** bc2uout.sch  19.10.98

Outline of U/V showing proposed structure of CSD
and the original CSD (subject) classes, from
Scientific basis of technology to Materials
technology. I plan to make all these directly
addable retroactively (& some- sometimes building
forward) to each individual technology, reserving
2/9, A/G for this. See instructions preceding U8A.

I've added to these some intercalated classes
which appear variously in your schedules filing
before, in the middle of, or after the above
'common' classes, and the status & relationship
of which is sometimes not clear to me.

From UH onwards appears the rest of your
schedule, notated with what I'd like to think is
a reasonably final allocation. I have added a
fair number of subclasses whose order I'm not
quite clear about (usually as a result of the
variations noted above).

As usual, (encloses any term which is
synthetically constructed (excluding the first
appearance of the term in this schedule (eg the
CSD at U2). When the normal synthetic provision
is replaced by a different, intercalated
provision, this is indicated by a note; eg UF4_B.

* Add to U2 numbers 2/X following AY2 with the
  slight amendments noted.

Profession
Technologists, engineers
(By occupational status)
Technicians, mechanics
Organizations
Conferences
International bodies
National bodies
Communication & information
Diffusion of technical information
Publishing & broadcasting
Reporting
Education & training in technology
History of technology
In AY, period is cited before place for the
history of science (including sci/tech
together).

Methodology
(Sources)
Industrial archeology
(By place) * By Schedule 2
(By period)

* Add to U28 letters B/V following AY28.
[1-Technology U]
[2-(CSD) U2]
  . [3-History of technology U27]
    . [4-(By period) U28A]

U29 2
  04. . Biography of technologists
  04. . Technological progress, technological development
  04. . . Inventions, technological discovery
  06. . . . * For patents, see U29_SBM.

A
  02 Social aspects of technology, technology & society
  03. * For impact of technology on society, see K
  03. * As Classes K and L/W.

EP
  03. Technology policy

KFD
  03. Attitudes towards technology

KIG
  04. . Hostility to technology, Ludditism, anti-
  04. . technology

KSL M
  03. Technology in non-literate societies

KW
  03. Custom & folklore in technology

PY
  03. Ethics & technology

S
  03. Law & technology

SBM
  04. . Patent law & technology
  05. . . * When dealing with the influence of law on
  05. . . technology; patent law as a part of
  05. . . substantive law is preferred in Class S
  05. . . Law.

T
  03. Economics

TOO
  04. . Export of technology

TPH
  04. . Less developed countries & technology

TPK
  4D. . developing countries

TPL
  04. . Developed countries, industrialized countries

U
  04. . Standards & standardization
  05. . . * For standardization as an element in
  05. . . production, see UB.

W
  03. Technology as an art
  04. . * See industrial design WD and the note there
  04. . regarding the relations of technology to the
  04. . arts.

X
  02 Technology as a discipline

XJ
  03. Objectives of technology

U2A
  03. Philosophy of technology

U2K
  03. Technology as a science
  04. . * For works dealing with science and technology
  04. . combined, see AY; for scientific aspects of a
  04. . technology, see U4B...

U2M
  02 Mathematics in technology, engineering mathematics
  03. * As AM

U2X
  02 Statistics in technology
  03. * As AX

@ . (Operations & agents)

U32
  03. Research & development

U34
  04. . Theory in technology

U39 Q
  03. Organization & management in technology
  04. . * Add to U39 letters Q/Y following T in TQ/TY.

QR
  04. . Management techniques

QS
  05. . . Operational research
  06. . . . * See also Systems engineering UA
01 Technology
02.  ** File bc2out2.sch  23.12.98
02.  ** Proposed amendments to Outline of 23.10.98. If
02.    agreed, the following will replace U39/U4 in that
02.    Outline.

02.  (Operations, processes & properties)

U39 Q 03.  Organization & management in technology
04.    * See also Project planning U3A.

U3A 03.  Project planning in technology (general)
04.    * Add to U3 letters A/D following U03; eg U3D_E

U3E 03.  (Processes special to the technology)
04.    * Use this position only to qualify a particular
04.    technology; see U03_F Architecture (a special
04.    service in building construction) for an
04.    example.
04.    ** Not sure whether this unusual setup is worth
04.    generalizing like this. Perhaps Architecture
04.    wd be better given its own (enumerated)
04.    classmark in UO.

U3F 03.  (Environmental aspects of particular technologies)
04.    * For environmental aspects of technology
04.    generally, see UX/UY.
04.    * Classmarks F/G following U3 are not to be used
04.    alone. They are to be used only (amplified as
04.    necessary) under a particular technology; eg
04.    UFO_3FC Nuclear reactors --_Pollution control.
04.    * Add to U3F letters A/Y following UX;
04.    * Add to U3G letters A/Y following UY.
04.    * Some major classes are given below only to
04.    indicate the scope of the qualification
04.    available.

U3F C 04.  Pollution control
D 05.  Waste management... Re-use, recycling...

H 04.  Public & industrial health aspects

U3G 04.  Safety engineering aspects

U3G G 05.  Rescue & salvage aspects

H 04.  * Unwanted effects
05.  * Adapted from AY37/8

U3J 03.  Technical faults & defects

U3K 02.  (Relations of one particular technology to others)
03.  ** See notes under rubric (Particular technologies)
03.  following U7. This position in filing order
03.  reflects the position in BSO of the
03.  intercalators needed to allow the necessary
03.  linking. In some ways, locating the
03.  intercalators at UG (when qualifying a
03.  particular technology) gives a better filing
03.  order. Perhaps both provisions shd be made, one
03.  as an alternative?
03.  * Add to U3K letters H/Y following U;
03.  * Add to U3L letters A/S following V.
03(Operations & processes special to a technology)

04. ** The main purpose of 3A/3Y is to try to allow for
04. the various classes which file before or in the
04. middle of the 'common' classes U3/UF in your
04. schedules; eg site planning in construction
04. technology UO.

U3A 04. Special relationship activities ]
05. * Use this position only to qualify a particular
05. technology; eg architectural practice as a
05. special activity in building construction US3_A.

U3C 04. Project planning & management ]
05. * Use this position only to qualify a particular
05. technology; see UP Construction technology for an
05. example of its use.
05. * Add to U3C letters A/Y following UP3_C if
05. applicable.

U3D 04. Environmental aspects of technology
05. * Use this position only to qualify a particular
05. technology; the general class is at UX/UY.
05. * Add to U3D letters following UX
05. * Add to U3E letters following UY; eg

U3D C 05. Pollution control
D 06. * Waste management
07. * Re-use, recycling
05. Public & industrial health aspects

U3E 05. Safety engineering aspects
U3F 05. Unwanted effects
06. * Adapted from AY37/8

U3H 04. Technical faults, defects
05. ** This seems reasonably closely related to the
05. above?

03 Application aspects of natural science

04. Applied physics, physics in technology

J4C 04. Applied chemistry ]
05. * See VLH

U4E 04. Bionics (Common subject subdivision from AY37/7)
03(Technologies commonly applicable to other technologies)

Θ 04. (Agents)

U4F 05. Equipment & materials (together)
06. * Not limited to a particular technology.
06. * For materials alone, see UF
06. * Add to U4F letters following AY3_B;

U4G 05. Handling equipment & materials
06. ** In AY this refers to handling the physical
06. * agents of research. Is it worth
06. * materials of technological production at UF?
06. * Add to U4G letters following AY3_C.

U4H 05. (Processes & effects of physical phenomena)
06. * Add to U4H letters following AY3_F.
02(Application aspects of natural sciences
03. ** The purpose of these amendments to U4 wd be (1) to
03. give a shorter classmark for most applications of
03. physics; (2) to give more notation for Equipment &
03. plant (as distinct from instrumentation at U5).
U4 03. Applied physics, physics in technology
04. . * Add to U4 letters A/L following B;
04. . * Add to U4M letters M/W following B.
U4N 03. Applied chemistry
U4O 03. Applied biology
@ 02(Agents & Materials)
U4Q 03. Equipment & materials together)
04. . * For works dealing with concepts from both
04. . facets.
04. . * Add to U4Q letters B/T following AY3; eg U4Q_JE.
04. . Reliability of equipment & materials
@ 02(Agents)
U4R 03. Equipment & plant (general)
U4R QR 04. . )Materials of equipment & plant(
05. . . * For materials used in a technology per se
05. . . (especially the energy technologies UF/UL)
05. . . see UE.
U4S 04. . Industrial laboratories
U4T /Y 04. . (Specific items of plant or equipment)
05. . . * Nearly all the literature relates to
05. . . particular technologies.
U5 04. . Instruments & instrumentation
U4J
05(Properties, parts & kinds).
06. * Add to U4 letters J/Q following AY3; eg

U4J E
06. Reliability

U4K L
06. Optical properties

U4N B
06. Surfaces

U4P V
06. Intelligent equipment & materials

U4R
05(Materials of equipment & instruments)
06. * For materials of technological production, see
06. UF.
06. * Add to U4 letters R/T following AY3

U4U
05(Equipment & plant)
06. * Add to AV4 letters U/X following AY3; eg
06. Industrial laboratories
06. Instruments & instrumentation
07. * The chief difference between the treatment
07. of this class in AY and your schedule is
07. that in AY I have (perhaps unwisely)
07. attempted to separate those instruments &
07. instrumental operations reflecting an
07. action on phenomena from those reflecting
07. some other characteristic - especially
07. their energy system. Also, AY distinguishes
07. operations internal to the instrumentation
07. (eg switching, transmitting) and operations
07. on the phenomena (eg counting, measuring).
07. But I'm afraid there are occasional
07. overlaps between these different arrays (eg
07. indicators, recorders) & these need to be
07. eliminated or strictly controlled by
07. defining notes.
07. * In AY the investigatory operations have
07. been separated pretty clearly from the
07. instrumental ones; again, I may have been
07. unwise to attempt this. It would be more in
07. accord with your instrumentation class if
07. this distinction were minimized and all
07. the classes AV4/7 were interpreted as
07. instrumentation?. This term would then
07. cover the operation of using & supplying
07. instruments as well as describing the
07. instruments themselves.

U5
07. Components in instrumentation
08. * Add to U5 numbers & letters 2/V

U5X
07. (Types of instrumentation)
07. * Add to U5X letters J/V following AY5
[1] Technology U

[2] (Operations & agents) G

[3] (Technologies commonly applicable to other technologies) G

[4] (Agents) G


[7] (Types of instrumentation) U5X

G 04.

(Methods, techniques, instrumental operations)

05. * Add to U numbers 6/7 following AV; eg

U66 05.

High-speed instruments & techniques

U69 05.

Instrumentation & physical methods

U6B 06.

Mechanical... Thermal... Electromagnetic...

U6 05.

(By action on phenomenon investigated)

U74 G 06.

Detecting & observing (together)

U76 06.

Measurement

U7A 06.

Testing & evaluation

U7F 06.

Modelling & simulation

U77 06.

Imaging... Magnification... Microscopy...

U7 07.

Holography, wavefront reconstruction

07.

imaging...

U7M 07.

Spectroscopy & spectrography

U7P 06.

Scatter techniques... Tracers...

G 02 (Particular technologies)

** The selection of subclasses under the various technologies below has been determined solely by the need to decide just where a number of quasi-common technical operations, etc. file in relation to the 'main-classes' U4P/U4F which it is proposed to apply directly to each & every class.

* Any given technology may be qualified as follows (where the hyphen represents the classmark of the technology):

* Add to - numbers & letters 2/F following U;

* Add to -G letters G/Y following U if applicable;

* Add to -GZ letters A/R following V if applicable.

** The provision of intercalators G and GZ reflects your provision of .06/.08 for Internal combination in B50. These imply that forward building may sometimes be necessary, since retro is not specified. Although I can find no comparable provision in yr schedules, I assume you wd still consider such provision desirable & may simply have left it to me, as notator? I wonder if
02(Particular technologies)
03. ** file u8a.sch 1.12.98; add u8ag.sch (Control)
03. 2.12.98

U8A 03. Systems engineering
U8A 2M 04. )Mathematical techniques(
05. * For mathematical modelling, see U8A_7F.
2QI 05. Tensors
2RS 05. Algebra
2RT 9L 06. Theory of equations
2TB 06. Matrix algebra
2W 05. Analysis
06. Integral transforms
06. Combinatorial mathematics
06. Sorting
06. Graph theory
06. Topology
06. Set theory
06. Number theory

2X 05. Statistics and probability
06. Queueing
06. Games
06. Monte Carlo method
05. (Particular mathematical techniques)
06. Root-locus
06. Volterra series
06. Singular perturbations
06. Harmonic analysis
06. Signal flow graphs
06. Banach spaces
06. Eigenvalues
06. Canonical forms

@ 04. (Operations & processes)
U8A 3C 05. )Planning(
06. Exploratory planning
06. Development planning
06. Current engineering studies

3F 05. )Unwanted effects(
06. * See Systems behaviour U8A_GD

7F 05. Modelling
06. Qualitative
07. Input-Output
06. Quantitative

7FM 07. Mathematical modelling
08. Identification
08. Estimation
09. Parameters
09. State
10. (Variables)
11. Observers
08. Holistic mapping
08. Pole assignment
08. Order reduction
08. Collected data models
08. Analytical models
08. Simulation

9 05. )Computer technology in systems engineering(
the 3rd note at the very beginning of yr outline has something to do with it?

Systems engineering

Analysis

Mathematics & statistics
(Particular techniques)

Planning

Unwanted effects

Modelling

Broadening of system... ** FES

** I’m noting under each main class
the first enumerated subclass
(FES) so far as I can make out what
this wd be if the various common &
 quasi-common concepts listed at
U3A/UF (or applied in special
 guises under particular classes)
 are correct.

(Properties)

Efficiency...

Control systems

Analysis & design

Mathematics & statistics

Optimization

* I can’t find a definition
 of mathematical
 programming; I assume it’s
 synonymous with the
 application of this class.

Unwanted effects

Modelling(—)

Efficiency(—)

(Parts) ** FES

Computers

(Processing) Software

** This would allow the uninterrupted
 application of the ‘common’
 concepts U3/UF. The alternative
 (following your schedule order)
 would require an intercalator to
 file it before U9E )Energy
 sources(. Or, we could make room
 for it following the last of the
 (Operations on) classes in UDP
 (say). Conceptually, this would
 give your existing order, which I
 agree is correct (ie Processes
 following Operations). I indicate
 the provision needed for this
 arrangement at U9D_P below.

<6>
[2- (Particular technologies) Θ]
[3- Systems engineering U8A]
[4- (Operations & processes) Θ]
[5- )Computer technology in systems engineering( U8A9]

U8A A 05. )Testing(
B 05. (Qualification by rest of technology class)
06. . * The provisions indicated in the notes in the
06. . Outline schedule (19.10.98) preceding U8A, for
06. . the subdivision of any technology, are
06. . modified here to meet the special needs of
06. . systems engineering.
06. . * Add to U8A_B letters B/Y following U if
06. . applicable.
06. . * Add to U8A_C letters A/R following V of
06. . applicable.

D 04Systems communication & control -
05. * Add to U8A letters G/P following AY with, the
05. additions & modifications indicated.

E 05. Systemology in systems engineering
06. . * Do not apply numbers and letters 2/F following
06. . U to this general class, but to U8A in general.
06. . * For mathematics and statistics in systems
06. . engineering, see U8A_2M.

G9B 06. . (Analysis and design)
G9G 07. . Broadening of system
G9H 07. . Optimisation
G9J 08. . . Trade-off studies
G9K 08. . . Criterion functions
G9L 08. . . Delimitation of objectives ]

GC 06. . )Systems behaviour(
GD 07. . . (Unwanted effects and problems)
GDF 08. . . Faults
GDH 09. . . Deterioration
GDJ 09. . . Failure
GE 08. . . Errors
GEO 09. . . Mean square
GEK 08. . . Bias
GEM 08. . . Drift
GNY 06. . )State of system(
07. . * Properties of engineering systems.

