

# Q

**Q** In the context of a fiber optic communication system, one-half of the ratio of peak-to-peak signal to rms noise.

(C/LM) 802.3-1998

**QA** *See*: quality assurance.

**QA access function** *See*: queued arbitrated access function.

**QAM** *See*: quadrature amplitude modulation.

**QA segment** *See*: queued arbitrated segment.

**QA slot** *See*: queued arbitrated slot.

**QC** *See*: quality control.

**Q-channel** *See*: quadrature video.

**Q chrominance signal** The sidebands resulting from suppressed-carrier modulation of the chrominance subcarrier by the Q video signal. *Note*: The signal is transmitted in double-sideband form, the sidebands extending approximately 0.6 MHz above and below the chrominance subcarrier. The phase of the signal, for positive Q video signals, is 33° with respect to the (B—Y) axis.

(BT/AV) 201-1979w

**Q coil** *See*: coil Q.

**Q energy (laser maser)** The capacity for doing work. Energy content is commonly used to characterize the output from pulsed lasers, and is generally expressed in joules.

(LEO) 586-1980w

**Q-hour meter** An electricity meter that measures the quantity obtained by effectively lagging the applied voltage to a watt-hour meter by 60°. This quantity is one of the quantities used in calculating quadergy (varhours).

(ELM) C12.1-1988

**QIC** *See*: quarter-inch cartridge.

**Q-meter (quality-factor meter)** An instrument for measuring the quality factor Q of a circuit or circuit element. *See also*: instrument.

(EEC/PE) [119]

**Q of an electrically small tuned antenna** An inverse measure of the bandwidth or an antenna as determined by its impedance. It is numerically equal to one half the magnitude of the ratio of the incremental change in impedance to the incremental change in frequency at resonance, divided by the ratio of the antenna resistance to the resonance frequency. *Note*: The Q of an antenna also is a measure of the energy stored to the energy radiated or dissipated per cycle.

(AP/ANT) 145-1983s

**Q of a resonant antenna** The ratio of 2π times the energy stored in the fields excited by the antenna to the energy radiated and dissipated per cycle. *Note*: For an electrically small antenna, it is numerically equal to one-half the magnitude of the ratio of the incremental change in impedance to the corresponding incremental change in frequency at resonance, divided by the ratio of the antenna resistance to the resonant frequency.

(AP/ANT) 145-1993

**QOLB** *See*: queue on lock bit.

**QP detector** *See*: quasi-peak detector.

**Q-percentile life (1) (non-repaired items) (assessed)** The Q-percentile life determined as limiting value or values of the confidence interval with a stated confidence level, based on the same data as the observed Q-percentile life of nominally identical items. *Notes*: 1. The source of the data should be stated. 2. Results can be accumulated (combined) only when all conditions are similar. 3. The assumed underlying distribution of failures against time should be stated. 4. It should be stated whether a one-sided or two-sided interval is being used. 5. Where one limiting value is given this is usually the lower limit.

(R)

**(2) (extrapolated)** Extension by a defined extrapolation or interpolation of the observed or assessed Q-percentile life for stress conditions different from those applying to the assessed Q-percentile life and for different percentages. *Note*: The validity of the extrapolation should be justified.

**(3) (observed)** The length of observed time at which a stated proportion (Q%) of a sample of items has failed. *Notes*: 1. The

criteria for what constitutes a failure should be stated. 2. The Q-percentile life is also that life at which (100-Q)% reliability is observed.

**(4) (predicted)** For the stated conditions of use, and taking into account the design of an item, assessed or extrapolated Q-percentile lives of its parts. *Note*: Engineering and statistical assumptions should be stated, as well as the bases used for the computation (observed or assessed).

**Q response (subroutines for CAMAC)** The symbol *q* represents a logical truth value which corresponds to the CAMAC Q response. It is set to true if the Q response is 1, to false if the Q response is 0.

(NPS) 758-1979r

**Q responses (subroutines for CAMAC)** The symbol *qa* represents an array of Q response values. Each element of *qa* has the same form and can have the same values as the parameter *q*. The length of *qa* is given by the value of the first element of *cb* at the time the subroutine is executed. *See also*: control block; Q response.

(NPS) 758-1979r

**Q-switch (laser maser)** A device for producing very short (Δ 30 ns), intense laser pulses by enhancing the storage and dumping of electronic energy in and out of the lasing medium, respectively.

(LEO) 586-1980w

**Q-switched laser (laser maser)** A laser which emits short (Δ 30 ns), high-power pulses by utilizing a Q-switch.

(LEO) 586-1980w

**Q-switching (laser maser)** Producing very short (Δ 30 ns), intense pulses by enhancing the storage and dumping of electronic energy in and out of the laser-maser medium, respectively.

(LEO) 586-1980w

**quad (1)** A structural unit employed in cable, consisting of four separately insulated conductors twisted together. *See also*: cable.

(EEC/PE) [119]

**(2)** *See also*: star quad.

(LM/C/LM) 802.3-1998

**quad-bundle** *See*: bundle.

**quadded cable** A cable in which at least some of the conductors are arranged in the form of quads. *See also*: cable.

(EEC/PE) [119]

**quadded components** The use of four identical components in a particular circuit configuration in order to reduce the probability of overall circuit failure due the possible occurrence of a fault in one or more of such components during circuit operation.

(C) 610.10-1994w

**quadded logic** The quadruple replication of each individual gate in a logic circuit.

(C) 610.10-1994w

**quadergy (1) (general)** Delivered by an electric circuit during a time interval when the voltages and currents are periodic, the product of the reactive power and the time interval, provided the time interval is one or more complete periods or is quite long in comparison with the time of one period. If the reference direction for energy flow is selected as into the region, the net delivery of quadergy will be into the region when the sign of the quadergy is positive and out of the region when the sign is negative. If the reference direction is selected as out of the region, the reverse will apply. The quadergy is expressed by

$$K = Q t$$

where *Q* is the reactive power and *t* is the time interval. If the voltages and currents form polyphase symmetrical sets, there is no restriction regarding the relation of the time interval to the period. If the voltages and currents are quasi-periodic and the amplitudes of the voltages and currents are slowly varying, the quadergy is the integral with respect to time of the reactive power, provided the integration is for a time that is one or more complete periods or that is quite long in comparison with the time of one period. Mathematically,

$$K = \int_{t_0}^{t_0+t} Q dt$$

where  $Q$  is the reactive power determined for the condition of voltages and current having slowly varying amplitudes. Quadregy is expressed in var-seconds or var-hours when the voltages are in volts and the currents in amperes, and the time is in seconds or hours, respectively. *See also:* network analysis. (Std100) 270-1966w

(2) (**metering**) The integral of reactive power with respect to time. (ELM) C12.1-1988

**quadlet (1)** A set of four adjacent bytes.

(C/BA) 10857-1994, 896.3-1993w, 896.4-1993w,  
1014.1-1994w

(2) A unit of computer data consisting of 32 bits.

