A chamber common to several passages, as in the central distribution chamber of a heater blower case or the center passage of a manifold gauge set.

Pressure Relief Valve – Small device located on compressor body to relive excessively high pressure to avoid hose or component failure.

Pressure Sensor – Monitors refrigerant pressure and sends voltage signal to A/C ECU to control condenser fan operation and compressor clutch operation if pressure becomes excessive or insufficient. Replaces the pressure switch on some models.

PSI (Pounds Per Square Inch) – A British unit of measure for fluid or gas pressure where zero psi is the absolute vacuum of outer space.

PSIG (Pounds Per Square Inch Gauge) – A measurement of fluid or gas pressure in which zero psi on the gauge is equal to atmospheric pressure or 14.5 pounds per square inch.

PTC (Positive Temperature Coefficient) – Describes the relationship between temperature and resistance of common metals.

R

R-12 – See dichlorodifluoromethane.

R-134a – See tetrafluoroethane.

Radiator – A water-to-air heat exchanger, the final stage cooler of an engine-cooling system.

Receiver-Drier – A combined accumulator and dehydrator in a refrigeration system. Filters impurities from the liquid refrigerant.

Recharging – Filling an A/C system following repair with a quantity of refrigerant necessary for efficient heat transfer.

Recirculate – Recooling of air in an enclosed space, providing increased cooling efficiency.

Reclamation – An off-site process of purifying recovered refrigerant to an "as-new" condition.

Recovery – Removal of refrigerant from an A/C system before repair or service.

Recycling – On-site purification of recovered refrigerant to a standard as defined by the SAE.

Refrigerant – A substance used in a heat exchange system to cool an area based on evaporation and condensation of the refrigerant.

Relative Humidity – A measure of the amount of water vapor in suspension in the atmosphere at a given temperature.

Relief Valve – A nonreusable valve that opens to relieve excessive pressure and thus protect the system from explosion without a total loss of refrigerant; replaces the fusible plug on newer A/C systems.

Resistance – A measure of an electrical circuit or a component to resist current flow. See Ohm's Law.

Retrofit – Replacement A/C system components installed on a vehicle in service using non-CFC refrigerant. There are kits available to convert vehicles using R-12 refrigerant to HFC-134a. Usually consists of new HFC-134a fittings, receiver-drier and system identification decals.

S

SAE (Society of Automotive Engineers) – A professional organization that drafts standards for vehicle systems.

Saturated – 100% relative humidity, air is saturated when it holds the maximum possible amount of water vapor in suspension, water will precipitate (condense into liquid and fall out of suspension) at this point.

Sealants – Aftermarket products added to refrigerant to self-plug leaks in the system from the inside. Sealants can plug up internal passages and result in serious damage to system.

Sensing Bulb – A small chamber filled with refrigerant and connected to the expansion valve by a thin capillary tube, controls expansion valve operation based on the surface temperature at the outlet of the evaporator.

Series Resistance – An electrical circuit where the current flows through the system components in a single path between power and ground. See Ohm's Law.

Smog Ventilation Sensor – A sensor just behind the grille that detects HC, CO or NO_x in the air outside the vehicle and signals the ECU to close the outside air inlet to the RECIRC position. The sensitivity level of the Smog Ventilation Sensor can be adjusted using the customize feature on Techstream.

Smoke Sensor – A sensor that detects smoke particles in the ambient air and sends a signal to the ECU to control the air inlet control damper and the blower motor (for rear A/C and air purifier).

Solar Sensor – Detects sun load which is 60% of heat entering the vehicle and provides input information to the ECU.

Solid – The coldest of the three states of matter, a solid does not flow to fill a space and cannot be compressed or expanded.

SPD (Speed) – A variable input signal to the ECU representing vehicle road speed.

STA (Start) – An input signal to the ECU when the starter solenoid is energized.

Stabilize – The steady operating condition of an A/C system during heat exchange and pressures and temperatures are within normal operating range.

Static Pressure – The steady pressure within an A/C system that is not operating, units are in PSIG or kg/cm.

Step-less – Variable blower fan speed control as opposed to 3 or 4 set fan speeds.

Stratosphere – A layer of the Earth's atmosphere 12-20 miles above the Earth.

S

Stratospheric Ozone – A layer of ozone gas (O3) surrounding the Earth in the stratosphere. Because ozone is blue in color, this layer reflects much of the ultraviolet light from the sun to protect the surface from radiation.

Sub-cool Condenser - Latest type of condenser incorporates the filter/drier in a modulator tube at the end of condenser. Modulator has removable filter-drier bag that must be replaced when system has been open allowing moisture to saturate the drier element.

Systematic – An approach to problem-solving based on a logical process.

T

TAM – Ambient air temperature or outside air temperature measured in the front grille area.

TAO – Outlet air temperature sensor in Auto A/C sends signal to A/C ECU.

Temperature – A measure of the heat quantity present in a material, units are Fahrenheit (English system) or Centigrade (Metric system).

Tetrafluoroethane – HFC-134a or R-134a; a molecule of hydrogen, carbon and fluorine, a clear, odorless, nontoxic gas, a refrigerant for mobile air conditioning systems which has greatly reduced potential to deplete ozone and a low potential for contributing to global warming.

THA – a variable input signal to the ECU that represents air temperature in the air intake passage.

Thermal Capacitance – The ability of a material to resist sudden temperature changes, describes an insulating property.

Thermistor – A solid-state component that changes resistance with changes in temperature. Used as an electrical thermal sensor. A thermistor has a negative temperature coefficient.

THW – An input signal to the ECM/ECU that represents coolant temperature at the cylinder head outlet.

TR (Room Temperature Sensor) – Measures interior temperature.

TSET (Temperature Setting) or target temperature – Selected with Auto A/C systems input to A/C ECU.

Two-Pass Machine – Recovers refrigerant from a vehicle system without recycling. An additional process is necessary before the refrigerant can be returned to service. See also One-Pass Machine.

U

UL® (Underwriters' Laboratory) – An independent organization that tests products to verify compliance with safety standards.

Ultraviolet Radiation – Intense blue light that consists of visible and invisible wavelengths. Excessive ultraviolet radiation may cause skin cancer, cataracts and other harm to living things.

V

Vacuum – An extremely low pressure, the absence of any measurable pressure.

Vaporization – A process where a liquid changes into a gas, either due to a drop in pressure or an increase in temperature.

Voltage – A measure of the electrical potential of a circuit, voltage drop within a circuit is defined by Ohm's Law. See also Ohm's Law.

VSV (Vacuum Switching Valve) – An electrical solenoid that controls the flow of vacuum.

VTA – A variable input signal to the ECM/ECU that corresponds to the angle of the throttle opening.

W

Water Control Valve – A water regulation control valve that controls coolant flow into the heater core. It is controlled by a cable or a servo-motor for outlet temperature control.