GO 07. . . Efficiency
GOV 07. . . Effectiveness
GP 07. . . Accuracy
GQ 07. . . Reliability
GR 07. . . Consistency
GRR 07. . . Resolution
GS 07. . . Sensitivity

GX 07. . . Transfer functions
08. . . * Input/output ratios.
H 07. . . Variability
HH 08. . . Change of state (systems engineering)
HK 09. . . . Cycles (systems engineering)
HKL 10. . . . . Limit cycles

<2>
[3-Systems engineering U8A]
[4-Systems communication & control - U8AF]
. . . [7-Variability U8AH]
. . . . [8-Change of state (systems engineering) U8AHH]
. . . . . [9-Cycles (systems engineering) U8AHK]
. . . . . . [10-Limit cycles U8AHKL]

U8A RN 09. . . . . . . Response (systems engineering)
ENN 10. . . . . . . Frequency response
ENP 10. . . . . . . Impulse response
HNS 10. . . . . . . Step response
HNT 10. . . . . . . Time response
HNW 11. . . . . . . Delay
HQ 12. . . . . . . . Hysteresis
HRB 09. . . . . Saturation
HU 09. . . . . . . Stability
HUH 10. . . . . . . Nyquist plots

04(Parts of engineering systems)

U8A JX 05. Filters

8 04(Kinds of engineering systems) Add from A7

U8A KD 05. Compartmental
KE 05. Multiple
KF 05. Multilevel
KG 05. Repairable
KL 05. Analytic
KN 05. Stochastic
KO 06. . Markov process

KOT 05. Degenerate
KOV 05. Distributed parameter
KP 05. Stationary
KQ 05. Non-stationary
KS 05. Multivariable
KT 05. Multiple input-Single output

KV 05. Analogue, Continuous
KK 05. Discontinuous
KXO 06. . On-Off
KY 06. . Digital

LB 05. Periodic
LC 05. Time delay
LD 05. Delay-Differential
LE 05. Time dependent
LF 05. Relay
U8A LG 05. Parabolic
  LH 05. Hyperbolic
  LI 05. Integral
  LN 05. Linear
  LS 06. Bilinear
  KM 05. Non-linear
  K-MV 05. Saturating
  K-MW 05. Singularly perturbed
  LND 05. Sampled data
  LNEB 05. Minimum time
  LNEC 05. Minimum cost
  LNEE 05. Minimum energy
  LNF 05. Adaptive systems
  LNV 05. Fuzzy systems

P 03 Communication & control in engineering
  04. ** also separate file u8aq.sch 1.12.98
  04. * Add to U8A_P letters N/Y following AYP; eg

PN 04. Information theory, communication theory

PS 05. Signalling

PT 06. Coding

PU 05. Channel capacity

PW 05. Interference
  06. * For noise, see U8A_QGE_N.

Q 03 Control systems
  04. ** At AYQ this is equated with cybernetics.
  04. * Add to U8A letters Q/S following AY; eg

Q2M 04. Mathematical techniques
  05. Algebra
  06. Theory of equations
  06. Matrix algebra
  07. Eigenvalues
  07. Canonical forms
  06. Tensors
  05. Topology
  06. Signal flow graphs
  05. Analysis
  06. Functional analysis
  07. Banach spaces
  07. Harmonic analysis
  06. Integral transforms
  06. Fourier transforms
  06. Laplace transforms
  06. Z transforms
  05. Numerical analysis
06. Analytical methods
07. . Perturbation methods
08. . . Singular perturbations
06. Approximation
07. . Describing functions
07. . Polynomial approximation
07. . Chebyshev approximation
07. . Interpolation
07. . Extrapolation
07. . Data fitting
07. . Least squares
07. . Fourier analysis
07. . Iterative methods
07. . Bessel functions
07. . Relaxation methods
07. . Gradient methods
07. . Quadrature methods
07. . Variational methods
08. . . Complementary variational methods
08. . . Variational embedding
07. . Pade approximation
07. . Newton’s method
07. . Gauss-Seidel method
07. . Euler-Cauchy method
07. . Runge-Kutta method
07. . Newton-Raphson method
07. . Rayleigh-Ritz method
07. . Linearisation
08. . . Quasilinearisation, Generalised Newton-Raphson
08. . . method
05 Functional equations
06. Differential equations
07. . Ordinary differential equations
08. . . (Solution)
09. . . . Series expansion
10. . . . Taylor series
09. . . . Picard’s method, Successive approximation
08. . . First order ordinary differential equations
09. . . (Solution)
10. . . . Singular integrals
08. . . Linear ordinary differential equations
09. . . (Solution)
10. . . . Superposition methods
10. . . . Green’s functions, Variation of constants,
10. . . . weighting functions
10. . . . Complex variable methods
11. . . . . Series expansion about regular singular
11. . . . . points
08. . . Second order non-linear ordinary differential
08. . . equations
09. . . . (Solution)
10. . . . . Phase plane methods
10. Critical point methods
10. Limit cycle methods
07. Partial differential equations
08. (Solution)
09. Riemann-Volterra methods
09. Method of characteristics
09. Integral transform methods
10. Laplace transforms of time variable
08. Hyperbolic equations
08. Parabolic equations
08. Elliptic equations
06. Difference equations
06. Integral equations
05. Series
06. Volterra series
05. Optimisation
06. Mathematical programming, Constrained optimisation
07. Approximation
08. Polygonal functions
08. Variational methods
09. Lagrange multipliers
10. Isoperimetric problem
09. Second order Euler equations
09. Canonical equations
10. Extremals
11. Hamilton-Jacobi equations
07. Linear programming
07. Non-linear programming
08. Quadratic programming
08. Convex programming
07. Dynamic programming
08. Bellman principle of optimality
05. Statistics and probability
06. Statistical inference
07. Estimation, Prediction
08. Maximum likelihood
08. Bayesian theory
06. (Analysis)
07. Correlation
07. Regression
06. Time series
06. Stochastic processes, Random processes
07. Monte Carlo methods
07. Queueing theory
07. Game theory
04(Operations & processes)
05. Modelling
06. Qualitative
07. Input-output
06. Quantitative
07. Mathematical modelling
08. Identification
08. . . . Estimation
09. . . . . Parameters
09. . . . . State
10. . . . . (Variables)
11. . . . . . Observers
07. . . . Holistic mapping
07. . . . Pole assignment
07. . . . Order reduction
07. . . Decoupling
07. . Laplace transform techniques, s-domain
07. . . techniques
08. . . . Root locus
07. . . Frequency domain techniques
07. . . Time domain techniques
07. . Collected data models
07. . . Analytical models
07. . Simulation

U8A Q9 05. )Computer technology in control engineering(
QA 05. )Testing(
QB 05. (Qualification by rest of technology class)
06. . * As for U8A_B/C

QG 04)Systemology in control systems(
QG9 B 05. )Analysis and design(
QGC 05. )Systems behaviour(
QGD 06. . (Unwanted effects and problems)
QGD F 07. . Faults
QGD H 08. . . Deterioration
QGD J 08. . . Failure
QGE 07. . Errors
QGE H 08. . . Mean square
QGE K 07. . Bias
QGE M 07. . . Drift
QGE N 07. . Noise
QGE NH 07. . . Hunting

U8A QGO 06. . Efficiency
QGO V 06. . Effectiveness
QGP 06. . Accuracy
QGQ 06. . Reliability
QGR 06. . Consistency
QGR R 06. . Resolution
QGS 06. . Sensitivity

QGX 06. . Transfer functions
QH 06. . )Variability(
QHK 07. . . Cycles
QHK L 08. . . Limit cycles
QHN 07. . . Response (control systems)
QHN N 07. . . Frequency response
QHN P 07. . . Impulse response

<7>
[2-(Particular technologies)]

[3-Control systems U8AQ]

[4-)Systemology in control systems (U8AQG]
   [5-)State of system Θ]
   [6-)Variability (U8AQH]
   [7-)Impulse response U8AQHNP]

U8A QHN S 07. ... Step response
QHN T 07. ... Time response
QHN W 08. ... Delay
QHQ 09. ... Hysteresis

QHR B 07. ... Saturation
QHU 07. ... Stability
QHU H 08. ... Nyqvist plots
QHU J 08. ... Bode diagrams
QHU K 08. ... Routh-Hurwitz methods
QHU L 08. ... Poincare-Liapunov theory
QHU M 08. ... Popov criterion
QHU N 08. ... Krylov-Bogolyubov approximation
QHU P 08. ... Pfaffian first order linear differential
                 08. ... equations

Θ

04(Parts of control systems)

U8A QJX 05. Filters
QJX L 06. ... Analogue
QJX N 07. ... Linear
QJX P 08. ... Wiener
QJX Q 07. ... Low-pass filters
QJY 06. ... Digital
QJY P 05. Plants
QJY R 05. Actuators
QJY T 05. Controllers, Regulators
QJY V 05. Compensators
QKB 05. Computers
       06. ... * See U8A_Q9 ?

Θ

04(Kinds of control systems)

U8A QN 05. ((By form of working energy))
QO 06. ... Electronic
QP 06. ... Electrical
QQ 07. ... Mechanical
QR 07. ... Fluidic
QS 07. ... Hydraulic
QT 08. ... Electropneumatic

U8A QV 06. Open loop control systems
       07. ... * This class includes "Controls" on
       07. ... instruments, machines and other working
       07. ... devices, whereby humanly activated
       07. ... mechanical input results in predetermined
       07. ... output

<8>
U8A QW 07. Programmed controlled systems
QWR 08. Programmed numerically-controlled systems
QX 07. Remote control
R 06. Closed loop control systems, feedback control systems,
06. Automatic control, automation
07. * This class includes most of the technical
07. literature on automation and automatic
07. control. For theoretical studies not
07. exclusively oriented to technical
07. implementation, See AX....
07. * Add to U8A_S letters K/N following U8A.
RS 07. Servomechanisms
08. * Control systems in which the controlled
08. quantity or output is mechanical position,
08. velocity or acceleration
RT 07. Multilevel control systems
SKL 07. Analytic control systems
SKM 07. Modal control systems
SKN 07. Stochastic control systems
SKO 08. Markov process control systems
SKO T 07. Degenerate control systems
SKO V 07. Distributed parameter control systems
SKP 07. Stationary control systems
SKQ 07. Non-stationary control systems
07. Multivariable control systems
07. Multiple input-single output control systems
SKX 07. Discontinuous control systems
SKX O 08. Bang-bang control systems, Extremal control
08. systems. on-off control systems, Schwarz-Weiss
08. control systems
SKY 08. Digital control systems
SLB 07. Periodic control systems
SLC 07. Dead time control systems
SLD 07. Time delay control systems
07. Delay-differential control systems
07. Time dependent control systems
07. Relay control systems
07. Hyperbolic control systems
07. Parabolic control systems
07. Elliptic control systems
07 Integral control systems
07 Proportional integral derivative control systems

07 Linear control systems
07 Non-linear control systems

07 Saturating control systems
07 Singularly perturbed control systems
07 Sampled data control systems
07 Predictive control systems

07 Minimum time control systems
07 Minimum cost control systems
07 Minimum energy control systems

07 Optimal control systems

09 Variational methods
09 Pontrjagin's principle
09 Dynamic programming
09 Bellman principle of optimality

07 Adaptive control systems
08 Gain schedules
08 Model reference control systems
08 Self-tuning regulators

07 Self-organising control systems

07 Fuzzy control systems
(0-5)Modelling (U8AN7F)
[1-Technology U]
[2-(Particular technologies) @]
[3-Computers U9]
[4-(Operations on) @]

U9A 05. . )Testing( 06. . . ** First example here of building forward,
06. . . using instruction preceding U8A.

U9D 05. . )Packaging... Dispatch...( 04. (Processing) Software
05. . ** Using the alternative allocation of notation
05. . at UDP.

U9E 04. )Energy technology( 04. )Materials(
U9F 04. )Components) ** FES
03Technical testing
U9H 04. 03Technological testing
UA 04. Specification
UA3 N 04. )Equipment( 04. )Physical test methods(
UA4 U 04. ) Characteristics tested) ** FES
UA9 04. )Maintenance, repair & replacement
UAM 03Technical design
UAP 04. Computer aided design
03Production technology, manufacturing engineering
UB 04. Statement of requirements ** FES
UB3 C 05. . Shopfloor organization
UB4 U 04. )Equipment(
UBF 04. )Tools
UBE 04. )Energy technology( 04. )Materials(
UBH 04. )Systems of production) ** FES
05. . ** I may be completely wrong, but the following
05. . concepts sound specials in production (as
05. . distinct from the 'common' ones got
05. . synthetically)? Wouldn't a work on energy
05. . needs in craft production cite craft
05. . production first?

UBH C 05. . Craft production...
UBH J 05. . Job production...

UBI 04. (Production processes)
UC 03Materials handling, mechanical handling
04. ** Better to give the more general term first &
04. imply that it cannot be distinguished fruitfully
04. from its species Mechanical & that they are
04. being treated as virtually synonymous?

UC4 U 04. )Equipment(
05. . * See also mechanical handling plant
05. . ** I'm not clear why the processes file before
05. . the equipment in your schedule. Should this
05. . be a 'see' reference and the main class
05. . Mechanical handling plant be given a
05. . different classmark so that it files after
05. . the processes?

UD 04. Packaging...

<7>
UD3 DD 05. . )Waste management(
06. . . )Wastes(
07. . . . ** Yr subordination of this to By-products
07. . . . is a bit puzzling; seems to imply that
07. . . . the general concept of by-products in
07. . . . technology (which may be usable &
07. . . . profitable products) includes wastes?
07. . . . Where wd by-products in general go?

UDB 05. . )Production(
06. . . (Special processes)
07. . . . Grading... Weighing...
08. . . . ** This is where it wd go if we use UDF
08. . . . for Packaging materials? Or do you
08. . . . intend these latter to form a class
08. . . . separate from the ‘common’ Materials
08. . . . class at UDF? In this case, yr
08. . . . (Processes) wd be the FES?

UDB R 05. . (Packaging for special articles, etc.)
06. . . * Deserves an alternative (not recommended)
06. . . . here?

UE ?
03Energy technology
04. ** Deserves an explanatory note? I can see that
04. this shd precede a Materials facet in normal
04. inverted filing order; but the fact that
04. Materials is then followed by all the specific
04. energy forms raises a doubt - shdn’t it file
04. immediately ahead of these?

UE3 F
04. )Environmental aspects(
05. . Energy consumption... Conservation...
06. . . ** Is this the collocation you envisage?
06. . . Conservation is usually seen as an
06. . . environmental problem? If not, these
06. . . classes wd constitute the FES?

03Materials technology
UF4 B
04. )Physics of materials(
05. . * For strength of materials, see UFH
UEA
04. )Materials testing(
UEH
04. Strength of materials, applied mechanics ** FES
04. * Add to UFH letters K/Y following BVB
04. ** The BVB (mechanics of solids) class deviates a
04. bit from your schedule, but not so much as to
04. prevent us using it here?

UEH K
04. Deformation
L 05. . Stress
LM 06. . . Stress distribution...
Materials technology, engineering materials
** file ue.sch 14.12.98
* For technology of particular materials, see the material (in Class V).

Defects(
* For defects in materials, see UEH

Physics(
* For strength of materials, see UEH

Materials testing(
Testing machines
Mechanical characteristics
Test specimens, Test pieces

(Kinds of test specimens, By shape)
(Notched--
Round--, Circular cylindrical--
Flat--
Prismatic--
Hollow bodies

Defects (materials)
See also Deterioration of materials
UEK P

Structure of materials
Microstructure
For crystallography, See CHC
Impurities
Inclusions

Strength of materials, applied mechanics
(strength of materials)
Add to UEI letters G/Y following
BVB (Physics of bulk matter);
Add to UEI letters A/F following
BVC; eg

Forces (strength of materials)
Pressure(
Deformation
Stress-strain relationships
Yield
Stress
Stress analysis
Stress distribution
(Kinds of stress, loading)
Residual stresses, internal stresses
Combined loading
Static
Dynamic
Cyclic
Thermal stresses
Bending
Torsional stress
11. * For torsion, see UEI UN.