(C/BA) 1275-1994

(3) Four bytes (32 bits) of data.

(C/MM) 1754-1994, 1596-1992, 1394-1995, 1212-1991s,  
1394a-2000

(4) A 4-byte data format or data type.

(C/MM) 1596.5-1993

(5) Four bytes of data.

(C/MM) 1596.4-1996

**quadlet aligned address** An address with zeros in the least significant two bits. (C/MM) 1394-1995

**quadrant** This pertains to the investigation and study of tamper protection concepts and mechanisms. *See also:* tamper protection. (C/BA) 896.3-1993w

**quadrantal error (navigation) (navigation aid terms)** An angular error in measured bearing caused by characteristics of the vehicle or station which adversely affect the direction of signal propagation; the error varies in a sinusoidal manner throughout the 360° and has two positive and two negative maximums. (AES/GCS) 172-1983w

**quadratic lag** *See:* lag.

**quadratic profile** *See:* parabolic profile.

**quadratic programming** Optimization problem in which:

- The objective function is a quadratic function of the variable.
- The plant description is linear.

*See also:* system. (SMC) [63]

**quadrature** The relation between two periodic functions when the phase difference between them is one-fourth of a period. *See also:* network analysis. (Std100) 270-1966w

**quadrature-acceleration drift rate (dynamically tuned gyro)**

A drift rate about an axis, normal to both the spin axis and the axis along which an acceleration is applied. This drift rate results from a torque about the axis of applied acceleration and is in quadrature with that due to mass unbalance.

(AES/GYAC) 528-1994

**quadrature amplitude modulation** A modulation technique that uses variations in signal amplitude and phase to represent data-encoded symbols as a number of states.

(C) 610.7-1995

**quadrature axis (synchronous machines)** The axis that represents the direction of the radial plane along which the main field winding produces no magnetization, normally coinciding with the radial plane midway between adjacent poles. *Notes:* 1. The positive direction of the quadrature axis is 90 degrees ahead of the positive direction of the direct axis, in the direction of rotation of the field relative to the armature. 2. The definitions of currents and voltages given in the terms listed below are applicable to balanced load conditions and for sinusoidal currents and voltages. They may also be applied under other conditions to the positive-sequence fundamental-frequency components of currents and voltages. More generalized definitions, applicable under all conditions, have not been agreed upon. (PE) [9]

**quadrature-axis component (1) (armature voltage)** That component of the armature voltage of any phase that is in time phase with the quadrature-axis component of current in the same phase. *Note:* A quadrature-axis component of voltage may be reproduced by:

- rotation of the direct-axis component magnetic flux;

b) variation (if any) of the quadrature-axis component of magnetic flux;

c) resistance drop caused by flow of the quadrature-axis component of armature current. The quadrature-axis component of terminal voltage is related to the synchronous internal voltage by

$$E_{aq} = E_i - RI_{aq} - jX_d I_{ad}$$

*See also:* phasor diagram. (EEC/PE) [119]

(2) (**armature current**) That component of the armature current that produces a magnetomotive-force distribution that is symmetrical about the quadrature axis. (PE/EEC) [119]

(3) (**rotating machinery (magnetomotive force)**) The component of a magnetomotive force that is directed along an axis in quadrature with the axis of the poles. *See also:* asynchronous machine; direct-axis synchronous impedance.

(PE) [9]

**quadrature-axis current (rotating machinery)** The current that produces quadrature-axis magnetomotive force. *See also:* direct-axis synchronous impedance. (PE) [9]

**quadrature-axis magnetic flux (rotating machinery)** The magnetic-flux component directed along the quadrature axis. *See also:* direct-axis synchronous impedance. (PE) [9]

**quadrature-axis operational inductance (standstill frequency response testing) (synchronous machine parameters by standstill frequency testing)** The ratio of the Laplace transform of the quadrature-axis armature flux linkages to the Laplace transform of the quadrature-axis current.

(PE/EM) 115A-1987

**quadrature-axis subtransient impedance (rotating machinery)** The operator expressing the relation between the initial change in armature voltage and a sudden change in quadrature-axis armature current, with only the fundamental-frequency components considered for both voltage and current, with no change in the voltage applied to the field winding, and with the rotor running at steady speed. In terms of network theory it corresponds to the quadrature-axis impedance the machine displays against disturbances (modulations) with infinite frequency. *Note:* If no rotor winding is along the quadrature axis and/or the rotor is not made out of solid steel, this impedance equals the quadrature-axis synchronous impedance. *See also:* asynchronous machine; direct-axis synchronous impedance. (PE) [9]

**quadrature-axis subtransient open-circuit time constant** The time in seconds required for the rapidly decreasing component (negative) present during the first few cycles in the direct-axis component of symmetrical short-circuit conditions with the machine running at rated speed, to decrease to  $1/e \Delta$  0.368 of its initial value. (EEC/PE) [119]

**quadrature-axis subtransient reactance** The ratio of the fundamental component of reactive armature voltage due to the initial value of the fundamental quadrature-axis component of alternating-current component of the armature current, to this component of current under suddenly applied balanced load conditions and at rated frequency. Unless otherwise specified, the quadrature-axis subtransient reactance will be that corresponding to rated armature current.

(EEC/PE) [119]

**quadrature-axis subtransient short-circuit time constant** The time in seconds required for the rapidly decreasing component present during the first few cycles in the quadrature-axis component of the alternating-current component of the armature current under suddenly applied symmetrical short-circuit conditions, with the machine running at rated speed to decrease to  $1/e \Delta$  0.368 of its initial value.

(EEC/PE) [119]

**quadrature-axis subtransient voltage (rotating machinery)** The quadrature-axis component of the terminal voltage that appears immediately after the sudden opening of the external circuit when the machine is running at a specified load, before any flux variation in the excitation and damping circuits has taken place. (PE) [9]

**quadrature-axis synchronous impedance (rotating machinery) (synchronous machines)** The impedance of the armature winding under steady-state conditions where the axis of the armature current and magnetomotive force coincides with the quadrature axis. In large machines where the armature resistance is negligibly small, the quadrature-axis synchronous impedance is equal to the quadrature-axis synchronous reactance. (PE) [9]

**quadrature-axis synchronous reactance** The ratio of the fundamental component of reactive armature voltage, due to the fundamental quadrature-axis component of armature current, to this component of current under steady-state conditions and at rated frequency. Unless otherwise specified, the value of quadrature-axis synchronous reactance will be that corresponding to rated armature current. (EEC/PE) [119]

**quadrature-axis transient impedance (rotating machinery)** The operator expressing the relation between the initial change in armature voltage and a sudden change in quadrature-axis armature current component, with only the fundamental frequency components considered for both voltage and current, with no change in the voltage applied to the field winding, with the rotor running at steady speed, and by considering only the slowest decaying component and the steady-state component of the voltage drop. In terms of network theory it corresponds to the quadrature-axis impedance the machine display against disturbances (modulation) with infinite frequency by considering only two poles pairs\* (or poles\*), namely those with smallest (including zero) real parts, of the impedance function. *Notes:* 1. If no rotor winding is along the quadrature axis and/or the rotor is not made out of solid steel, this impedance equals the quadrature-axis synchronous impedance. 2. The term pole refers here to the roots of the denominator of the impedance function. *See also:* direct-axis synchronous impedance; asynchronous machine. (PE) [9]

**quadrature-axis transient open-circuit time constant** The time in seconds required for the root-mean-square alternating-current value of the slowly decreasing component present in the direct-axis component of symmetrical armature voltage on open-circuit to decrease to  $1/e \Delta 0.368$  of its initial value when the quadrature field winding (if any) is suddenly short-circuited with the machine running at rated speed. *Note:* This time constant is important only in turbine generators. (EEC/PE) [119]

**quadrature-axis transient reactance** The ratio of the fundamental component of reactive armature voltage, due to the fundamental quadrature-axis component of the alternating-current component of the armature current, to this component of current under suddenly applied load conditions and at rated frequency, the value of current to be determined by the extrapolation of the envelope of the alternating-current component of the current wave to the alternating-current component of the current wave to the instant of the sudden application of load, neglecting the high-decrement current during the first few cycles. *Note:* The quadrature-axis transient reactance usually equals the quadrature-axis synchronous reactance except in solid-rotor machines, since in general there is no really effective field current in the quadrature axis. (EEC/PE) [119]

**quadrature-axis transient short-circuit time constant** The time in seconds required for the root-mean-square alternating-current value of the slowly decreasing component present in the direct-axis component of the alternating-current component of the armature current under suddenly applied short-circuit conditions with the machine running at rated speed to decrease to  $1/e \Delta 0.368$  of its initial value. (EEC/PE) [119]

**quadrature-axis transient voltage (rotating machinery)** The quadrature-axis component of the terminal voltage that appears immediately after the sudden opening of the external circuit when running at a specified load, neglecting the components with very rapid decay that may exist during the first

few cycles. *See also:* asynchronous machine; direct-axis synchronous impedance. (PE) [9]

**quadrature-axis voltage (rotating machinery)** The component of voltage that would produce quadrature-axis current when resistance limited. (PE) [9]

**quadrature hybrid (waveguide components)** A hybrid junction that has the property that a wave leaving one output port is in phase quadrature with the wave leaving the other output port. (MTT) 147-1979w

**quadrature modulation** Modulation of two carrier components 90 degrees apart in phase by separate modulating functions. (Std100) 270-1964w

**quadrature spring rate (dynamically tuned gyro)** When the case of a dynamically tuned gyro is displaced with respect to the gyro rotor through an angle about an axis perpendicular to the spin axis, a torque proportional to and  $90^\circ$  away from the displacement acts in a direction to reduce this angle and to align the rotor with the case. The torque is usually due to windage, a squeeze-film force, or flexure hysteresis. This spring rate results in a drift rate coefficient having dimensions of angular displacement per unit time per unit angle of displacement about an input axis. (AES/GYAC) 528-1994

**quadrature video** One of a pair of coherent, bipolar video signals derived from the RF or IF signal by a pair of synchronous detectors with a  $90^\circ$  phase difference between the coherent oscillator (coho) reference inputs used for each. *Note:* The quadrature component is often identified as *Q* and the other of the pair as in-phase video or *I*. *Synonym:* Q-channel. *See also:* in-phase video. (AES) 686-1997

**Quadrex** *See:* explosives.

**quadrilateral characteristic** A distance relay characteristic on an R-X diagram created by a directional measurement, a reactance measurement, and two resistive measurements. (PE/PSR) C37.113-1999

**quadri pole** *See:* two-terminal pair network.

**quadruple-address instruction** *See:* four-address instruction.

**quadruple-length register** Four registers that function as a single register. *Synonym:* quadruple register. *See also:* n-tuple length register; double-length register; triple-length register. (C) 610.10-1994w

**quadruple register** *See:* quadruple-length register.

**quadrupole parametric amplifier** A beam parametric amplifier having transverse input and output couplers for the signal, separated by a quadrupole structure that is excited by a pump to obtain parametric amplification of a cyclotron wave. *See also:* parametric device. (ED) 254-1963w, [46]

**quadword** An aligned hexlet. *Note:* The definition of this term is architecture-dependent, and so may differ from that used in other processor architectures. (C/MM) 1754-1994

**qualification (1) (nuclear power generating station)** The generation and maintenance of evidence to ensure that the equipment will operate on demand to meet the system performance requirements. (PE/NP) 323-1974s

**(2) (personnel) (nuclear power quality assurance)** The characteristics or abilities gained through education, training, or experience, as measured against established requirements, such as standards or tests, that qualify an individual to perform a required function. (PE/NI/NP) [124], N42.23-1995

**(3) (raceway systems for Class 1E circuits for nuclear power generating stations) (raceway system)** Demonstration in the form of certificates of compliance, analysis reports, or testing reports that the raceway system meets the design requirements. (PE/NP) 628-1987r

**qualification testing (1) (software)** Formal testing, usually conducted by the developer for the consumer, to demonstrate that the software meets its specified requirements. *See also:* software; requirement; acceptance testing; system testing; formal testing. (C/SE) 729-1983s

**(2) (mechanical)** Testing of the complete assembly or sub-assemblies to determine acceptability by applying an actual input that has a test response spectrum (either ground- or

floor-response spectrum) equal to or larger than the design earthquake response spectrum.