Impact
Tensile loading
Compression loading
Shear loading
Torsion

Types of deformation
Elastic deformation
* for ductility, see UEJ BM
Dimensional changes (deformation)
Elongation
Flattening
Plastic deformation
Superplasticity
Hardness
Failure
Strength, resistance to failure
Fatigue
Corrosion fatigue
Creep
Fracture
Ductile fracture, fibrous fracture
Brittle--
Cracks
* See also Ductile fracture
(Initiation)
(Propagation)
Buckling
Tearing

Friction
* See UEJ S
Elasticity
Rigidity
Toughness
Brittleness
Stiffness

Surface properties
Surface defects
Shape
Roughness, Contour
Porosity
Tribology
Friction
Erosion, Wear
Lubrication
[3-Materials technology UE]
[4-(Properties) @]
  . [5-Tribology UEJR]
    . [6-Lubrication UEJU]

UEK 05. Thermal properties of materials
UEK L 06. . Thermal cycling
M 06. . Thermal conductivity

P 05. Deterioration of materials
Q 06. . Protection of materials
UEL 06. . Corrosion
UEL KQ 07. . Corrosion protection
KR 08. . . Passivation
KS 08. . . Inhibitors
KT 08. . . Protective atmospheres
M 07. . Corrosion resistance
N 08. . . Coatings
@ 07. . . (Kinds of corrosion)

VNT. P 08. . Electrochemical--
PQ 09. . . Cathodic protection
PR 09. . . Aqueous--
PS 10. . . . Sea water
PT 10. . . . Steam
Q 8G. . . aseous--
R 08. . Non-electrolytic liquid--
S 08. . Stress--
T 08. . Cavitation--
U 08. . Fretting
V 08. . Atmospheric--
W 08. . . Soil
X 08. . . Biological--, Biodegradation
Y 08. . . Microbiological degradation

@ 04(Materials specified by significant properties)
@ 05. ((By directionality of properties))
 UEM D 06. . Orthotropic materials
 F 06. . Isotropic materials
 H 06. . Anisotropic materials
 @ 05. ((By reaction to environment))
 UEM J 06. . Smart materials
 X 05. Barrier materials
 UEN 06. . Insulating materials
 07. . . * For electrical insulation, see
 07. . . Electrotechnology
 07. . . * For sound insulation, see Vibration &
 07. . . AcousticsU/8854
 07. . . * For thermal insulation, See Thermal
 07. . . technology
 UEN W 06. . Waterproofing materials
 Y 05. Mechanically significant properties
 UEO 05. Thermally significant properties
 05. * For Fire resistant materials, See Environmental
 05. technology
 UEO T 05. Particle technology
 UEP 06. . Powder technology

<3>
07. * Fabrication methods and products using non-metals
07. or metals and non-metals taken together
07. * For powder fabrication of ceramic materials
07. See V/5430
07. * For powder metallurgy, See V/604640......

UEP S 06. Sintered materials technology

UET 05. Composite materials, reinforced materials
UEQ T 06. Matrix materials
UER C 06. Reinforcing materials
E 07. Randomly dispersed materials
G 07. (Geometrically ordered materials)
J 08. Woven mats
L 08. (Solid sheet materials)
P 07. Particles
Q 07. Fibres
08. * For boron, graphite, glass fibres, etc
08. specifically. See the notation for the
08. respective substances under V.....
S 08. Filaments
09. * Relatively long fibres
S 08. Whiskers
T 07. Platelets, flakes
V 07. Rods
@ 06. (Kinds of composites)
@ 07. ((By reinforcement))
08. * Add to UES letters Q/R following UE
UES T 08. Impregnated composites
V 08. Laminates
@ 07. ((By method of placement of reinforcement))
UET 08. In-situ composites
09. * Individual kinds of in-situ composites, eg
09. directionally solidified eutectics and
09. dispersion-strengthened alloys, are usually
09. regarded as conventional materials. This
09. place is for literature dealing
09. collectively with all kinds of in-situ
09. composites.

UEU 07. Sandwich materials
UEV 07. Cellular materials
UEV 06. (Materials special to a copnext (eg semiconductors)
Energy technology

04. ** file uf.sch 23.12.98;

UF3 F
04. )Environmental aspects(

UFH C
04. Energy consumption, Energy utilization  [FES]

E
04. Energy conservation

F
05. . Recycling

J
04. Energy conversion
05. . * For Direct conversion to electrical power, See
   05. . U/5748

K
05. . Efficiency

N
05. . Transducers

S
04. Energy storage
05. . * For Batteries and Fuel cells, See U/574832
05. . * For Capacitors, See U/5042
05. . * For Compressed air storage, See U/8470....
05. . * For Flywheels, See U/803599
05. . * For Pumped storage, See U/5743..
05. . * For Springs, See U/8036

UFJ B
04. Energy sources
05. . * For Energy resources, See UF3_F

D
05. . Non-renewable--

F
06. . . Fossil fuels
07. . . . * For Thermal engineering, See U/7
07. . . . * For Fuel technology, See V/8230

H
05. . Renewable--

N
06. . . Nuclear--
07. . . . * For Nuclear technology, See U/4

P
07. . . Nuclear fission

V
07. . . Nuclear fusion

UFK
06. . Chemical fuels, Synthetic fuels

UFK L
07. . . Hydrogen

UFL C
06. . Solar--
07. . . . * For Photoelectric devices, See U/5325
07. . . . * For Extraction of thermal energy from the
   07. . . . sea, See U/7....

C4T
07. . . . Collectors, Concentrators

F
06. . . Wind power

J
06. . . Water

L
07. . . Water power

N
07. . . Energy from the sea

O
08. . . . Tidal power

Q
08. . . . Sea currents

S
08. . . . Wave power

V
06. . . Geothermal power

X
06. . . Biomass--

UFM
04. Total energy systems
03 Nuclear technology
04. ** I originally notated UE/UF on the assumption
04. that UE was Materials & UF was Energy
04. technology. The latter fairly easily allowed
04. M/Y for Nuclear. Now, having reversed the
04. order, I find UF Materials is more crowded &
04. less easily gives room for Nuclear. Do you
04. think we shd give Nuclear its own 2-letter
04. class? Having raised the question, I shd be
04. grateful if you find any of the classmark
04. allocations in U/V give too much or too little
04. to particular classes.

04. Civil applications

29A 04. Environmental aspects(29VH
3F 04. )Military applications
05. ** Worth a note re when to qualify the general
05. class & when to treat them as qualifying
05. reactors narrowly?

UFR 04. Reactor technology, fission reactors
05. * Is this where a general work on applied
05. nuclear fission wd go?

UFR 4B 05. )Reactor physics(
06. ** This and the next 6 classes demonstrate
06. how the logic of the filing order got by
06. synthetic application of U2/UF seems to
06. clash with the particular needs of the
06. containing class. I wd appreciate
06. explicit advice on how far I shd amend
06. notation in this case.

4U 05. )Reactor plant in general(~
4UG P 06. )Construction engineering(
B 06. )Production operations(
06. Start-up...
F 05. )Reactor materials(
H 05. )Reactor components) ** FES

03 Electrotechnology
UG3 E 04. )Safety(
HG 05. )Electrotechnological faults(

UG4 U 04. )Equipment(
05. ** Since much of electrotechnology is about
05. devices through which electrical phenomena
05. manifest themselves, and since you visualize
05. Equipment filing after Materials, wd it be
05. sensible to move Equipment in general to go
05. with the components at (say) UGJ?

UGF 04. )Materials(
05. * See UGI

<9>
02ELECTROTECHNOLOGY
03. ** file ug.sch (from bc2u5) 12.1.99
03. * Class here material on topics which are common to
03. both (weak current) Electronic engineering and to
03. (heavy current) Electrical engineering

UG3 7E 03. (Electrical safety)
04. . (Fire hazards)
05. . . Intrinsically safe equipment
05. . . Flameproof enclosures

H 03. Electrotechnological faults
04. . * For Power system faults and protection, See
04. . U/57...
04. . Fault-detecting relays
04. . Electrical protection
05. . . Fuses
05. . . Protective relays
06. . . . Differential relays (D.C.)
07. . . . . Merz-Price systems
05. . . Earthing
05. . . Surge protection
06. . . . Surge diverters, Surge absorbers
06. . . . Spark gaps
06. . . . Surge arrestors
07. . . . . Liquid--
07. . . . . Electrolytic--
07. . . . . Dielectric--
06. . . . Surge limiting reactors, Protective coils,
06. . . . . chokes, line choking coils
05. . . . Protective capacitors

UGH C 03. Electrical quantities, electrical variables
04. . * For variables arising only in periodic systems,
04. . See U/5........below use letters for. BYH
04. . (Input-output relations)

E 05. . . Gain
F 05. . . Loss
H 04. . Charge
J 04. . Voltage, Potential difference, Electromotive force,
04. . EMF
K 04. . Capacitance
M 04. . Current
05. . . ** allow N/O and Q/S for A-C current
P 04. . Conductance
T 04. . Resistance
W 04. . Power
X 04. . Load

UGI B 03. Electric and magnetic fields in technical devices
04. . Electric field strength $E$
04. . Electrostatics $\#N$
05. . . Electrostatic induction, Electric displacement $\#NK$
04. . Magnetic fields
04. . Magnetic effects of electric currents,
04. . Electromagnetic induction
05. . . Inductance

K Electronic vacuum devices
KFC Transmission
UGH  04.  Electrical quantities... Fields...  ** FES
       05.  ** I can't see how we could accommodate these
       05.  properties in the slots I've proposed at U3.
       05.  Just conceivably they might be treated as
       05.  special energy concepts & file at the end of
       05.  UE Energy? But this not on? The problems in
       05.  UG occur again, of course, in UH/UK.

UGI  04.  Materials
       05.  * If El quantities, fields, etc are treated as
       05.  FES

UGJ  04.  Electrical equipment components

UGS  04.  Circuits (general)

UG  04.  Electronic engineering
       05.  )Circuits(
       06.  * See UIN
       06.  ** I'm not sure I've interpreted the
       06.  hierarchy in UH correctly. Can't
       06.  semiconductors be qualified by circuits?
       06.  Wd UIN (say) really be the general class
       06.  for electronic circuits?

UX  05.  Semiconductors

UIN  05.  Electronic circuits ?

UXUJ  04.  Telecommunications engineering

UX3H  05.  )Faults(

UXUJ  05.  Destination-directed telecom  ** FES
       06.  ** Classmark of FES will be determined by the
       06.  need to divide classes U1/UK like UG

UXUK  04.  Electrical power engineering
       05.  ** The notation here will be largely determined
       05.  by the answers to the filing problems raised
       05.  in UG/UG.

UXUL  03.  Thermal engineering
       04.  )Energy( Heat sources

ÜLF  04.  )Materials(
       05.  ** Your schedule files materials before energy
       05.  in this class.

ULH  04.  Heating & cooling systems  ** FES

UM  03.  Mechanical engineering

UM4U  04.  )Equipment(
       05.  * See also Mechanical components UMH

UMB  04.  )Production( Machine building

UMH  04.  Mechanical components & mechanisms  ** FES

UN  03.  Fluid engineering

UN4U  04.  )Equipment(
       05.  * See also Parts of systems UNH & Fluid power
       05.  machinery UNJ_P.
       04.  Working fluids
       05.  * Can't find a definition, so this location
       05.  puzzles me.

UNF  04.  )Materials(  <10>
UGI R 06. . . Self-inductance
S 06. . . Mutual inductance
T 05. . Eddy currents

UGJ 03Materials
04. * Add letters following UE; eg
UGJ N 04. Insulating materials, Dielectrics
05. . (Electrical quantities, variables)
06. . Permittivity
07. . . . Absolute--
07. . . . Relative--, Dielectric constant
06. . . Dielectric strength, Disruptive strength
06. . . Dielectric loss
07. . . . Dielectric hysteresis
08. . . . . . * indent error on next line
04. (Particular materials)
05. . * Add as at V2060? to V/78 with additions?

UGK B 03Electrical and electronic devices or components
04. * Components which operate at various power levels.
04. For devices operating at W or over, See U/57.
04. For devices operating at less than W
04. See U/53 and U/55

C 04. Electrostatic devices
D 04. Dielectric devices
05. . Electret devices
E 04. Thermoelectric devices
F 04. Dielectric electromechanical devices
05. . Piezoelectric devices
05. . Ferroelectric devices
05. . Acoustoelectric devices
I 04. Electronic equipment?
05. . ** occurs at this point under El. power technology.
05. . Not sure if replaces use of U1 as retro
05. . qualifier under later classes (UH...)

J 04. Magnetic devices
05. . Permanent magnets
05. . Electromagnets
05. . Solenoids
05. . Magnetostrictive devices
T 04. Electrochemical devices
05. . * The technology and use of electrochemical devices
05. . as components in electrotechnical systems
05. . * For applied electrochemistry, See V/12,51
V 05. . Electrolytic devices
05. . Battery operated devices

UGL C 04. Electrical converters
05. . Rotary converters
05. . Static converters

<2>
UGL E 05. Rectifiers
06. * For rectifiers used exclusively at supply system power levels, See U/57
06. (Static converters)
07. . Half-wave rectifiers
07. . Full-wave rectifiers
F 07. . Electron tube rectifiers
08. . * This position is provided for material on rectifier tubes generally
08. . * For particular kinds of tubes used mainly for rectification, See U/53.
G 07. . Semiconductor rectifiers
08. . * This position is provided for material on semiconductor rectifiers generally
08. . * For particular kinds of semiconductor devices used mainly for rectification,
08. . See U/53
I 05. Inverters # Thyristors?
J 05. Electric reactors
05. * For Electrical reactors for power purposes,
05. See, U/57
K 05. Inductors
06. . Saturable reactors, Transductors,
07. . Autotransductors
06. . Series inductors
06. . Shunt inductors
N 04Transformers
05. * Use only for materials giving information on both d.c. and a.c. transformers.
05. * The term "Transformers" without qualification is often used to mean a.c. transformers, for which See U/57...below under A.C. electrotechnology
05. * For Power transformers, See U/57...
UGM C 04Capacitors
D 05. Fixed--
E 05. Variable--
G 05. Electrolytic capacitors
06. . Dry electrolytic capacitors
05. (By dielectric)
J 06. . Vacuum dielectric capacitors
K 06. . Gas dielectric capacitors
L 07. . Air dielectric capacitors
M 06. . Liquid dielectric capacitors
N 06. . Solid dielectric capacitors
OF 07. . . Foil capacitors
07. . . Mica capacitors
07. . . Ceramic capacitors
07. . . Plastic film capacitors
07. . . Paper capacitors
07. . . Semiconductor capacitors
08. . . . Metal-oxide-semiconductor capacitors, MOS
08. . . . capacitors
08. . . . Varactors
05. (By metal)

UGM Q 06. . Aluminium capacitors
R 06. . Tantalum capacitors
05. (By aggregation)
T 06. . Capacitor banks
05. (By function)
06. . * For Power capacitors, See U/57....
V 06. . Blocking capacitors
W 06. . Trimming capacitors

U 04 Resistors
D 05. Fixed--
E 05. Variable--
F 06. . Rheostats
G 06. . Potentiometers
05. (By construction)
I 06. . Wirewound resistors
05. (By material)
L 06. . Film resistors
06. . Carbon resistors
06. . Semiconductor resistors
07. . . Varistors
05. (By function)
06. . * For Power resistors, See U/57...
06. . Ballast resistors
06. . Baretters