(SWG/SUB/PE) C37.122-1983s, C37.122.1-1993G, C37.100-1992

(3) Testing performed to demonstrate to the acquirer that a software item or a system meets its specified requirements.

(C/SE) J-STD-016-1995

**qualification tests (safety systems equipment in nuclear power generating stations)** Tests conducted on safety systems equipment to demonstrate the capability to meet specified functional requirements under the action of specified test levels of environmental and operational parameters. *Note:* These tests subject a sample or samples of equipment to specified conditions designed to simulate normal, abnormal, containment test, design-basis-event, including loss-of-coolant, and post-design-basis-event conditions.

(PE/NP) 600-1983w

**qualified** Having adequate knowledge of the installation, construction, or operation of apparatus and the hazards involved.

(NESC) C2-1997

**qualified climber** A worker who, by reason of training and experience, understands the methods and has routinely demonstrated proficiency in climbing techniques and familiarity with the hazards associated with climbing.

(NESC/T&D/PE) C2-1997, 1307-1996

**qualified diesel-generator unit** A diesel-generator unit that meets the qualification of IEEE Std 387-1995.

(PE/NP) 387-1995

**qualified life (1) (nuclear power generating station) (cable, field splice, and connection qualification)** The period of time for which satisfactory performance can be demonstrated for a specific set of service conditions.

(PE/EDPG) 690-1984r

(2) **(seismic qualification of Class 1E equipment for nuclear power generating stations)** The period of time, prior to the start of a design basis event (DBE), for which the equipment was demonstrated to meet the design requirements for the specified service conditions.

(PE/NP) 344-1987r, 317-1983r, 627-1980ar, 382-1985, 323-1974ls

(3) **(Class 1E battery chargers and inverters) (Class 1E motor control)** The period of time for which satisfactory performance can be demonstrated for a specific set of service conditions. *Note:* The qualified life of a particular equipment item may be changed during its installed life where justified.

(SWG/PE/NP) 383-1974r, C37.100-1992, 649-1980s, 650-1979s, 323-1974as

**qualified life test (electric penetration assemblies)** Tests performed on preconditioned test specimens to verify that an electric penetration assembly will meet design requirements at the end of its qualified life.

(PE/NP) 317-1983r

**qualified module (nuclear power generating station)** Module that exhibits performance characteristics that are acceptable for Class 1E service in a nuclear power generating station and that satisfy the aging criteria and other requirements of this document.

(PE/NP) 381-1977w

**qualified person** One familiar with the construction and operation of the equipment and the hazardous involved.

(NESC/NEC) [86]

**qualified procedures** An approved and validated procedure that has been demonstrated to meet the specified requirement for its intended purpose.

(NI/PE/NP) N42.23-1995, [124]

**qualified worker** A worker who has received, as part of a training program, formal instruction and training in the techniques for climbing and working on structures and/or equipment. A qualified worker will have satisfactorily completed and demonstrated proficiency in the climbing portion and technical aspects of a formal training program. Climbing may be included in routine work assignments. Examples of a qualified worker are engineers and technicians doing inspections, testing, communications installations, etc.

(T&D/PE) 1307-1996

**qualifying symbol** A symbol added to the basic outline of an element to designate the physical or logic characteristics of an input or output of the element or the overall logic characteristics of the element.

(GSD) 91-1984r

**qualitative adjectives** *See:* geometrical adjectives; magnitude-related adjectives; time-related adjectives; polarity-related adjectives; descriptive adjectives.

**qualitative distortion terms** *See:* preshoot; valley; overshoot; ringing; rounding; spike; tilt.

**qualitative techniques, results or data** Judgmental scaling of the adequacy of the man-machine interface based, for example, on information from task analysis, or human engineering, training, or procedures review.

(PE/NP) 845-1988s

**quality (software)** The totality of features and characteristics of a product or service that bear on its ability to satisfy given needs. *See also:* software quality.

(C/SE) 729-1983s

**quality area** The area of the cathode-ray-tube phosphor screen that is limited by the cathode-ray tube and instrument specification. *Note:* If the quality area and the graticule area are not equal, this must be specified. *See also:* viewing area; graticule area; oscillograph.

(IM/HFIM) [40]

**quality assurance (QA) (1) (software quality assurance)** A planned and systematic pattern of all actions necessary to provide adequate confidence that the item or product conforms to established technical requirements.

(C/SE) 729-1983s, 730-1998

(2) All those planned and systematic actions necessary to provide adequate confidence that an analysis, measurement, or surveillance program will perform satisfactorily in service.

(NI) N42.23-1995

(3) **(monitoring radioactivity in effluents)** All planned and systematic actions necessary to provide adequate confidence that a system or component will perform satisfactorily in service.

(PE/NI/NP) 933-1999, N42.18-1980r

**quality assurance program plan** A document that contains or references the quality assurance elements established for an activity, group of activities, a scientific investigation or a project, and describes how conformance with such requirements is to be assured for the activities.

(NI) N42.23-1995

**quality assurance record (nuclear power quality assurance)** A completed document that furnishes evidence of the quality of items or activities, or both, affecting quality.

(PE/NP) [124]

**quality attribute** A characteristic of software, or a generic term applying to quality factors, quality subfactors, or metric values.

(C/SE) 1061-1998

**quality control (1) (nuclear power generating station)** Those quality assurance actions which provide a means to control and measure the characteristics of an item, process or facility to established requirements.

(PE/NP) 467-1980w

(2) Those actions that control and measure the attributes of the analytical process, standards, reagents, measurement equipment, components, system, or facility according to predetermined quality requirements.

(NI) N42.23-1995

**quality control chart** *See:* instrument quality control chart.

**quality factor (1) (network, structure, or material)** Two pi times the ratio of the maximum stored energy to the energy dissipated per cycle at a given frequency. *Notes:* 1. The  $Q$  of an inductor at any frequency is the magnitude of the ratio of its reactance to its effective series resistance at that frequency. 2. The  $Q$  of a capacitor at any frequency is the magnitude of the ratio of its susceptance to its effective shunt conductance at that frequency. 3. The  $Q$  of a simple resonant circuit comprising an inductor and a capacitor is given by

$$Q = \frac{Q_L Q_C}{Q_L + Q_C}$$

where  $Q_L$  and  $Q_C$ , are the  $Q$ s of the inductor and capacitor, respectively, at the resonance frequency. If the resonant circuit comprises an inductance  $L$  and a capacitance  $C$  in series with an effective  $R$ , the value of  $Q$  is

$$Q = \frac{1}{R} \left( \frac{L}{C} \right)^{1/2}$$

An approximate equivalent definition, which can be applied to other types of resonant structures, is that the  $Q$  is the ratio of the resonance frequency to the bandwidth between the frequencies on opposite sides of the resonance frequency (known as half-power points) where the response of the resonant structure differs by 3 decibels (dB) from that at resonance. 4. The  $Q$  of a magnetic or dielectric material at any frequency is equal to  $2\pi$  times the ratio of the maximum stored energy to the energy dissipated in the material per cycle. 5. For networks that contain several elements, and distributed parameter systems, the  $Q$  is generally evaluated at a frequency of resonance. 6. The nonloaded  $Q$  of a system is the value of  $Q$  obtained when only the incidental dissipation of the system element is present. The loaded  $Q$  of a system is the value of  $Q$  obtained when the system is coupled to a device that dissipates energy. 7. The period in the expression for  $Q$  is that of the driving force, not that of energy storage, which is usually half that of the driving force.

(Std100) 270-1966w

(2) In active filters the transfer functions are generally broken down into second-order sections expressed by biquadratic functions as follows:

$$T(s) = \frac{n_2 s^2 + n_1 s + n_0}{d_2 s^2 + d_1 s + d_0}$$

Such transfer functions are generally re-arranged in the following form where the zero  $Q$ -factor,  $Q_z$ , and the pole  $Q$ -factor,  $Q_p$ , may be identified.

$$T(s) = K \frac{s^2 + s \frac{\omega_{0z}}{Q_z} + \omega_{0z}^2}{s^2 + s \frac{\omega_{0p}}{Q_p} + \omega_{0p}^2}$$

(CAS) [13]

(3) Two  $\pi$  times the ratio of the maximum stored energy to the energy dissipated per cycle at a given frequency. An approximate equivalent definition is that the  $Q$  is the ratio of the resonant frequency to the bandwidth between those frequencies on opposite sides of the resonant frequency, where the response of the resonant structure differs by 3 dB from that at resonance. If the resonant circuit comprises an inductance,  $L$ , and a capacitance,  $C$ , in series with an effective resistance,  $R$ , then the value of  $Q$  is

$$Q = \frac{1}{R} \sqrt{\frac{L}{C}}$$

(IA/SPC) 519-1992

(4) A management-oriented attribute of software that contributes to its quality. (C/SE) 1061-1998

(5) Two pi times the ratio of the maximum stored energy to the energy dissipated per cycle at a given frequency. *Note:* In a parallel resonant circuit, such as a load on a power system

$$Q = R \sqrt{\frac{C}{L}}$$

where

$Q$  = quality factor

$R$  = effective load resistance

$C$  = effective load capacitance (including shunt capacitors)

$L$  = effective load inductance

Or, on a power system, where real power,  $P$ , and reactive powers,  $P_{qL}$ , for inductive load, and  $P_{qC}$  for capacitive load, are known as

$$Q = (1/P) \sqrt{P_{qL} \times P_{qC}}$$

where

$Q$  = quality factor

$P$  = real power

$P_{qL}$  = inductive load

$P_{qC}$  = capacitive load

(SCC21) 929-2000

**quality factor sample** A set of quality factor values that is drawn from the metrics database and used in metrics validation. (C/SE) 1061-1998

**quality factor value** A value of the direct metric that represents a quality factor. *See also:* metric value. (C/SE) 1061-1998

**quality management** That aspect of the overall management function that determines and implements the quality policy. (C/SE) 1074-1995s

**quality metric (software)** A quantitative measure of the degree to which software possesses a given attribute which affects its quality. *See also:* software; quality. (C/SE) 729-1983s

**quality of lighting (illuminating engineering)** Pertains to the distribution of luminance in a visual environment. The term is used in a positive sense and implies that all luminances contribute favorably to visual performance, visual comfort, ease of seeing, safety, and esthetics for the specific visual tasks involved. (EEC/IE) [126]

**quality of service (QoS)** The four negotiated parameters for a link: signaling speed, maximum turnaround time, data size, and disconnect threshold. (EMB/MIB) 1073.3.2-2000

**quality policy** The overall quality intentions and direction of an organization as regards quality, as formally expressed by top management. (C/SE) 1074-1995s

**quality requirement** A requirement that a software attribute be present in software to satisfy a contract, standard, specification, or other formally imposed document. (C/SE) 1061-1998

**quality subfactor** A decomposition of a quality factor or quality subfactor to its technical components. (C/SE) 1061-1998

**quantitative adjectives** *See:* functional adjectives; integer adjectives; mathematical adjectives.

**quantitative techniques, results or data** Procedures for developing numerical information, or the numerical information itself, that is capable of being systematically combined or compared with a standard to assess man-machine performance. (PE/NP) 845-1988s

**quantitative testing (test, measurement, and diagnostic equipment)** Testing that monitors or measures the specific quantity, level, or amplitude of a characteristic to evaluate the operation of an item. The outputs of such tests are presented as finite or quantitative values of the associated characteristics. (MIL) [2]

**quantity equations** Equations in which the quantity symbols represent mathematico-physical quantities possessing both numerical values and dimensions. (Std100) 270-1966w

**quantity of light (illuminating engineering)** (luminous energy,  $Q_v = \int \phi_v dt$ ) The product of the luminous flux by the time it is maintained. It is the time integral of luminous flux. (EEC/IE) [126]

(EEC/IE) [126]

**quantization (1) (telecommunications)** A process in which the continuous range of values of an input signal is divided into non-overlapping subranges, and to each subrange a discrete value of the output is uniquely assigned. Whenever the signal value falls within a given subrange, the output has the corresponding discrete value. *Note:* "Quantized" may be used as an adjacent modifying various forms of modulation, for example, quantized pulse-amplitude modulation. *See also:* quantization distortion; quantization level. (C/COM) [20], [123], [49], [85]

(2) **(data transmission)** In communication, quantization is a process in which the range of values of a wave is divided into a finite number of smaller subranges, each of which is represented by an assigned (or quantized) value within the subrange. *Note:* "Quantized" may be used as an adjective modifying various forms of modulation, for example, quantized pulse amplitude modulation. (PE) 599-1985w

(3) **(accelerometer) (gyros)** The analog-to-digital conversion of a gyro or accelerometer output signal that gives an output that changes in discrete steps, as the input varies continuously. (AES/GYAC) 528-1994

**quantization distortion (data transmission) (quantization noise)** The inherent distortion introduced in the process of quantization. (PE) 599-1985w

**quantization error (1) (supervisory control, data acquisition, and automatic control)** The amount that the digital quantity differs from the analog quantity.