UGO B 04 Switchgear
05. * For Contactors, See U/57
05. * For Circuit breakers, See U/57
05. (Components)
BP 06. . Contacts
05. (Kinds of switchgear)
C 06. . Switches
07. . . * Manually operated switches
07. . . By operator control mechanism)
DG 08. . . . Toggle switches
DL 08. . . . Lever switches
DM 09. . . . Microswitches
DP 08. . . . Pushbutton switches
DQ 08. . . . Sliding switches
DR 08. . . . Rotary switches
DS 08. . . . Key switches
DT 08. . . . Pendant switches
DV 08. . . . Cord switches
07. . . (By form of energising)
E 08. . . . Electronic switches
<table>
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<tr>
<th>UGO</th>
<th>EP</th>
<th>09.</th>
<th>Glow switches</th>
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<td>ES</td>
<td>09.</td>
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<td>09.</td>
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<td>09.</td>
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<td>Superconductor switches, Cryotrons</td>
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<td>J</td>
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<td>L</td>
<td>08.</td>
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<td>Electromagnetic switches</td>
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<td>Mechanical switches</td>
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<td>Fluid power operated switches</td>
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<td>.</td>
<td>Two-pole switches, Double pole switches</td>
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<td>PW</td>
<td>08.</td>
<td>.</td>
<td>Switchboards</td>
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<tr>
<td>QB</td>
<td>08.</td>
<td>.</td>
<td>Knife switches</td>
</tr>
<tr>
<td></td>
<td>08.</td>
<td>.</td>
<td>Reed switches, Magnetic reed switches</td>
</tr>
<tr>
<td></td>
<td>08.</td>
<td>.</td>
<td>Butt switches</td>
</tr>
<tr>
<td></td>
<td>08.</td>
<td>.</td>
<td>Roller switches</td>
</tr>
<tr>
<td>QN</td>
<td>08.</td>
<td>.</td>
<td>Vacuum switches</td>
</tr>
<tr>
<td></td>
<td>08.</td>
<td>.</td>
<td>(Air contact switches)</td>
</tr>
<tr>
<td>QP</td>
<td>08.</td>
<td>.</td>
<td>Oil switches</td>
</tr>
<tr>
<td>QQ</td>
<td>08.</td>
<td>.</td>
<td>Mercury switches</td>
</tr>
<tr>
<td></td>
<td>07(By function)</td>
<td>.</td>
<td>* For Power switches, See U/57...</td>
</tr>
<tr>
<td>SC</td>
<td>08.</td>
<td>.</td>
<td>Change-over switches</td>
</tr>
<tr>
<td></td>
<td>08.</td>
<td>.</td>
<td>Two-way switches</td>
</tr>
<tr>
<td></td>
<td>08.</td>
<td>.</td>
<td>Multiway switches</td>
</tr>
<tr>
<td></td>
<td>08.</td>
<td>.</td>
<td>Interrupters</td>
</tr>
<tr>
<td></td>
<td>08.</td>
<td>.</td>
<td>Choppers</td>
</tr>
<tr>
<td>SJ</td>
<td>08.</td>
<td>.</td>
<td>Selector switches, Combination switches, multiple position switches</td>
</tr>
<tr>
<td></td>
<td>08.</td>
<td>.</td>
<td>Bank and wiper switches</td>
</tr>
<tr>
<td></td>
<td>08.</td>
<td>.</td>
<td>Stepping switches, Step switches</td>
</tr>
<tr>
<td></td>
<td>08.</td>
<td>.</td>
<td>Isolator switches, Disconnecting switches, section switches</td>
</tr>
<tr>
<td>T</td>
<td>08.</td>
<td>.</td>
<td>Control switches</td>
</tr>
<tr>
<td>UB</td>
<td>09.</td>
<td>.</td>
<td>Programmable switches</td>
</tr>
<tr>
<td></td>
<td>09.</td>
<td>.</td>
<td>Limit switches</td>
</tr>
<tr>
<td></td>
<td>09.</td>
<td>.</td>
<td>Proximity switches</td>
</tr>
<tr>
<td></td>
<td>09.</td>
<td>.</td>
<td>Pressure switches</td>
</tr>
<tr>
<td></td>
<td>09.</td>
<td>.</td>
<td>Crossbar switches</td>
</tr>
<tr>
<td>UI</td>
<td>09.</td>
<td>.</td>
<td>Time switches</td>
</tr>
<tr>
<td>UW</td>
<td>07Switch-fuses</td>
<td>&lt;5&gt;</td>
<td></td>
</tr>
<tr>
<td>UGO V</td>
<td>07. Contactor controllers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>--------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>07. Circuit breakers, contactor controllers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**UGP C 06 Relays**

- **07. (By input)**
  - **DB**
    - 08. Single input relays
    - 08. Double input relays
    - 08. Multiple input relays
  - **07. (By size)**
    - 08. Miniature relays
  - **07. (By form of energising)**
    - 08. Electronic relays
    - **E**
    - **F**
      - 09. Semiconductor relays
    - **G**
      - 10. Transistor relays
    - **H**
      - 10. Thyristor relays
    - **J**
      - 10. Photoelectric relays, Allstrom relays
    - **K**
      - 08. Electrostatic relays
    - **L**
      - 08. Electromagnetic relays, Armature relays
      - 09. * For Differential relays, See U/5 ... above
    - **MC**
      - 09. Rotary electromagnetic relays
      - 09. Plunger relays, Balanced beam relays, Beam relays
      - 09. Latching relays
      - 09. Reed relays, Magnetic reed relays
      - 09. Solenoid relays
      - 09. Moving coil relays
      - 09. Moving iron relays
      - 09. Induction relays (A.c)
      - 09. Polarisé relays (D.c), Directional relays
    - **08. Piezoelectric relays**
    - **08. Electrolytic relays**
    - **08. Thermal relays**
    - **N**
      - 08. Mechanical relays
    - **O**
      - 09. Fluid power relays
    - **OP**
      - 10. Pneumatic relays
  - **07. (By contact medium)**
    - **UGQ N**
      - 08. Vacuum relays
      - 08. Mercury relays
  - **07. (By input trigger)**
    - **UGR B**
      - 08. Voltage relays
      - 08. Current relays
      - 08. Frequency relays
      - 09. Frequency selective relays
  - **07. (By function)**
    - 08. * For Protective relays, See U/5 ... above
    - 08. * For Power relays, See U/57 ...
    - **UGP T**
      - 08. Control relays, Regulating relays
    - **UC**
      - 09. Locking relays
      - 09. Limiting relays

<6>
[3-Electrical and electronic devices or components UGKB]
[4-Switchgear UGOB]
  6. [6-Relays UGPC]
  7. [7-Circuit breakers UGOW]
  8. [8-Control relays UGPT]
  9. [9-Locking relays UGPUC]

09. . . . . Time relays
09. . . . . Time delay relays
09. . . . . Slugged relays

UGQ B 04Conductors
  05. Busbars
  05. Bare wires, Non-insulated wires
  05. Insulated wires

D 05. Cables
  06. . * For Electrical power transmission cables, See
        U/57
  06. . * For Cables in Electronics, See U/53
  06. . * For Telecommunication cables, See U/55
  06. . (Operations)

DB 07. . Cable laying
  07. . . Joining
  08. . . Joints
  09. . . . . * For Connectors, See U/5...below
  07. . . Location
  06. . (Components)

E 07. . Cores
  08. . . Steel--
  08. . . Aluminium--
  07. . . Cable conductors

I 07. . Insulation
  08. . . Vacuum insulation
  08. . . Pressurised gas insulation
  09. . . Sulphur hexafluoride insulation
  08. . . Oil insulation
  08. . . Mineral insulation
  08. . . Oil-impregnated paper insulation
  08. . . Polymer insulation
  09. . . Rubber insulation
  10. . . . . E.P.R., Ethylene-Propylene rubber--
  10. . . . . Silicone rubber--
  09. . . . Plastics insulation
  10. . . . . P.V.C.--, Polyvinyl chloride--
  10. . . . . P.E.--, Polyethylene--, Polythene--

K 07. . (Protective components)
  08. . . Wrappings
  09. . . Bitumenised fabrics

L 08. . . Sheaths
  09. . . Lead--
  09. . . Aluminium--
  08. . . Armour
  07. . . Cooling systems
  07. . . Cable terminations
  06. . (Types of cables)
  07. . * For Power cables, See U/57...
  07. . (By configuration)
UGQ P 08. . . . Paired cables, Twin cables
09. . . . . Shielded pair cables
08. . . . Coaxial cables
R 07. . . (By component)
08. . . . . * Add * letters ....... to ....... with
08. . . . . meanings as at ........ to ....... above, and
08. . . . with the following additions:
08. . . . (By conductor)
09. . . . . Braided cables
09. . . . . Stranded cables
08. . . . . (Cored cables)
09. . . . . Single core cables
09. . . . . Multicore cables
07. . . . (By use environment)
T 08. . . . Overhead cables
U 08. . . . Underground cables
W 08. . . . Underwater cables
X 09. . . . . Submarine cables
UGR C 07. . . Cryogenic cables, Cryocables
08. . . . . Superconducting cables
E 04Electrical conduits, Cable ducts
05. . Shielded conduits
05. . Trunking, Electrical trunking
F 04Cable junctions
05. . . * For Cable joints, See U/5.. above
05. . Terminal boxes
06. . . Junction boxes
G 04Electric connectors
05. . Crimped connectors
05. . Clamped connectors
05. . Screwed connectors
05. . Plug connectors
05. . Socket connectors
05. . Plug adaptors
05. . Socket adaptors
H 04Electric terminals
J 04Insulators
05. . Pin insulators
05. . Bobbin insulators
05. . High collar insulators
05. . Solid core insulators
05. . Suspension insulators
05. . Bushings
K 04Electric screens, Electric shielding
03(Electrotechnical systems)

**UGS**
04. D.C electrotechnology, Direct current electrotechnology
05. (Components)
06. D.C. transformers, Direct current transformers

**UGS W**
04. Periodic electrotechnical systems
05. (Quantities, Variables)
06. Frequency
05. (Kinds)

**UGT**
06. A.C. electrotechnology, Alternating current electrotechnology
06. electrotechnology

**UGT HC**
07. (Quantities, Variables)
08. Electrical admittance
08. Susceptance
08. Electrical impedance
09. Reactance
10. Capacitive--
10. Inductive--
08. Phase
08. Power factor

**KB**
07. (Components)
08. (Electrical converters)
09. Rotary frequency converters, Rotary
09. frequency changers
09. Rotary phase converters, Rotary phase
09. changers

**LN**
08. A.C. transformers
09. (Types)
10. (By design)
11. Core type--
11. Shell type--
11. Autotransformers
10. (By coolant)
11. Air cooled--
11. Oil cooled--
11. Gas cooled--
10. (By housing)
11. Sealed--
11. Encapsulated--
10. (By function)
11. * For Instrument transformers,
   See U/11,30....
11. * For Current transformers< See
   U/11,30.....
11. * For Potential transformers,
   See U/11,30...
11. * For Pulse transformers, See
   U/12,40
11. * For Power transformers, See
   U/57
11. * For Variocouplers, See U/55
11. under

<9>
11. Radio engineering
11. Step-up--
11. Step down--
11. Variable ratio--, Induction-voltage regulators
11. Tap changing--
11. Booster--
11. Isolating--
07. (Kinds of a.c. system)
08. (By phase)

UGW C 03. Electronic and electrical circuits
04. Lumped circuits
04. Distributed circuits
04. Passive circuits
04. Active circuits
04. Transmission lines
05. * For waveguides, See U/53, 50
05. * For electrical filters, See U/53......

UGX B 04. Electrical networks
05. Linear--
05. Non-linear--
05. Unilateral--
05. Bilateral--
05. Dipole--, Two terminal--, One port--
05. Quadrupole--, Four terminal--, Two port--
05. Multiterminal--
05. Ladder--
05. Lattice--
05. Hybrid--
05. Resistive--
05. Negative resistance--
05. Capacitive--
05. Inductive--
05. Inductance-Resistance
05. Resistance-Capacitance--
05. Resistance-Inductance-Capacitance--

04. (Electronic and electrical circuits, by function)
05. * Add letters as at UI Electronics (Amplifiers to
05. Delay circuits) for circuits for use at both
05. electronic and higher power ratings
Electronic engineering

** file uh.sch (from bc2u53) 13.1.99

* According to most formal definitions, Electronic engineering covers the technology of electron tubes and semi-conductor devices. In practice the phrase tends to be used with a wider meaning to comprehend almost the whole field of low-power electrical engineering in contrast to electrical power engineering. Electronic engineering is largely concerned with devices which operate by means of quantum effects, which in themselves involve only low levels of electrical power. Note that some electronic devices are designed to switch or otherwise act upon high-power systems, and are classed according to their application in U/57 Electrical engineering.

* For instrument technology, See U/11,30

---

FH3H

Faults in electronic devices

UHA

(Testing, Maintenance, Design, Production and Packaging of electronic devices)

UHHC

(Quantities, variables)

* Add letters following UGH as far as applicable.

UHIB

(Electric and magnetic fields in electronic devices)

* Add letters following UGI with meanings as at U/5......

UHJ

(Materials of electronic devices)

* Add letters following UGJ (Particular materials)

* Add letters with meanings as at V/2360 to V78

UHK

(Components)

* Add to UHK letters K/X following UG and with the following additions:

UHL

Electron tubes, Valves

UHLK

(Components)

UHLM

Electrodes

UHLN

Cathodes

UHLO

Anodes

UHLP

Grids

UHLPM

Filaments

UHLPS

Housings, Envelopes

* ** allow IQ/LY for more components

(Types)

(By size)

UHME

Miniature electron tubes

<1>
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UHMF</td>
<td>Nuistors</td>
</tr>
<tr>
<td>UHMH</td>
<td>(By number of electrodes)</td>
</tr>
<tr>
<td>Diodes</td>
<td></td>
</tr>
<tr>
<td>Triodes</td>
<td></td>
</tr>
<tr>
<td>Tetrodes</td>
<td></td>
</tr>
<tr>
<td>Pentodes</td>
<td></td>
</tr>
<tr>
<td>UHML</td>
<td>Multi-electrode tubes</td>
</tr>
<tr>
<td>Hexodes</td>
<td></td>
</tr>
<tr>
<td>Heptodes</td>
<td></td>
</tr>
<tr>
<td>Octodes</td>
<td></td>
</tr>
<tr>
<td>Nonodes</td>
<td></td>
</tr>
<tr>
<td>UHMQ</td>
<td>Tubes with 10 or more electrodes</td>
</tr>
<tr>
<td>UHMT</td>
<td>(By function)</td>
</tr>
<tr>
<td>Trigger tubes</td>
<td></td>
</tr>
<tr>
<td>* For Trigatrons, See below</td>
<td></td>
</tr>
<tr>
<td>UHN</td>
<td>(By cathode thermal condition)</td>
</tr>
<tr>
<td>Thermionic tubes, Thermionic valves, hot cathode tubes</td>
<td></td>
</tr>
<tr>
<td>UHMK</td>
<td>(Components)</td>
</tr>
<tr>
<td>* Add letters from above with the following addition:</td>
<td></td>
</tr>
<tr>
<td>UHNLQ</td>
<td>Heaters</td>
</tr>
<tr>
<td>UHNR</td>
<td>Cold cathode tubes</td>
</tr>
<tr>
<td>UHNT</td>
<td>Tunnel cathodes</td>
</tr>
<tr>
<td>UHNX</td>
<td>(By frequency)</td>
</tr>
<tr>
<td>X-ray tubes</td>
<td></td>
</tr>
<tr>
<td>UHNY</td>
<td>Radio frequency tubes, R.F tubes</td>
</tr>
<tr>
<td>UHO</td>
<td>Microwave tubes</td>
</tr>
<tr>
<td>* Add letters 'I/V following UJJ</td>
<td></td>
</tr>
<tr>
<td>UHOOI</td>
<td>Extremely high frequency tubes, E.H.F. tubes, Millimetre wave frequency tubes</td>
</tr>
<tr>
<td>Ultra-high frequency tubes, U.H.F tubes</td>
<td></td>
</tr>
<tr>
<td>UHOQ</td>
<td>Very high frequency tubes</td>
</tr>
<tr>
<td>UHP</td>
<td>(By filling or evacuation)</td>
</tr>
<tr>
<td>Vacuum tubes</td>
<td></td>
</tr>
<tr>
<td>UHFMU</td>
<td>Electron multipliers</td>
</tr>
<tr>
<td>UHPN</td>
<td>Thermionic tubes</td>
</tr>
<tr>
<td>Dynatrons</td>
<td></td>
</tr>
<tr>
<td>Mixer tubes</td>
<td></td>
</tr>
<tr>
<td>Power tubes</td>
<td></td>
</tr>
<tr>
<td>Resnatrons</td>
<td></td>
</tr>
<tr>
<td>Cold cathode tubes</td>
<td></td>
</tr>
<tr>
<td>* For Phototubes, See below</td>
<td></td>
</tr>
<tr>
<td>* For Photomultiplier tubes, see U/53,25 below</td>
<td></td>
</tr>
<tr>
<td>UHPO</td>
<td>Microwave tubes</td>
</tr>
<tr>
<td>UHPON</td>
<td>Thermionic tubes</td>
</tr>
</tbody>
</table>
** Larousse equates with th. valves
Beam power tubes, Beam pentodes, space a charge pentodes
Electron wave tubes
(Components)
* Add letters as above, with the following additions:
  Electron guns
  Cavity resonators
  Collector plates
(Kinds)
  Linear beam tubes
  Crossed field tubes
  Velocity modulated tubes
    Travelling wave tubes,
      slow wave tubes
    Backward wave tubes
  Carcinitrons
  Klystrons
    ** alignment correct?
  Reflex klystrons
  Magnetrons
    ** alignment correct?
    * For Platinotrons, See U/55,80...
  Trochetrons

Electron beam deflection tubes \[= \text{cathode ray tube} \]
(Components)
* Add letters as above and the following additions:
  Deflector plates
  Deflectör coils
  Focusing coils
  Thermionic tubes
    * For tubes which contain optical-to-electrical and/or electrical-to-optical transducer components, eg Photocathodes, Electro-luminescent phosphor screens, see U/53,32 below

Storage tubes
  * For Cathode ray storage
  see See U/53,32 below
Charge storage tubes

Discharge tubes, Gas discharge tubes
  * For discharge lamps, See U/9714
  * For Transmit-receive tubes and Antitransmit-receive tubes, See U/55,80.....