(SWG/PE/SUB) C37.1-1987s, C37.100-1992

(2) *See also:* quantizing error. (AES) 686-1997

**quantization level (1) (data transmission)** A particular sub-range of a symbol designating it. (PE) 599-1985w

(2) **(telecommunications)** The discrete value of the output designating a particular subrange of the input. *See also:* quantization. (Std100) 270-1964w

**quantization noise** *See:* quantization distortion.

**quantize** To subdivide the range of values of a variable into a finite number of non-overlapping subranges or intervals, each of which is represented by an assigned value within the sub-range, for example, to represent a person's age as a number of whole years. (C) [20], [85]

**quantized pulse modulation** Pulse modulation that involves quantization. (EEC/PE) [119]

**quantized system** A system in which at least one quantizing operation is present. (PE/EDPG) [3]

**quantizer** A device that digitizes analog input; for example, a digitizing tablet, motion sensor, or a light pen. *See also:* digitizer. (C) 610.10-1994w

**quantizing error** An error caused by conversion of an analog variable having a continuous range of values to a quantized form having only discrete values, as in analog-to-digital conversion. The error is the difference between the original (analog) value and its quantized (digital) representation. *Synonym:* quantization error. (AES) 686-1997

**quantizing loss (A)** In phased arrays, a loss in peak gain that occurs when the beam is phase steered by digitally controlled phase shifters, due to the quantizing errors in the phase shifts applied to the various radiating elements. **(B)** In signal processing, a loss that occurs when elements of a composite signal (for example, complex amplitudes of pulses in a pulse train) are quantized (digitized) before being combined. *See also:* quantizing error. (AES) 686-1997

**quantizing noise (1) (analog voice frequency circuits)** The noise introduced during the process of digitally encoding an analog signal. (COM/TA) 743-1995

(2) **(distortion)** The impairment introduced during the process of digitally encoding and decoding an analog signal. (COM/TA) 1007-1991r

(3) **(telecommunications)** A random signal caused by the error of approximation in a quantizing process. It may be regarded as noise arising in the pulse-code modulation process when the code-derived facsimile does not exactly match the waveform of the original message. (COM/TA) 973-1990w

**quantizing operation** One which converts one signal into another having a finite number of predetermined magnitude values. (PE/EDPG) [3]

**quantum efficiency (1) (photocathodes)** The average number of electrons photoelectrically emitted from the photocathode per incident photon of a given wavelength. *Note:* The quantum efficiency varies with the wavelength, angle of incidence, and polarization of the incident radiation. *See also:* phototube; photocathode; semiconductor. (ED/NPS) 161-1971w, 398-1972r

(2) **(laser, maser, laser material, or maser material)** The ratio of the number of photons or electrons emitted by a material at a given transition to the number of absorbed particles. (LEO) 586-1980w

(3) **(fiber optics)** In an optical source or detector, the ratio of output quanta to input quanta. Input and output quanta need not both be photons. (Std100) 812-1984w

**quantum noise (fiber optics)** Noise attributable to the discrete or particle nature of light. *Synonym:* photon noise. (Std100) 812-1984w

**quantum-noise-limited operation (fiber optics)** Operation wherein the minimum detectable signal is limited by quantum noise. *See also:* quantum noise. (Std100) 812-1984w

**quarter adder** An adder that accepts two inputs, producing only a sum as output according to the table below. *Contrast:* full adder; half adder. *See also:* exclusive OR.

input #1	0	0	1	1
input #2	0	1	0	1
output sum	0	1	1	0

quarter adder

(C) 610.10-1994w

**quarter-inch cartridge** A type of storage medium for magnetic tapes in which each tape is encased in a small cartridge. *Synonym:* minicartridge. (C) 610.10-1994w

**quarter-phase or two-phase circuit** A combination of circuits energized by alternating electromotive forces that differ in phase by a quarter of a cycle, that is, 90 degrees. *Note:* In practice the phases may vary several degrees from the specified angle. *See also:* center of distribution. (T&D/PE) [10]

**quarters (electric installations on shipboard)** Where used in these recommendations, those spaces provided for passengers or crew, as specified, which are actually used for berthing, mess spaces, offices, private baths, toilets and showers, and lounging rooms, smoking rooms, and similar spaces. (IA/MT) 45-1983s

**quarter-squares multiplier** An analog multiplier incorporating inverters, analog adders, and square-law function generators, whose operation is based on the identity:

$$xy = \frac{(x + y)^2 - (x - y)^2}{4}$$

(C) 610.10-1994w

**quarter-thermal-burden ambient-temperature rating** The maximum ambient temperature at which the transformer can be safely operated when the transformer is energized at rated voltage and frequency and is carrying 25 % of its thermal-burden rating without exceeding the specified temperature limitations. (EEC/PE) [119]

**quartet (1) (mathematics of computing)** A group of four adjacent digits operated upon as a unit. (C) 1084-1986w

(2) A byte composed of four bits. *Synonym:* four-bit byte. *See also:* nibble. (C) 610.10-1994w

**quasi-analog signal (data transmission)** A digital signal after conversion to a form suitable for transmission over a specified analog channel. The specifications of an analog channel includes the frequency of range, frequency of bandwidth, signal-to-noise ratio (snr), and envelope delay distortion. When this form of signaling is used to convey message traffic over the public dial-up network telephone systems, it is often referred to as voice data. (PE) 599-1985w

**quasi-asymptotic stability** (solution  $\phi(x(t_0);t)$ ). Implies

$$\lim_{t \rightarrow \infty} \|\Delta\phi\| = 0$$

*Notes:* 1. Quasi-asymptotic stability is condition. 2. in the definition of asymptotic stability and, hence, need not imply Lyapunov stability. 3. An example of a solution that is quasi-asymptotically stable but not asymptotically stable is the solution  $x(t) = 0$  of the system  $\dot{x} = x^2$ . The solution of the above system for a perturbation  $\Delta x(t_0)$  from 0 is

$$\rho(\Delta x(t_0);t) = \Delta x(t_0)/[1 - (t - t_0)\Delta x(t_0)]$$

Obviously,  $\phi(\Delta x(t_0);t)$  approaches zero as  $t$  approaches  $\infty$ , yet is not Lyapunov stable since it is unbounded at  $t = t_0 + (1/\Delta x(t_0))$ . *See also:* control system. (CS/IM) [120]

**quasi-crystalline approximation** A formulation used to determine the coherent mean field of a wave propagating in a non-tenuous (dense) random medium; a higher order approximation to Foldy's approximation. (AP/PROP) 211-1997

**quasi-Gaussian pulse shape** A pulse shape approximated by the curve of a normal or Poisson distribution. In this standard, four or more integrators shall be used in producing the pulse. *See also:* integrated pulse. (NPS) 325-1996

**quasi-Gaussian shaping (1) (germanium gamma-ray detectors) (charged-particle detectors)** Pulse shaping consisting of one differentiation followed by four or more integrations resulting in a pulse shape that is approximated by a Gaussian curve. For  $n$  integrations the shaping network is sometime denoted as  $CR - (RC)^n$ . (NPS) 325-1986s

**(2) (charged-particle detectors)** Pulse shaping in a linear amplifier in which the amplitude of the shaped pulse versus time approximates that of a normal distribution (in the case of unipolar shaping) or its mathematical derivative (in the case of bipolar shaping). Unless otherwise stated, the shaping network shall contain at least four cascaded low-pass sections (integrators). (NPS) 300-1988r

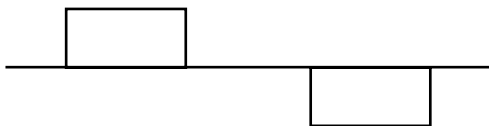
**quasi-impulsive noise** A superposition of impulsive and continuous noise. *See also:* electromagnetic compatibility. (EMC/INT) [53], [70]

**quasi-peak detector** A detector having specified electrical time constants that, when regularly repeated pulses of constant amplitude are applied to it, delivers an output voltage that is a fraction of the peak value of the pulses, the fraction increasing toward unity as the pulse repetition rate is increased. *Synonym:* QP detector. *See also:* electromagnetic compatibility. (EMC/T&D/PE/INT) [53], 539-1990, [70]

**quasi-peak voltmeter** A quasi-peak detector coupled to an indicating instrument having a specific mechanical time-constant. *See also:* electromagnetic compatibility. (EMC/INT) [53], [70]

**quasi-random signal** A pseudo-random test signal that has artificial constraints to limit the maximum number of zeros in the bit sequence. (COM/TA) 1007-1991r

**quasi-square wave (converter characteristics) (self-commutated converters)** The stepped waveform obtained from the difference of two phase-shifted square waves of equal amplitude.



quasi-square wave

(LA/SPC) 936-1987w

**quasi-static field** A field that satisfies the condition  $f \ll c/l\pi\sqrt{2}$ , where  $f$  is the frequency of the field,  $c$  is the speed of light, and  $l$  is a characteristic dimension of the measurement geometry, e.g., the distance between the field source and the measurement point. *Note:* Power frequency magnetic and electric fields near power lines and appliances are examples of quasi-static fields. (T&D/PE) 1308-1994

**quasi-triangular pulse shape (1)** A pulse shape approximated by the curve of a normal or Poisson distribution. In this standard, four or more integrators shall be used in producing the pulse. *See also:* integrated pulse. (NPS) 325-1996

**(2)** A pulse shape approximated by a triangle with a truncated top. Such a shape can be obtained from a  $CR - (RC)n$  or  $n$  sinen network by summing appropriate signal fractions from the  $n$  integrating sections. (NPS) 325-1996

**quaternary code** A code whose output alphabet consists of four symbols. *See also:* ternary code. (IT) [123]

**quenched sample (1) (liquid-scintillation counters)** A counting sample (material of interest plus liquid-scintillation solution) that contain adulterants that reduce the photon output from the vials. (NI) N42.16-1986

**(2) (liquid-scintillation counters)** A counting sample (material of interest plus liquid-scintillation solution) that contains chemical impurities that reduce the photon output to the photomultiplier tubes. (NI) N42.15-1990

**quenched spark gap converter (dielectric heating)** A spark-gap generator or power source that utilizes the oscillatory discharge of a capacitor through an inductor and a spark gap as a source of radio-frequency power. The spark gap comprises one or more closely spaced gap operating in series. *See also:* induction heating. (IA) 54-1955w, 169-1955w

**quenching** The process of terminating a discharge in a Geiger-Mueller radiation-counter tube by inhibiting a reignition. *Note:* This may be effected by self-quenching (internal quenching) by use of an appropriate gas or vapor filling, or externally (external quenching) by momentary reduction of the applied potential difference. (NI/NPS) 309-1999

**quenching circuit (radiation counters)** A circuit that reduces the voltage applied to a Geiger-Mueller tube after an ionizing event, thus preventing the occurrence of subsequent multiple discharges. Usually the original voltage level is restored after a period that is longer than the natural recovery time of the Geiger-Mueller tube. *See also:* anticoincidence. (ED) [45]

**query (data transmission)** The process by which a master station asks a slave station to identify itself and to give its status. *See also:* poll. (PE) 599-1985w

**query language** A database manipulation language used to access information stored in a database. *Contrast:* specification language; programming language. (C) 610.13-1993w

**queue (1) (software)** A list that is accessed in a first-in, first-out manner. *See also:* stack. (C/SE) 729-1983s

**(2)** *See also:* batch queue.

**queue allocation protocols** The protocols used to allocate queue space when several nodes are sending packets to a shared node. This involves rejecting packets (with a busy status), but reserving future queue space; the reserved queue space is eventually used during one of the packet's retransmissions. (C/MM) 1596-1992

**queued arbitrated access function** The *access control function* in this part of ISO/IEC 8802 that uses the *Distributed Queue* to access *empty Queued Arbitrated (QA) slots* for the transfer of *QA segments*. *Synonym:* QA access function. (LM/C) 8802-6-1994

**queued arbitrated segment** A *segment* transferred using *Queued Arbitrated (QA) Access functions*. *Synonym:* QA segment. (LM/C) 8802-6-1994

**queued arbitrated slot** A *slot* that is used for the transfer of a *QA segment*. *Synonym:* QA slot. (LM/C) 8802-6-1994

**queue on lock bit (QOLB)** A mechanism for efficiently sequencing the access to resources that are not to be used by more than one process at a time. (C/MM) 1596-1992

**queue position** The place a job occupies in a queue. This place is relative to other jobs in the queue and defined in part by submission time and its priority. *See also:* job priority. (C/PA) 1003.2d-1994