Thermionic tubes
Arc discharge tubes
Thyratrons
* For Mercury arc rectifiers, see U/57,050,32...

Switching tubes
Pool tubes
Ignitrons
Capacitrons, Band igniter tubes

Plasmatrons
Duoplasmatrons
Triplasmatrons
Cold cathode tubes
Trigatrons
* For Trigger tubes generally, see above

Glow discharge tubes
Neon tubes
Voltage stabilizer tubes, Voltage regulator tubes
Tuning indicator tubes
Counter tubes, Scaling tubes Dekatrons, Stepping tubes
Corona discharge tubes

UI
Semiconductor technology
** ref to solid state devices? or equate?

UIA
(Testing, Design, Production and Packaging of semiconductor devices)
* Add letters...........to.......with meanings as at U/15 to U/27,40

UIJ
(Semiconductor materials)
* Add letters to...........with meanings as at U/35
* Normal retro from UH is amended here, to accommodate particular materials. Use UIL for Components.

(UIK)
(Particular materials)
Intrinsic semiconductors
** need note here re use of these materials to specify kinds – eg Intrinsic barrier devices UI?
Or is specification not to be distinguished here?

UIK
Extrinsic semiconductors

Dopants

Elemental semiconductors
Silicon
Germanium

3-5 Group semiconductors
Gallium arsenide
Gallium phosphide
Indium antimonide
Indium phosphide
2-6 Group semiconductors
Cadmium sulphide
Cadmium selenide
Cadmium telluride
Zinc telluride
Transition metal compounds
Oxides and ferrites
Organic semiconductors
Amorphous semiconductors
Glasses
Chalcogenides

(Devices & components)
* Add to UIL letters K/Y following UGK;
* Add to UIM letters L/V following UH, so far as applicable.

(Special semiconductor devices)
* For semiconductor devices with optical input and/or output, see below

Power devices
** Note "To electrical engng" not clear.
Point contact devices
Junction devices, Bipolar devices
(Kinds of junction devices)
(By manufacturing method)
Alloy junction--
Alloy diffused--
Diffused--
Mesa
Planar--
Epitaxial planar--
Grown diffused--
Grown junction--
Ion implantation
Electrochemical--
** allow 5 more

Intrinsic barrier devices
Surface barrier devices, Schottky devices
** 6 kinds in transistors
Avalanche breakdown devices, Zener devices

Heterojunction devices
** allow 5 more (supercond)
Space charge limited devices
** allow 7 divs. (transistors)
Field effect devices, Unipolar devices
MOS devices
** allow 7 divs (transistors)
<5>
Diodes

Point contact diodes
Junction diodes
Intrinsic barrier diodes
p-i-n diodes
Four layer diodes
Surface barrier diodes, Schottky diodes
BARITT, Punch through injection diodes
Avalanche diodes, Zener diodes
IMPATT, Impact avalanche transit time diodes ,Read diodes
** note as for BARITT
TRAPATT, Trapped plasma avalanche transit time diodes
** note as for BARITT
Charge storage diodes, Snap-off diodes, Snapback diodes, Step recovery diodes
Varactors, Parametric diodes
Backward diodes, Unitunnel diodes
Tunnel diodes, Esaki diodes
Heterojunction diodes
Gunn diodes, Bulk effect diodes
** note as for BARITT
Space charge limited solid state diodes
Field effect diodes, Unipolar diodes
Metal-oxide-semiconductor diodes
** allow here for more diodes (photoelectric diodes)?

Transistors
Mesa
Planar
Epitaxial planar
Interdigitated

Point contact transistors
Bucket brigade devices
Junction transistors, Bipolar transistors
(By manufacture method)
Alloy junction
Alloy diffused
Drift, Graded base
Grown diffused
Grown junction
Electrochemical
Diffused collector
Microalloy diffused
Microalloy
Microlayer
Silicon alloy diffused
(By construction)
n-p-n transistors
p-n-p transistors
Four layer transistors
Surface barrier transistors
Intrinsic barrier transistors
p-n-p-n transistors
n-p-n-p transistors
Avalanche transistors
Unijunction transistors, Double base diodes
Heterojunction transistors
Field effect transistors, Unipolar transistors
Junction field effect transistors, JUGFETS
Insulated gate field effect transistors, IGFETS
Enhancement mode
Depletion mode
Metal-Oxide-Semiconductor transistors, MOSTs
Complementary metal-oxide-semiconductor transistors, CMOSTs
Charge coupled devices
Optoelectronics
* Electronic components with optical input and output.
Electron tubes
Image converter tubes
Image intensifiers
Image tubes
Infra-red image tubes
Thermicons

Photoelectric devices
Photocells, photodetector cells
* Photoemissive and semiconductor cells taken together
* For power generation by photocells, See U/57,46
Electron tubes
Photoemissive cells
Phototubes, photovoltaic tubes
Camera tubes, Pick-up tubes
Iconoscopes
Orthicons
Image orthicons
Videicons
Semiconductor devices
* Add to UIR_D letters A/
following UI
Semiconductor photocells
Photodiodes
Depletion layer photodiodes
Point contact photodiodes
p-n junction photodiodes
p-i-n photodiodes
Schottky photodiodes
Heterojunction photodiodes
Avalanche photodiodes
)
)
Transistors(
* Use UIR_F
Photo voltaic cells
* For Photovoltaic cells in electrical power generation, See U57,48...
p-n junction photovoltaic cells
Solar cells
Barrier layer photovoltaic cells
Photoconductive cells
Phototransistors
Photovaristors
Inverse photoelectric devices,
electrical input-optical output devices
Electron tubes
Cathode ray tubes
Dark trace tubes, Skiatrons
Picture tubes
* For television receiver tubes, See U/55,65...
Colour picture tube
Cathode ray storage tubes
* For Storage tubes generally, See above
Cathode ray storage tubes
Image storage tubes, Display storage tubes
Photoconductor storage tubes
Semiconductor devices
Diodes
Light emitting diodes
Piezoelectric semiconductor devices
Pressure-sensitive diodes
Acoustic surface wave devices,
electroacoustic devices
UIRJ
Thermal semiconductor devices
Temperature sensing transistors
Thermistors

UIRK
Magnetic semiconductor devices
Magnetodiodes
Hall effect semiconductor devices

UISB
Electronic circuits
(By form)

UISC
Printed circuits

UISD
Integrated circuits, Microcircuits
Thick film circuits
Thin film circuits
* For Superconducting thin film circuits, See U/53.... below
Hybrid integrated circuits
Multi-chip circuits, Silicon multi-chip circuits

UISE
Monolithic integrated circuits, Single chip circuits, Silicon single chip circuits
Small scale integrated circuits, SSI circuits
Medium scale integrated circuits, MSI circuits
Large scale integrated circuits, LSI circuits
Very large scale integrated circuits, VLSI circuits
Extra large scale integrated circuits, ELSI circuits
(By continuous/discrete mode)

UISG
Linear circuits, Analogue circuits

UISH
Digital circuits
(By function)

SJ
Power supplies

UISL
Amplifiers

UISM
Linear--
Class A--
Class AB--

UISN
Non-linear--
Class C

UISO
Wideband--

UISP
A.F.--, Audio frequency

UISQ
Video--

UISR
R.F--, Radio frequency--
L.F-- Low frequency--
I.F.--, Intermediate frequency--
H.F.--, High frequency--
V.H.F.--, Very high frequency
U.H.F.--, Ultra-high frequency--
Microwave--
S.H.F.--, Super high frequency--
E.H.F.---, Extremely high frequency---

Class D

A.C.---, Alternating current---

D.C.---, Direct current---

Power---

Voltage---

Bandpass---, Frequency selective---

Parametric---

Differential---

Preamplifiers

Operational---

Pulse

Signal generators

Function generators

Noise generators

Pulse generators

Square wave generators

Time base generators, Sweep generators,

Ramp generators

Miller sweep generators

Oscillators

Harmonic oscillators

Tunable oscillators, Variable frequency

oscillators

Multivibrators

Astable---

Monostable---

Bistable---

Logic circuits

Modulators

Frequency---

Phase---

Amplitude---

Modems

Detectors, Demodulators

Discriminators

Mixers

Digital circuits

Counting circuits

Adders

Shift registers

Switching circuits

Timer circuits

Trigger circuits

Filters

Coaxial---

Passive ---

Active---

Digital---

Attenuators

Equalisers

Frequency multipliers

Phase changing circuits

Differentiators

Dividers
Multipliers
Integrators
Co-ordinate resolvers
Delay circuits, Time delay circuits
Acoustic delay lines

Stimulated emission devices
Masers, Paramagnetic amplifiers
* For Cyclotron resonance masers,
see U/4 Nuclear fusion)

Pulsed masers
Continuous masers

Beam masers
Atomic beam masers
Molecular beam masers
Optically pumped gas-cell masers
Gas masers
Solid state masers
Three level masers
Cavity masers
Travelling wave masers
Ruby masers
Semiconductor masers

Lasers
Pumping

Pulsed lasers
Continuous lasers

Nuclear powered lasers

Ultraviolet lasers
Visible light lasers
Infra-red lasers

Gas lasers
Water vapour lasers
Helium-Neon lasers
Helium-Zinc lasers
Carbon monoxide lasers
Carbon dioxide lasers
Nitrogen lasers
Iodine lasers
Argon lasers
Hydrocyanic acid lasers
Liquid lasers
Dyé lasers
Solid state lasers
Glass lasers
Ruby lasers
Yttrium-Iron garnet lasers
Semiconductor lasers, Diode lasers
Gallium arsenide lasers
Heterojunction lasers
Double heterojunction laser

Superconductor technology
Superconducting junction devices
Superconducting quantum interference
devices, SQUIDS
Josephson effect devices
* For Josephson effect computer
  storage units, See U/12,55
* For Josephson effect computer
  logical elements, See U/12,55
  D.C. Josephson junctions, Direct
Josephson junctions
A.C. Josephson junctions, Alternating
current Josephson junctions
Meissner effect devices
** Magnetic field effect; cd be UIW_LIK ?
* For Superconducting magnets, See
* For Superconducting cables, See
* For Superconductive electrical

Machinery
  machinery, see U/57,60
  * For Cryotrons, See U/57,0,50,52...
Superconducting thin film circuits

Microwave transmission
* For Microwave electron tubes, See
  U/53... above
* For Microwave semiconductor diodes
  see U/53 above, U/53...(Gunn diodes)
  U/53... (IMPATT diodes), U/53...
  (Schottky diodes), U/53... (Charge
  storage diodes), U/53...(p-i-n
diodes), U/53 Field effect diodes
* For Microwave transistors, Use U/53..

Waveguides
(Modes)
TE, H wave
TM, E wave
Components
Mounts, Feeders
Bends, Corners
E bends
H bends

Waveguide junctions
Couplers
  Rotary couplers
  Directional couplers
  Cavity resonators
<12>
Waveguide transformers
Quarter wavelength lines
Attenuators
Gyrators
Irices
Waveguide lenses
Tuning screws
Waveguide plungers
Waveguide posts
Waveguide stubs
Waveguide terminations

(Kinds of waveguide)
Rectangular
Circular
Helical

Uniform
Parallel plate
Tapered
Stepped
Ridged
Open ended
Coaxial
Surface
Stripline
Microstrip
Leaky
Matched
Multi-mode
Dielectric loaded
Phase shift
Squeezable

Circulators
Isolators, Ferrite isolators
Microwave limiters, Current limiters
Telecommunications engineering

** file uj.sch (originally bc2u55) 14.1.99

* The technologies of electrical communications over
distance i.e. telecommunications as covered in this
section, and of electrical communications over time,
ie the recording and reproduction of electrical signals
are closely allied both historically and by the fact
that they involve many common devices and processing
stages. However the recording, storage and reproduction
of sound and visual material are classed at 5...

Logically Telecommunications Engineering should also be
classed at 5 rather than at U which does not usually
comprehend technical fields defined by a strictly non-
technical purpose or application such as Communication.
However the practical and customary relation between
Electronic engineering and Telecommunication is so
close that the latter is retained in U as a unique
exception to the otherwise prevailing pattern.

* Classify in the area U/55..... only material of which
the application is not confined to any one of the
following: Line communication, Radio communication,
Coded signals communication, Sound communication,
Television, Radar.

* For Communication sciences, See 5
* For Communication theory, See 56

UJ3H )Faults(
    Noise
    Signal-noise ratio
    Noise suppression
    (Kinds of noise)
    (By source)
    Galactic noise
    Atmospheric noise
    Man made noise, Interference noise
    Random noise
    Shot noise, Schottky noise, Flicker noise
    White noise
    Thermal noise
    Impulse noise
    Carrier noise

Distortion
    Phase distortion
    Attenuation distortion
    Crossover distortion
    Delay distortion
    Non-linear distortion
    Amplitude distortion
    Harmonic distortion
    Intermodulation distortion

UJA )Testing(

UJF (Relations with other technologies)
* If not otherwise provided for.
* Add to UJF letters F and L/Y following U;
* Add to UJG letters A/V following V.
** Need slot for (Operations) facet; eg Radar UJW

UJG )Electrotechnology(
* Add to UJ letters G/I following U; eg
UJW_LP_GOK (Rale)

Networks

UJJC  Destination-directed telecommunication
UJJD  Broadcasting, Mass telecommunication
      (Transmission wave variables and components)
      ** Use UJJE for transmission per se (eg UJV_JE)? - no, use
UJJE  Carrier waves
UJJF  Frequency
      (Frequency bands)
      * This position is for material on the properties
        of frequency bands as such!. Telecommunication
        !systems! specified or characterised by
        particular frequencies are classed at U/55....
        to U/55... below. In case of doubt, prefer
        U/55..... below.

JH  Microwaves
UJJL  Extremely high frequency, E.H.F.,
      millimetre wave frequency
      W-band
UJJL  V-band
UJJW  Q-band
UJK  K-band
UJM  Centimetre wave frequency
UJML  Superhigh frequency, S.H.F.
UJMQ  X-band
UJJN  S-band
UJJQ  Ultrahigh frequency, U.H.F.
      L-band
UJP  P-band
UJQ  Very high frequency, V.H.F.
UJR  High frequency, H.F., Short waves
UJS  Medium frequency, M.F.
UJT  Low frequency, L.F., Long waves
UJV  Very low frequency, V.L.F.

SW  Audio frequency
UJKB  Modulated waves, Modulated signals
UJKC  Positive
UJKD  Negative
      ** pos & neg special to TV?
UJKE  Bandwidth
UJKF  Sidebands
UJKG  Upper--
UJKH  Lower--
UJKI  Vestigial--
      ** allow J for single sideband UJ
UJKK  Subcarriers
      (Kinds of modulation)
      * The positions which immediately follow are for
        material about the various kinds of modulation
        as such!. Complete telecommunication systems
        characterised by kind of modulation are classed
        at U/55.... below. In case of doubt prefer U/55...
        below

UJK L  Signal processing
Amplitude modulation, A.M.
Phase angle modulation
Phase modulation
Frequency modulation, F.M.
Pulse modulation
Pulse amplitude modulation, P.A.M
Pulse width modulation, Pulse duration
modulation, P.D.M.
Pulse frequency modulation, P.F.M
Pulse position modulation, P.P.M.
Pulse code modulation, P.C.M.