**queue priority** The maximum job priority allowed for any job in a given queue. The *queue priority* is set and may be changed by users with appropriate privilege. The priority shall be bounded in an implementation-defined manner. (C/PA) 1003.2d-1994

**quick-break** A term used to describe a device that has a high contact opening speed independent of the operator. (SWG/PE) C37.100-1992

**quick-break switch (high-voltage switchgear)** A switch that has a high contact opening speed independent of the operator. (SWG/PE) C37.40-1993

**quick charge** *See:* boost charge.

**quick-flashing light (illuminating engineering)** A rhythmic light exhibiting very rapid regular alternations of light and darkness. There is no restriction on the ratio of the durations of the light to the dark periods. (EEC/IE) [126]

**Quick FORTRAN** A subset of FORTRAN that is easy to learn due to its efficient debugging facility and interactive interface. (C) 610.13-1993w

**quick-make** A term used to describe a device that has a high contact closing speed independent of the operator.

(SWG/PE) C37.100-1992

**quick release (control brakes)** The provision for effecting more rapid release than would inherently be obtained. *See also:* electric drive.

(IA/IAC) [60]

**quick set (control brakes)** The provision for effecting more rapid setting than would inherently be obtained. *See also:* electric drive.

(IA/IAC) [60]

**quick startup reserve (power operations)** The operating reserve available within a specified time through startup and synchronization of quick start internal combustion generation.

(PE/PSE) 858-1987s

**quiescent** *See:* supervisory control.

**quiescent-carrier telephony** That form of carrier telephony in which the carrier is suppressed whenever there are no modulating signals to be transmitted.

(EEC/PE) [119]

**quiescent current (electron tube)** The electrode current corresponding to the electrode bias voltage.

(ED) [45], [84]

**quiescent operating point (magnetic amplifier)** The output obtained under any specified external conditions when the signal is non-time-varying and zero.

(MAG) 107-1964w

**quiescent point (amplifiers)** That point on its characteristic that represents the conditions existing when the signal input is zero. *Note:* The quiescent values of the parameters are not in general equal to the average values existing in the presence of the signal unless, the characteristic is linear and the signal has no direct-current component. *See also:* operating point.

(EEC/PE) [119]

**quiescent state** A state in which all modules on a Futurebus+ backplane bus have ceased all activity on all Futurebus+ defined signals and all user I/O field signals.

(C/BA) 896.2-1991w

**quiescent supervisory system (station control and data acquisition)** A system that is normally alert but inactive, and transmits information only when a change in indication occurs at the remote station or when a command operation is initiated at the master station. *See also:* supervisory system.

(SWG/PE/SUB/PE) C37.100-1992, C37.1-1994

**quiescent value (pulse transformers)** (base magnitude) The maximum value existing between pulses.

(PEL/ET) 390-1987r

**quiet automatic volume control** Automatic volume control that is arranged to be operative only for signal strengths exceeding a certain value, so that noise or other weak signals encountered when tuning between strong signals are suppressed. *See also:* radio receiver.

(EEC/PE) [119]

**quiet ground (health care facilities)** A system of grounding conductors, insulated from portions of the conventional grounding of the power system, that interconnects the grounds of electric appliances for the purpose of improving immunity to electromagnetic noise.

(EMB) [47]

**quieting sensitivity (1) (frequency-modulation receivers)** The minimum unmodulated signal input for which the output signal-noise ratio does not exceed a specified limit, under specified conditions. *See also:* radio receiver.

(VT) [37]

**(2) (test, measurement, and diagnostic equipment)** The

level of a continuous wave (CW) input signal which will reduce the noise output level of a frequency-modulation (FM) receiver by a specified amount, usually 20 dB. (MIL) [2]

**quiet sun (radio-wave propagation)** The sun in the absence of any unusual electromagnetic activity.

(AP/PROP) 211-1990s

**quiet tuning** A circuit arrangement for silencing the output of a radio receiver except when the receiver is accurately tuned to an incoming carrier wave. *See also:* radio receiver.

(EEC/PE) [119]

**quiet zone (1)** The area immediately preceding the start character and following the stop character, which contains no markings.

(PE/TR) C57.12.35-1996

**(2)** A described volume within an anechoic chamber where electromagnetic waves reflected from the walls, floor, and ceiling are stated to be below a certain specified minimum. The quiet zone may have a spherical, cylindrical, rectangular, etc., shape depending on the chamber characteristics.

(EMC) 1128-1998

**quill drive** A form of drive in which a motor or generator is geared to a hollow cylindrical sleeve, or quill, or the armature is directly mounted on a quill, in either case, the quill being mounted substantially concentrically with the driving axle and flexibly connected to the driving wheels. *See also:* traction motor.

(EEC/PE) [119]

**quinary** Five-level.

(C/LM) 802.3-1998

**quinhydrone electrode** *See:* quinhydrone half cell.

**quinhydrone half cell** A half cell with an electrode of an inert metal (such as platinum gold) in contact with a solution saturated with quinhydrone. *Synonym:* quinhydrone electrode. *See also:* electrochemistry.

(EEC/PE) [119]

**quintet (1)** A byte composed of five bits. *Synonym:* five-bit byte.

(C) 610.10-1994w

**(2) (local area networks)** A contiguous string of five bits.

(C) 8802-12-1998

**quotation board** A manually or automatically operated panel equipped to display visually the price quotations received by a ticker circuit. Such boards may provide displays of large size or may consist of small automatic units that ordinarily display one item at a time under control of the user. *See also:* telegraphy.

(EEC/PE) [119]

**quotient** *See:* phasor product.

**quotient relay** A relay that operates in response to a suitable quotient of two alternating electrical input quantities. *See also:* relay.

(SWG/PE) C37.100-1981s

**Q video signal (National Television System Committee color television)** One of the two video signals ( $E'_1$  and  $E'_2$ ) controlling the chrominance in the NTSC system. *Note:* It is a linear combination of gamma-corrected primary color signals,  $E'_R$ ,  $E'_G$ , and  $E'_B$ , as follows:

$$\begin{aligned} E'_Q &= 0.41(E'_B - E'_Y) + 0.48(E'_R - E'_Y) \\ &= 0.21E'_R - 0.52E'_G + 0.31E'_B \end{aligned}$$

(BT/AV) 201-1979w

**QWERTY keyboard** A standard keyboard layout, named for the first six keys of the third row from the bottom. That is, when the row is read across, the keys read Q W E R T Y U I O P. *Contrast:* Dvorak keyboard.

(C) 610.10-1994w