** allow UJLB/LH for divisions under sound & TV

(Devices and circuits)
* Devices and circuits usable in both transmitters and receivers

U
(Devices)
* Add LH/LO following UJSB if applicable

UJMP
(Circuits)
* Add following UJ

(UJN
Transmitters, Input sub-systems
UJO
Receivers, Output sub-systems
UJQ
Signal level
UJF
(Telecommunication stations)
UJPQ
Mobile telecommunication stations

(Systems of telecommunications)
UJQB
Transceivers, transreceivers
* Circuitry is common to both transmission and reception.
(Kinds of systems by wave transmission character)
(By frequency)
* Add to UJQ letters H/W following UJJ

UJOH
Microwave
Extremely high frequency, E.H.F., Millimetre wave frequency

UJQJB
W-band
V-band
Q-band

UJQL
K-band
Centimetre wave frequency
Superhigh frequency, S.H.F.
X-band
S-band
Ultrahigh frequency, U.H.F.
L-band

UJQQ
P-band
Very high frequency, V.H.F.
High frequency, H.F., Short waves
Medium frequency, M.F.
Low frequency, L.F., Long waves
Very low frequency, V.L.F.

UJQW
(By modulation)
* Add to UJQ_W letters B/W following UJK with the additions indicated.

UJQWJ Single sideband
UJQWM Amplitude modulation, A.M.
UJQWN Phase angle modulation
   Phase modulation
   Frequency modulation, F.M.
UJQWQ Pulse modulation
   Pulse amplitude modulation, P.A.M
   Pulse width modulation, Pulse duration
      modulation, P.D.M.
   Pulse frequency modulation, P.F.M
   Pulse position modulation, P.P.M.
   Pulse code modulation, P.C.M.
** allow 3 more for sound
   (By discreteness of signal)
   Analogue communications
   Digital communications
   (By number of paths)
UJQRE Multiplex communications, multisignal,
   single path
UJRF Diversity telecommunications, multipath
UJRL Line telecommunications
   * Communications systems using wires, cables or
      waveguides as physical paths
UJRM Optical waveguide transmission
UJRN Fibre optical communication
UJRP Plane polarised fibre, optical fibre
   (Receivers)
   Superheterodyne--
UJRPO Electrical conductor transmission
UJRS Conductors
   Wires
UJRT Cables
UJRU Submarine cables
UJRV Ocean cables
UJRW Waveguides
UJRX Free space telecommunications, Radio communications
   * Radio communication in the wide sense, including
      transmission of signals of all kinds, coded,
      audio, and video. For radio communication in the
      narrow sense, meaning the output of audio signals
      alone. See U/55....Sound radio engineering
      )Destination directed(
   Radio links
   * Destination-directed free-space
      telecommunications.
   (Transmission wave components and variables)
UJSBJDUX Ground waves
   ** or shd these file after carrier waves?
UJSBJDXY Ionospheric waves
   (Devices)
UJSBLH Aerials, Antennae
UJSBLHP  Radiation patterns
UJSBLHR  Radiation resistance
UJSBLI  Gain
UJSBLJ  Feed-point impedance
       (Kinds of aerials)
       (By shape)
       Umbrella--
       Clover leaf--
       H--
       L--
       T--
       Cigar--
       Corner--
       ** allow 2 more for radar
       (By structure)
UJSBLM  Dipole aerials
UJSBLK  Half-wave--
UJSBLKH  Full wave--
UJSBLKL  Folded--
UJSBLKLM  Directive aerials
UJSBLKN  Aerial arrays, Beam aerials
UJSBLKO  Broadsid arrays
UJSBLO  Endfire arrays, Staggered aerials
UJSBLOK  Yagi aerials
UJSBLOL  Steerable aerials
UJSBN  Frame aerials, Loop antennas, Coil antennas
UJSBO  ** allow 2 more for radar
UJSBO  Transmitters
UJSBO  Receivers
UJSD  Satellite communications
UJSDN  Transmitters
UJSDO  Receivers
UJSDOP  Amplifiers
UJSDOQ  Masers (amplifiers)
UJSDOS  Parametric amplifiers
UJSDOT  Cryogenic amplifiers
UJSDOW  Echo cancellers
UJSDQB  (Kinds of satellite communication systems)
UJSDQDR  Transceivers
UJSDQDR  Transponders
UJSE  Spread spectrum system
UJSEEK  (Modulated waves, Modulated signals)
UJSEEKB  (Operations)
       Digital code sequences, DSK
       Frequency hopping
       Time hopping
       Time-frequency hopping
<5>
(@
(Telecommunication systems, by kind of signal transmitted)

UJSI Symbolic information, Coded signals.
UJSJ Telegraph
    (Devices)
UJSJLP Teleprinters
    (Kinds of telegraphy)
UJSK Carrier telegraphy
    ** or UJP_PPJ_EC ?
UJSL Amplitude modulated telegraphy,
    A.M. telegraphy
UJSM Frequency modulated telegraphy,
    F.M. telegraphy
UJSN Pulse code modulated telegraphy,
    P.C.M. telegraphy
UJSP Wire telegraphy, Line telegraphy
UJSR Direct current telegraphy
UJSV Spark telegraphy
UJSPX Rotary discharger telegraphy
UJST Radio telegraphy, Radio telegraphic links
UJST Telex
UJSTU Facsimile transmission
UJSTV Phototelegraphy, Telephotography
UJTB Teletext and viewdata
UJTC Teletext
    * non-interactive, using PCM video signal
UJTE Viewdata, Videotext
    * interactive, using telephone signals
    output to TV screen.
UJTG Data transmission
UJTH Wire channel
    )Devices(
    Binary to audio conversion, Audio to binary conversion
UJTHLW Modems
UJTHLY Acoustic couplers
UJTI Radio channel
UJTJ Packet switching
UJTL Electronic mail, Teletex
UJTN Audio communications, Sound transmission
UJTNJE (Transmission wave components and variables)
    * Add to UJT_NJ letters E/Y following UJ
UJTNLH (Devices and circuits)
    Compandors, Volume compressors-expanders
    (Subsystems)
UJTN Transmitters
UJTNNT Microphones
UJTNNUC Carbon granule--
    Reisz--
UJTNNUG Condenser--
UJTNNUL Crystal--, Piezoelectric--<6>
Receivers

Telephony
* Mainly wire channel sound transmission, which may include radio links

Transmitters

Receivers
** mobile phones? ⇆ UJφα

Telephone stations
(Devices and circuits)
Signalling equipment
Bells
Calling equipment
(Kinds of stations)

Subscriber stations
Telephone sets
Push button sets
Dial sets

Private exchanges

Switching, Public exchanges, Switching stations

Switches
** prefer enumeration?
Fereed switches

Local exchanges
Toll centres
Group centres
Zone centres

Switching networks
Repeaters
(Kinds of networks)
Manual
Strowger
Crossbar selector
Electronic switching networks
Computerised switching networks
Automatic electronic networks

(Kinds of telephony)
* For Videophones, See U/55.....below

Direct current telephony
Voice frequency telephony
Carrier telephony
Quiescent carrier telephony

Multiplex telephony
Time division multiplex
Frequency division multiplex

Radio telephony, Radio telephonic links
(Kinds of sound transmitted)

Speech
(Signal processing)
Speech compressors
Vocoders

Non-speech sounds
Sound radio engineering
* For Radio communications, not necessarily limited to sound transmission, See
* For Radio astronomy, See DB

(UJUJC) Destination-directed sound radio

(UJUJD) Radio broadcasting
Stations
Studios

(UJUJE) Transmission wave components and variables

(UJUNH) Aerials, Antennas

(UJUO) Transmitters

(UJUO) Receivers

(UJUOHL) Electron tubes

(UJUOO) Tuners
  Capacitive--
  Inductive--
  Turret --
  Preamplifiers

(UJUOP) Detectors, Demodulators
  Crystal detectors
    Silicon--
    Carborundum--
    Iron pyrite--
    Zincite-chalcopyrite--
  Detector circuits

(UJUOQ) Audio-frequency amplifiers
  Negative feedback audio-frequency amplifiers
  Tone control
  Negative feedback tone control

(UJUOU) Loudspeakers
  Electrostatic--
    Full frequency range electrostatic--
  Earphones
  (Kinds of sound radio receivers)
    Superheterodyne--
    Regenerative--
    Superregenerative--
    Neutrodyne--
    Negative feedback--
    Automatic volume control--
    Transistor--

(UJUOW) Integrated circuit--
  Metal-oxide-semiconductor integrated circuit--, MOSIC
    Complementary metal-oxide-integrated circuit-- CMOS
  Bucket brigade circuit--
  (Sound radio systems)

(UUQB) Transceivers(
  (By kind of sound radio transmission)
    * Add to UJU_T as UJQW

(UJUTM) Amplitude modulated, A.M.
  Frequency modulated, F.M.

(UJUTW) Monophonic --

<8>
Stereophonic--
Quadrrophonic--
Diversity --
  Space diversity--
  Frequency diversity--
  Polarisation diversity--

Sound & vision transmission, Television engineering
Noise
  Thermal noise, Snow
  Ghost images
Closed circuit television
Broadcast television
(Transmission wave components and variables)
Video transmission, Picture transmission
** assume picture is being equated with TV in general; the sound component is given at UJV_LG - but no provision for video (picture) alone? Separate provision is made under transmitters & receivers, with video filing before audio. See also note at UJV_N.
Carrier waves
Modulated waves
  Positive modulation
  Negative modulation
  Sidebands
  Vestigial--
  Subcarriers
Synchronising pulses
Scanning signals
** is this filing position OK?
  Line--
  Sequential--
  Interlaced--
  Field--
  Blanking level
  White level
  Black level
Audio transmission
  * Add letters as at
Devices, Circuits

Transmitters
** Under electronic circuits, UISP Audio files before UISQ Video. Reversal here reflects greater importance of video?

Video devices, circuits
Television cameras
(Parts)
Optical systems
Picture pick-up devices
  Television camera tubes
  * For Camera tubes generally,
see U/53...
(Kinds of television camera tubes)
* Add letters as at U/53...
Charge coupled pick-up devices
Preamplifiers
Scanners, Time base generators
(Kinds of television cameras)
Studio--
Portable
Telecine

Video amplifiers
** Not sure if shd build from functional
electronic circuits (UJSJ...) for
amplifiers, modulators, filters, etc.
or enumerate. Latter is easier!
Video amplitude modulators
R.F. carrier generators
Picture r.f. amplifiers
Vestigial sideband filters
Diplexers, Combiners
Audio devices, circuits
Microphones
Audio amplifiers
Audio frequency modulators
R.F. carrier generators
Sound r.f. amplifiers

Receivers
** note at UJV_NMB applies here also.
R.F. amplifiers
Video devices, circuits
   Detectors, demodulators
I.F. amplifiers
Scanners, Time base generators
Video amplifiers
Picture tubes
   * For Cathode ray tubes generally, See U/53..
Controls
   Tuners
Automatic controls, Control systems
   Brightness--
   Contrast--
   Screen hold--
Audio devices,circuits
Sound i.f. amplifier
Detectors, Demodulators
Audio amplifiers
Loudspeakers

Line television
Wire television, Cable television
Pay television
Videophones
Central antenna television, CATV
Radio television
Aerials, Antennas
Transmitters
 Receivers

(Kinds of television system)

UJVT
Monochrome television

UJVV
Colour television
(Transmission wave components and variables)
* Add letters as at U/55... together with the following further additions:
  Composite colour signals
  Luminance signals, Brightness signals
  Chrominance signals
  Colour burst signals

(Devices, Circuits)

UJVN
Transmitters
* Add letters as at U/55... together with the following further additions:
  Colour coder circuits

UJVO
Receivers
* Add letters as at U/55, with the following further additions:
  Colour decoders
  Colour killers
  Tint control

(UJWWW)
NTSC, National Television System Committee system
PAL, Phase alternation line system
SECAM, Sequential and Memory System

(Telecommunication systems by purpose)
* For Telecontrol, See U/12,40
* For Telemetering, See U/11,30
* For Radio astronomy, See DB.....
* For Radio navigation, See U/940,36...

UJvy
Remote location

UJW
Radar

UJW3H
Noise
Clutter

(UJWBT)
Target acquisition
Scanning
Conical scanning

Targets
Swerling I
Swerling II
Swerling III
Swerling IV
(Devices, Circuits)
Aerials, Antennas
(Parts)
Feeders
Waveguides
(Kinds)
Parabolic--
Dish--
Transmit-receive--

Transmit-receive switches
* For Gas discharge tubes
 generally, see U/53

Power supplies
Modulators
Amplifiers
 Power amplifiers
 Preamplifiers
Waveform generators
Duplexers
(Subsystems)

Transmitters

Receivers
(Processes)
 Signal processing
 Coherent signal processing
 Non-coherent signal processing
(Parts)
Mixers, Frequency changers
Amplifiers
 I.F. amplifiers, Intermediate
 frequency amplifiers
Detectors, Demodulators
Pulse compressors
Displays
(Formats)
P, P.P.I., Plan position indicators
A
G
J
M
B
(Kinds of radars)
(By wave characteristics)
Pulsed radars
 Monopulse radars
Continuous wave radars
(By aerial disposition)
Monostatic radars
Bistatic radars
(By interaction with target)
Passive radars, Radiolocation
Primary radars
Secondary radars

<12>
(Devices)
  Transponders
    (By mounting)
      Airborne radars
    (By field of viewing)
      Sideways looking radar
    (By function)
      Multi-functional radars
      Surveillance radars
      Search radars
      Height radars
      Volumetric radars V-beam radars
      Tracking radars
        Moving target indication
        Velocity indication
        Doppler radars
      Telemetering engineering
        ** is here in BSO. Where in U?**
      Telecontrol engineering
        ** note as above**
UK 03 Electrical power engineering
04. ** file uk.sch (from bc2u57) 22.1.99
04. * Electrical engineering in the narrower sense,
04. excluding Electronic and Telecommun- ications Engineering. For Electrical Engineering in the
04. wider sense embracing Electronic Engineering ,
04. Telecommunications Engineering, Electrical Power
04. Engineering, Use U/5 Electrotechnology.

UK3 H 04. Electrical power faults
05. . (Overcurrent/Power systems/Elec. machin.
05. . (Reverse current/Power systems/Elec. mach
05. . (Overvoltage/Power syst./Elec mach.
05. . (Undervoltage/Power sys./Elec mach.
05. . (Underfrequency/A.C. syst/A.C. mach.
05. . (Phase unbalance/A.C. syst/A.C. mach
05. . (Reverse phase rotation/ A.C. syst./A.C. mach.
05. . Thermal faults

UKA 04. (Testing, Maintenance, Design, Production and
05. . Packaging of electrical power equipment)

UKH C 04. (Quantities, variables)
05. . * ^Add^& letters........to........ with meanings
05. . as at U/5 [UG]
05. . (Losses)
06. . . (Copper loss,|R loss/ Elec. mach.
06. . . (Core loss/Elec mach.
06. . . (Stray load loss/Elec. mach
06. . . (Friction and windage loss/Elec mach.

UKI B 04. (Electric and magnetic fields in electrical power
04. engineering)
05. . * ^Add^& letters ........to..... with meanings as
05. . at U/5 [UG]

UKJ 04. (Materials of electrical power equipment)
05. . * ^Add^& letters........to.........with meanings
05. . as at U/35... [UE]
05. . (Particular materials)
06. . . * ^Add^& letters........to.........with
06. . . meanings as at V/23,60 to V/78

UKK B 04. (Electrical power equipment components)
05. . * Add to UKK letters K/V following UG with the
05. . following additions:
KI 05. . Electronic equipment for power handling
06. . . * Add letters following UI
KJ 05. . Magnetic devices
LC 05. . Power converters
06. . . Rotary converters
06. . . Static converters
LE 06. . . Rectifiers, A.C. to D.C. converters
07. . . . . (Static converter rectifiers)
07. . . . . Half-wave rectifiers
07. . . . . Full-wave rectifiers
LF 08. . . . . Electron tube rectifiers
09. . . . . . . Mercury arc rectifiers
10. . . . . . . * For thyatrons generally, See
10. . . . . . . U/55...
Electrical power engineering

UK

- Electrical power equipment components
- Power converters
- Rectifiers

UKK

- Ignitrons
- Semiconductor rectifiers
- Diode rectifiers, Silicon diode rectifiers
- Thyristors
- Phototransistors
- Silicon controlled rectifiers, Reverse blocking triode thyristors
- Metal rectifiers

UKK LG

- Inverters, D.C. to A.C. converters
- Electric reactors
- Inductors
- Saturable reactors

UKK LN

- Transformers
  - Core type
  - Shell type
  - Autotransformers

UKK OB

- Switchgear

UKK PC

- Relays

UKK PT

- Contactors

UKK PU

- Circuit breakers
  - Air blast
  - Gas blast
  - Oil blast

UKK UKM

- Electric power systems

UKK 3H

- Faults
  - Protection equipment
  - Surges, Transients
  - Lightning surges
  - Overcurrent
  - Overvoltage
  - Overload

UKK B

- Electricity power system operation
  - Load coordination
  - Power factor correction
  - Synchronous capacitors, Phase modifiers

UKK HC

- Quantities, Variables
  - (Load)
  - Base load
  - Intermediate, load
  - Peak load

UKK S

- D.C. power systems, Direct current power systems
  - For D.C. electrotechnology generally, See U/5

UKK T

- A.C. power systems, Alternating current power systems
  - For A.C. electrotechnology generally, See U/5

UKK U

- Electric power circuits
  - For power transmission lines, See U/57 below

UKK UKN

- Electrical power generation, Electrical generators
06 * For electrical machinery generally, see U/57,70 below.

UKN 4U 06Power stations
4US 06Standby power sources
07. ** implies equipment?
4V 06D.C. generators, Direct current generators,
07. Dynamos
07. * For rotating amplifiers, See U/12,40
4VP 07. Homopolar generators
4W 06Alternators, A.C. generators, Alternating current
generators
4WS 07. Synchronous alternators
4WT 08. . Permanent magnet a.c. generators
4WU 08. . Inductor generators
4WV 07. Induction generators
P 06Thermal power generation
07. ** fairly consistent with UL (Thermal engg)
PQ 07. Boilers
PQR 08. . Coal fired--
PQS 08. . Oil fired--
PS 07. Heat engines
PT 08. . Steam turbines
PU 08. . Turbo-alternators
PV 08. . Diesel engines
PY 08. . Gas turbines
UKO C 07. Nuclear thermal power generation
D 07. Geothermal power generation
E 06Wind-power generation
F 06Hydroelectric power generation
07. * For conversion of water power to mechanical
07. power, not involving further conversion to
07. electrical power, See UNN
G 07. Pumped storage hydroelectric power generation
H 07. Wave power electrical generation
I 07. Tidal power electrical generation
K 06Direct conversion generation
L 07. Solar power generation
08. . * For use of solar power, not limited to
08. . conversion to electricity, see U/31
M 07. Magnetohydrodynamic power generation
MR 08. . Magnetogasdynamic power generation
N 07. Electrohydrodynamic power generation
NR 08. . Electrogasdynamic power generation
O 07. Thermionic power generation
P 07. Thermoelectric power generation
R 07. Electrochemical power generation
RS 08. . Photoelectrochemical power generation
RV 08. . Chemoelectric power generation
S 08. . Voltaic cells
SY 09. . Primary cells
T 10. . . Batteries
TS 09. . Secondary cells, Accumulators
UKO U 08. . . . Fuel cells

UKP 05. Electrical power transmission
06. . . * Transmission between power stations and power substations
06. . . * For transmission lines generally, not limited to lines for public supply of electrical power
06. . . from central generating stations to substations, See U/5...

UKP Q 06. . Lines
07. . . * Add to UKP letters Q/R following UG
QD 07. . . Cables
QM 07. . . Supports
QMP 08. . . Pylons

R 06. . A.C.-D.C interconnection links
S 06. . E.H.V. power transmission

T 05. Electrical power distribution
06. . . * Transmission between power substations and consumers' installations
TS 06. . Power substations

V 05. Electrical installations
06. . . * Fixed equipment at the consumer end of the power system
X 05. Uninterruptable electric power systems

UKQ B 04Electrical machinery, Electromagnetic machines
05. * Generators and electric motors taken together
05. * For generators alone, See U/57,40 above
05. (Components of electrical machines)
C 06. . Magnetic circuits
D 07. . Coils
08. . . Magnetic cores
09. . . (Components)
EP 10. . . . Pole pieces, Poles
09. . . (Kinds of magnetic cores)
ER 10. . . Laminated magnetic cores
ES 10. . . Solid magnetic cores
ET 10. . . Air cores
EU 10. . . Iron cores
EU 11. . . . Powdered
EV 10. . . Ferrite cores
F 08. . . Windings
G 09. . . Primary windings
H 09. . . Secondary windings
I 09. . . Tertiary windings
UKQ IR 09. . . . Drum windings
IS 10. . . . . Full-pitch windings
IU 09. . . . . Ring windings
IW 09. . . . Concentric windings, Spirally distributed
09. . . . windings
10. . . . . . . ** allow 8 for AC & DC
S 07. . . . Stators
T 07. . . . Rotors
TS 07. . . Air gaps
TV 07. . . Yokes
UKR C 06. Current collecting equipment
D 07. . . . Commutators
E 08. . . . Brushes
G 06. Control equipment
H 07. . . . Starting equipment
I 08. . . (Exciters,?)
09. . . . . . ** DC machines + Synchronous motors
J 07. . . Speed control equipment
08. . . . . . ** allow 12 under motors
05(Types of electrical machines)
R 06. Motor-generators
07. . . * For Ward-Leonard sets, See U/12,40
T 06. Permanent magnetic machines

UKS 06. D.C. machinery, Direct current machinery
07. . (Components)
UKS QD 08. . . (Coils)
QF 09. . . (Windings)
QJ 10. . . . . Series windings
QK 10. . . . Lap windings
QL 10. . . . Wave windings
QM 10. . . . Field windings
07. . (Types of d.c. machinery)
S 08. . . Series wound d.c. machines
T 08. . . Shunt wound d.c. machines
U 08. . . Compound machines
V 08. . . Homopolar machines
UKT 06. A.C. machinery, Alternating current machinery
07. . (Components)
UKT QD 08. . . (Coils)
QF 09. . . (Windings)
QN 10. . . . Single phase
QQ 10. . . . Two phase
QP 10. . . . Three phase
QQ 10. . . . Polyphase
QRC 10. . . . Full pitch
QRF 10. . . . Fractional pitch
QRH 10. . . . Y-connected
[5-Uninterruptable electric power systems UKPX]
[6-A.C. machinery UKT]
  [7-Speed control equipment UKRJ]
    [8-(Coils) UKTQD]
    [9-(Windings) UKTQF]
    [10-(Y-connected) UKTQF]

UKT QRL 10. Delta-connected
07. (Types of a.c. machinery)
R 08. Synchronous machinery
S 09. Salient pole machines
10. * For Synchronous converters, See U/50,32
T 09. Inductor machines
U 08. Asynchronous machinery, Non-synchronous machinery
V 09. Induction machines

UKU 06Electric motors
07. (Components)

RG 08. (Control equipment)
RJ 09. (Speed control equipment)
RK 10. Resistor speed control, Rheostatic speed
10. control
RL 10. (Pole changing equipment
11. ** not sure why bracketed; shd be
11. synthesized? from where?
11. (Pole amplitude modulation, P.a.m.

RMC 10. (Field control equipment
10. (Frequency control equipment
10. (Voltage control equipment

RMD 10. (Thyristor control equipment
10. (Static inverter control equipment

RN 09. Brakes
RO 10. Resistive braking, Rheostatic braking
10. Capacitive braking
10. Regenerative braking
10. D.c. injection braking, Direct current
10. injection breaking
07. (Types of electric motors)

SF 08. Fractional horse-power motors
08. (By housing)
SJ 09. Open--
09. Enclosed--
09. Guarded--
09. Weather protected--
09. Ventilated--
08. (By speed)

SP 09. Constant speed--
SQ 09. Variable speed--
09. Multispeed--

T 08. Linear motors
U 08. Oscillatory motors
V 08. Universal electric motors

UKV S 08. D.C. motors, Direct current motors
09. * For Rotating amplifiers, See U/1240....

ST 09. Homopolar motors

<6>
UKV SU 10. . . . Superconducting homopolar motors
T  08. A.C. motors, Alternating current motors
    09. . . * Add to UKVT letters A/T following UKU.
    09. . . (By phase)
    10. . . * Any type of A.C. motor may be qualified by
          10. . . preceding types:
          10. . . * Add to – (where hyphen is classmark
          10. . . qualified) letters A/T following UKU;
          10. . . letters V/W following UK.
U  10. . . Single phase motors
    11. . . {Shaded pole motors
    11. . . {Split phase motors
V  10. . . Two phase motors
W  10. . . Three phase motors
    11. . . ** allow –X for expansion
Y  10. . . Polyphase motors
UKW B 09. . Synchronous motors
    10. . . * For Synchronous capacitors, See U/S7 above
    10. . . * Add to UKWB letters A/X following UKV
C  10. . . Synchronous induction motors
CY 11. . . Reluctance motors
D  10. . . Hysteresis motors
F  09. . Asynchronous motors, Non-synchronous motors
    10. . . * Add to UKWF letters A/X following UKV
G  10. . . Induction motors
GU 11. . . Single phase induction motors
    12. . . . Shaded pole motors
    12. . . . Split phase motors
    11. . . . Synchros,Selsyns
GW 11. . . Three phase induction motors
GX 12. . . Slip ring motors, Wound rotor induction
    12. . . . motors
GXR G 14. . . . . (Control equipment)
    15. . . . . . (Speed control equipment)
    16. . . . . . . Slip variation control
    16. . . . . . . equipment
HB 12. . . . . Squirrel cage motors, Cage motors
HC 12. . . . . Capacitor motors
J  09. . A.C. commutator motors, Alternating current
    09. . commutator motors
JSQ 10. . . Variable speed motors
KB 10. . . Shrage motors
KC 10. . . Repulsion motors
KDG 11. . . Repulsion induction motors
KE 10. . . A.C. series motors, Alternating current series
    10. . . . motors
KEW N 11. . . Compensated series motors
KG 10. . . Doubly fed motors
KJ 07Torque motors
Starter motors
Stepping motors
Thermal engineering, heat engineering
** file ul.sch (bc2u700) 21.12.98
* For Space heating, See UT
* For process heating, See VL

Applied thermodynamics
  Enthalpy
  Entropy
  Reversible processes
  Irreversible processes
  Adiabatic processes
  Isothermal processes
  Isentropic processes
  Polytropic processes
  Isometric processes
  Isobaric processes
  Thermodynamic cycles
    Open cycle thermodynamics
    Closed cycle thermodynamics
    Isolated system thermodynamics
    Vapour cycles
      Regenerative heat vapour cycle
      Reheat vapour cycle
      Binary vapour cycle
      (Particular cycles)
        Brayton cycle, Joule cycle, Complete
        expansion diesel cycle

)Materials technology(
  * Excluding feed materials and working fluids
    (Particular materials)
      * Add letters [from chem. tech.]

)Energy technology(
  Heat utilisation
  Heat recycling, Heat recovery
  Heat sources

(Parts of thermal engineering systems)
  * Notation ULH_C/ULI_M is reserved for use
    under any systems to qualify it by its
    parts; eg preheaters in air heating
    systems ULK_FHC.

ULIN
  Heating & cooling combined systems
  * The term systems in this context includes
    the concepts heater, furnace and boiler.
    Although these sound like parts of a
    system, they act as systems in their own
    right. Their location in the order of
    systems below reflects an order of
    increasing complexity of function.

ULIP
  Heat pumps
  Air source/sink heat pumps

ULIR
  Water/source sink heat pumps
Heat pipes
Thermoelectric heating & cooling
Solar heating & cooling
District heating & cooling

Heating systems
(Kinds of heating systems)

Heaters
(Parts)

Radiators
Heating panels
(By output heat transfer method)
Convection heating, Convecter heating
Radiant heating
(By heat transfer medium)
Air heating

<Heaters>
(Parts)
Preheaters
Reheaters

Unit air heaters
Steam heating,
Water heating
* Heating systems using water as heat transfer medium
* For systems for supply of hot water, See Construction technology
* For systems for supply of hot water in buildings, See Building construction

Calorifiers
(By fuel, Fossil fuel heating)
(Parts)

Burners
Combustion chambers

Multifuel heating
Solid fuel heating
Oil fired heating
Gas fired heating
Butane fired heating
(By non-chemical energy utilised)

Electric heating
** allow arc furnace
Resistance heating
Radio frequency heating, RF heating
Induction heating
Dielectric heating
Microwave heating
(By heated end-product)
Hot water supply heating
(By heat source)
* "Add" letters... following UF
District heating

ULL

Furnaces
* For metallurgical furnaces, See
Processing technology

(Parts)

Linings, Refractory linings
* For refractory materials
generally, their properties
and production, see chemical
technology.

Hearths
Roofs
Exhaust ducts
(Kinds)

(By environment)
Vacuum furnaces

(By fuel)
Solid fuel fired furnaces
Oil fired furnaces
Gas fired furnaces
(By non-chemical energy utilised)
Electric furnaces

Arc furnaces
Radio frequency furnaces,
RF furnaces

Induction furnaces
Dielectric furnaces
Microwave furnaces

Solar furnaces
(By construction)
Walking beam furnaces
Gradient furnaces
Kilns
Muffle furnaces
Ovens
Roasters
Reverberatory furnaces
Recuperative furnaces

ULM

Cooling systems
(Kinds of cooling systems)

Coolers
(By number of stages)
Direct cooling systems
Indirect cooling systems

(By heat transfer method)
Radiant cooling systems
(By cooling mechanism)
   Evaporative cooling
      Slat evaporative coolers,
         cooling towers
      Natural draft cooling towers
      Mechanical draught cooling
         towers
      Forced draught cooling towers
      Induced draught cooling
         towers
   Spray cooling
      Spray ponds
(By cooled end-product)
   Air cooling
   Water cooling
Refrigeration
   * For refrigeration of food and drink,
      see food technology V
   * For refrigerants technology, See
      V Processing
   * For cryogenics in physics, See B
(Equipment)
(Parts)
   Evaporators
      Direct cooling evaporators
      Indirect cooling evaporators
   Compressors
      * Add letters following Fluid
         engineering
   Condensers
      Cascade condensers
   Expansion systems
      Expansion valves
      Expansion nozzles
      Expansion turbines
      Expansion coils
   Intercoolers, Desuperheaters
(Kinds of refrigeration equipment)
   Refrigerators
      * Insulated cooled compartments
   Freezers
   Cold traps
   Cold rooms
Refrigerants
   * Use only for utilisation aspects of
      refrigerants
Refrigeration cycles
   Reversed Carnot cycle
   Reversed Brayton cycle
(Kinds of refrigeration, by method)
   Air cycle refrigeration
   Compression refrigeration, Vapour
      compression refrigeration,
      mechanical refrigeration
Hermetically sealed compression refrigeration
Split system compression refrigeration
Cascade compression refrigeration
Direct expansion compression refrigeration
Absorption refrigeration
Steam jet refrigeration
Thermoelectric refrigeration, Peltier effect refrigeration
Vortex tube refrigeration, Hilsch tube refrigeration

Cryogenic engineering
* For Liquefaction of gases, See processing technology
Instrumentation()
Cryostats
* Refrigeration
Dilution refrigeration
Magnetic refrigeration, Adiabatic demagnetization

Heat exchange systems, heat transfer systems
Thermodynamics()
Heat balance
(Equipment)
Heat exchangers (general)
* For heat exchangers for producing changes of state or initiating chemical reactions, See V/11.51...
(Parts)
Heaters, Heat sources
Coils
Coolers
(Kinds)
(By heat transfer method)
Free convection heat exchangers
Forced convection heat exchangers
(By relative orientation of flows)
Parallel flow heat exchangers
Crossflow heat exchangers
Counterflow heat exchangers
(By coolant)
Gas cooled heat exchangers
Air cooled heat exchangers
Liquid cooled heat exchangers
Water cooled heat exchangers
(By construction)
** Leave notation for Special/Building/Engng services/Thermal engng services/Ht transfer /Equip./Ht exchangers/
Kinds/By construction/
Indirect cylinders
** provisional classmarks until
Bldg constructn notated
Tubular heat exchangers
  Finned tube--
  Shell and tube--
  Fixed tube--
  Floating head--
Extended surface heat exchangers
  Plate heat exchangers
  Finned plate--
  Annular heat exchangers, Coil
  heat exchangers
  Rotary heat exchangers

Boilers
  * For boilers for producing steam
  as output, See U/73,20 below
  Feedwater
    Feedwater pumps
    Feedwater heaters
  (Parts)
    Casings
    Mountings
      ** reserve E/G for furnaces
    Steam injectors
    Economisers
    Exhaust tubes
  (Kinds)
    (By assembly condition)
      Packaged boilers
    (By fuel)
      *Add to ULQ_K letters B/P
      following ULK
    Fossil fuel fired boilers
    (Parts)
      Combustion chambers
    (Kinds)
      Solid fuel boilers
      (Ancillaries)
        Mechanical stokers
        Automatic stokers
          Worm feed automatic
          stokers
        Coking stokers
        Chain grate stokers
        Gravity stokers
        Magazine stokers
    Peat fired boilers
    Coal fired boilers
    Coke fired boilers
    Pulverised fuel fired
    boilers
Oil fired boilers
<Heaters>
<Parts>
<Burners>
Atomisers
Pressure jet burners
Rotary burners, spinning cup burners
Vapourising burners
Gas fired boilers
Electric boilers
Electrode boilers
(By output)
* For steam boilers, See ULT
Hot water boilers
(By design)
Firetube boilers
Shell boilers
Lancashire boilers
Economic boilers
Water tube boilers
Straight tube boilers
Bent tube boilers
Forced circulation boilers
Once through boilers
Benson boilers
Monotube boilers
Loeffler boilers

ULR
Thermal insulation
* For thermal insulation of buildings, see Bldg construction
)Thermodynamics(
Heat loss
Thermal insulating materials
Reflective insulation
Heat shields
Heat storage
Storage heaters, Heat accumulators

ULR4B
ULRE
ULRM
ULRN
ULRS

ULS
Heat engines
* Devices which output mechanical power derived from thermal processes
* For prime movers generally, See U
* For chemical rockets, See U/974,47...
* For reaction engines, See U/974,47...

(Feed materials)
Working fluids
(Performance)
Power-weight ratio
Fuel consumption
Lubricant consumption

(Kinds)
ULSM
Simple expansion engines
ULSN
Compound expansion engines, Compound engines
ULSP
Piston engines
ULSR
Reciprocating engines
* Reciprocating devices which output mechanical power derived from thermal processes
* For reciprocating machines generally, See mechanical engineering.

(Parts)
ULSRIL
Engine valves
ULSRIN
Valve gear
ULSS
Engine starters
ULST
Rotary engines
* For rotary machines generally, see U/8
ULSV
Turbine engines
* For turbines generally, see U/84,55
* For gas turbines, See U/73,50
* For gas turbines, See U/73,25
ULSV
Vapour turbines
* For vapour turbines in refrigeration See U/78..

Steam engineering

(Parts)
ULT
Steam boilers, Steam generators
ULTQ
Steam chests
ULTRC
Steam accumulators
ULTRE
Ruth’s accumulators
ULTRF
Steam traps
ULTS
Steam engines
* For external combustion engines generally, See U/73... below

(Parts)
ULTNIC
Cylinders
ULTNIH
Steam jackets
ULTNIIJ
Steam ports
ULTNIL
Slide valves
ULTT
Steam turbines

(Parts)
ULTTIB
Blades
ULTTID
Discs
ULTTIE
Rotors
ULTTIH
Compressors

(Stages)
ULTTIN
Low pressure--
ULTTIO
Intermediate--
High pressure--
(Kinds)
Condensing steam turbines
Back pressure steam turbines
Mixed pressure steam turbines
Extraction turbines
Impulse turbines
Reaction turbines
Disc and drum turbines,
combination turbines,
impulse reaction turbines

External combustion engines
* For steam engines, See
ULT_N
Air engines, Hot air engines
Stirling engines

Internal combustion engines
(Parts)
Combustion chambers
(Parts)
Cylinder heads
Cylinder blocks
Cylinder liners
Fuel systems
Air injection systems
Injectors
Fuel atomisers
Fuel aerators
Fuel blenders
Fuel lines
Fuel tanks
** reserve IE/IF for ULX
Inlet systems
Inlet manifolds
Silencers, Mufflers
Exhaust systems
Afterburners, Reheat systems
Exhaust diffusers
Exhaust hoods
Exhaust manifolds
Exhaust pipes
Ignition systems
(Properties)
Preignition
Detonation
Autoignition
Firing order
Compression ratio
Scavenging
(Distributors)
Interrupters
Cooling systems
Lubrication systems
(Kinds of i-c engines)
(By cycle)
Two stroke engines
Four stroke engines, Otto cycle engines
(By primary moving element motion)
Rotary internal combustion engines
Rotary piston engines
Planetary--
Rotating piston--
Two rotor--
Rotary combustion engines
* For Wankel engines, See Transport tech.
(By fuel-air charge system)
Stratified charge engines
(By environment)
Stationary engines
* For non-stationary internal combustion engines used for propulsion, See Transport

Diesel engines, Compression ignition engines
* For diesel engines used for propulsion, See U/940.47.
(Parts)
(Ignition systems,
(Kinds of diesel engines)
Single--
Multiple--
In line--
V--
Horizontal--
Vertical--
Delta--
Radial--
(By piston action)
Single acting--
Double acting--
Trunk piston--
Crosshead--
Opposed piston--
(By cooling system)
Air cooled--
Water cooled--
Oil cooled--
ULVMB
ULVMD
ULVME
ULVMF
ULVMH
ULVMJ
charged--
ULVMK
ULVML
@
ULVMN
ULVMP
ULVMR
@
ULVN
/0
@
ULVP
engines
ULVQ
engines
ULVR
ULVS
ULVT
@
ULVU
ULVV
ULW
ULWV
ULVX
ULX
ULXID
ULXIE
ULXIEJ
ULXIF
ULY
Gas engines

| Natural gas diesel engines |
| Spark ignition gas engines |
| Spark ignition engines, Petrol engines, Gasoline engines |
| For spark ignition engines used for propulsion, See Transport tech. |

@ (Parts and Kinds)
* Add letters...following
ULU
(Fuel systems)
Carburettors
Chokes
Fuel injection systems

ULY
Gas turbines
* For gas turbines used for propulsion, See Transport tech.

@ (Parts)
Blades
Discs
Rotors
shafts
Inlet systems
Compressors
Combustion chambers

<11>
<table>
<thead>
<tr>
<th>Nozzles</th>
<th>Multifuel---</th>
<th>Dual fuel---</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual fuel---</td>
<td>Coal burning--</td>
<td>Peat burning--</td>
</tr>
<tr>
<td>Natural gas burning--</td>
<td>Methane burning--</td>
<td>Propane burning--</td>
</tr>
<tr>
<td>Ammonia burning--</td>
<td>Open cycle gas turbines</td>
<td>Semi-closed cycle gas</td>
</tr>
<tr>
<td>Closed cycle gas turbines</td>
<td>Free piston gas turbines</td>
<td></td>
</tr>
</tbody>
</table>

(By fuel)

(By cycle)

(By mechanical design)
03 Mechanical engineering
** file um.sch 11.12.98
04. )Production engineering(
05. . Machine building
04. )Mechanical engineering materials(
05. . (Particular materials)
04. (Operations) [FES]
05. . * See UMO for example
05. . (Properties)
05. . * See UMO for example
04. (Parts)
05. Mechanical components & mechanisms
06. . (Parts of mechanical components)
07. . (Structural components)
08. . Shafts
08. . Tubes
08. . Plates
08. . Discs
08. . Sheet materials
06. . (Types of mechanical components)
07. . Fasteners
08. . * Devices for physical connection of components.
08. . (Involving perforation of fastened components)
09. . (Parts)
10. . Fastener heads
11. . Recessed heads
11. . Slotted heads
11. . Cruciform heads
11. . Castellated heads
11. . Socket heads
11. . Capstan heads
11. . Knurled heads
11. . Flat heads
11. . Cone heads
11. . Raised heads
11. . Spherical Heads
11. . Round heads, dome top heads
11. . Cheese heads, fillister heads
11. . Oval heads, mushroom heads
11. . Pan heads
11. . Cap heads
11. . Cup heads
11. . Countersunk heads
11. . Hexagonal heads
11. . Pentagonal heads
11. . Rectangular heads
11. . Square heads
11. . Diamond heads
11. . Triangular heads, T-heads
### Types of Mechanical Components

- **Shafts, shanks**
- **Square necked shafts**
- **Notched shafts**
- **Hollow shafts, tubular shafts**

- **Points**

- **Rivets**
  * Add letters D/G following UMJ_I: eg

- **Hollow rivets, tubular rivets**

- **Blind rivets**

- **Chobert rivets**
- **Explosive rivets**
- **Full rivets**
- **Compound rivets**

- **Pins**
- **Taper pins**
- **Tubular pins**
- **Gudgeon pins**
- **Clevis pins**
- **Split pins-**
- **Dowels**

- **Locating pins, centring pins, positioning pins**
- **Swivel pins, Hinge pins, King pins**

- **Nails**
- **Wire nails**
- **Pins (nails)**
- **Gimp pins**
- **Panel pins**
- **Sprigs**

- **Cut nails**
- **Brads**
- **Clasp nails**
- **Clout nails**
- **Tacks**

- **Staples**
- **Threaded fasteners**
  (Equipment for inserting or withdrawing)

- **Spanners**
Fasteners UMJ
[8-(Involving perforation of fastened components) @]
[9-(Kinds of fasteners involving perforation) @]
[10-Threaded fasteners UMJT]
[11-(Equipment for inserting or withdrawing) @]
[12-Spanners UMJT4R]

UMJ T
13. . (Fixed)
14. . . (Open)
14. . . . (Closed)
13. . (Adjustable)
14. . . Screw adjustable spanners
14. . . Peg locked adjustable spanners
14. . . Ratchet spanners

T4S
12. Screwdrivers

U
11Threads, Screw threads

@ 12. By completeness

UMJ UM
13. . (Complete threads)

UN
13. . (Incomplete threads)

@ 12. (By tolerance

UP
13. . (Medium threads)

UQ
13. . (Normal threads)

UR
13. . (Close-fit threads)

US
13. . (Free threads)

@ 12. (By position

UMJ UW
13. . External threads, Male threads

UX
13. . Internal threads, Female threads

@ 12. (By direction

UMJ VB
12. Left hand threads

VC
12. (Right hand threads)

@ 12. (By-pitch

UMJ VE
13. . (Constant pitch threads)

VF
13. . Variable pitch threads

@ 12. (By shape

UMJ VH
13. . Trapezoidal threads, Acme threads

VJ
13. . Round threads

VK
13. . Square threads

VM
13. . Asymmetrical threads

VN
14. . . Buttress threads

12. (By shape of shank)

UMJ VQ
13. . Taper threads

@ 12. (By named type

UMJ WC
13. . ISO metric threads

WD
13. . ISO miniature threads

WF
13. . Sellers screw threads, American screw threads

WH
13. . Thury screw threads, Swiss screw threads

WJ
13. . Unified screw threads

WL
13. . Whitworth screw threads, BSW screw threads

WN
13. . G series screw threads

WP
13. . British Association screw threads, BA screw

13. . threads

WR
13. . British Standard cycle thread, BSC screw

13. . threads, cycle threads

WT
13. . SI screw threads

WV
13. . UNJ screw threads

X 11Screws
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<th>Description</th>
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<td>YH 12</td>
<td>Grub screws</td>
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<td>YJ 12</td>
<td>Machine screws</td>
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<td>Set screws</td>
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<td>YL 12</td>
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<td>YN 12</td>
<td>Self tapping screws, Tapping screws</td>
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<td>Lag bolts</td>
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<td>UMK CJ</td>
<td>Tee bolts, T-bolts</td>
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<td>CL 12</td>
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<td>CM 12</td>
<td>Shrouded bolts</td>
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<td>CN 12</td>
<td>Banjo bolts, Hollow bolts</td>
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<tr>
<td>CP 12</td>
<td>Sliding bolts</td>
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<tr>
<td>CQ 12</td>
<td>Hinged bolts</td>
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<td>CR 12</td>
<td>Expansion bolts</td>
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<td>CS 12</td>
<td>Load indicating bolts</td>
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<td>CT 12</td>
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<td>UMK FR</td>
<td>Tee nuts</td>
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<tr>
<td>FS 12</td>
<td>Wing nuts, Butterfly nuts, Fly nuts</td>
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<td>FT 12</td>
<td>Cap nuts, Box nuts, Dome nuts</td>
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<td>FU 12</td>
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<tr>
<td>FV 12</td>
<td>Lock nuts, Jam nuts, Self-locking nuts</td>
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<td>C 07</td>
<td>Keys</td>
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<td>GK 08</td>
<td>Gib-head keys</td>
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<td>GL 08</td>
<td>Woodruff keys, Whitney keys</td>
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<td>GM 08</td>
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<td>GN 08</td>
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<td>GP 08</td>
<td>Parallel keys</td>
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<td>GQ 08</td>
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<tr>
<td>GS 08</td>
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<td>GT 09</td>
<td>Involute splines</td>
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<tr>
<td>GU 09</td>
<td>Straight splines, Parallel splines</td>
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<td>GV 09</td>
<td>Serrated splines</td>
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<tr>
<td>GW 08</td>
<td>Cotter keys</td>
</tr>
<tr>
<td>GX 08</td>
<td>Tee slots</td>
</tr>
</tbody>
</table>
Mechanical engineering UM)
[4-(Parts) @]
[5-Mechanical components & mechanisms UMIB]
[6-(Types of mechanical components) @]
[7-Keys UMKG]
. [8-Tee slots UMKGX]

UMK H 07Hooks
J 07Ring fastenings
JL 08. Retaining rings, Spring retaining rings, snap rings
JM 09. . Circlips
JN 08. Joining rings
KB 07Mounting pads
KH 07Hinges
KL 08. Ball joints
KN 07Shackles
KP 08. Turnbuckles, Screw shackles

L 07Linkage mechanisms
LL 08. Rectilinear linkage mechanisms
LN 08. Conchoid linkage mechanisms
LP 08. Three bar linkage mechanisms
LQ 08. Four bar linkage mechanisms
LR 08. Multibar linkage mechanisms
LT 08. Crank-Rocker mechanisms
LV 08. Slider-Crank mechanisms
MD 08. Drag linkages
ME 08. Toggle block linkages
MF 08. Scotch yoke linkages
MG 08. Henderson's mechanisms
MH 08. Coupler curve linkages
MJ 08. Sliding block linkages
ML 08. Swinging block linkages
MN 08. Quick return mechanisms
MP 08. Revolute pair linkages
MQ 08. Prismatic pair linkages
MR 08. Rolamite

N 07Joints, Articulated joints

0 08. (By form)
UMK NM 09. . Mortise and tenon joints
NO 09. . Dovetail joints
NR 09. . Rebated joints
NT 09. . Interlocking joints, Side locking joints, finger
09. . joints
NV 09. . Seam joints, Welts
NW 09. . Friction joints

@ 08. (By relative position of joined parts)
UMK CC 09. . Lapped joints
OD 09. . Butt joints
OE 09. . Hollow section joints
OF 09. . T-joints
OG 09. . Corner joints, Angle joints

<5>
<table>
<thead>
<tr>
<th>UMK OGM</th>
<th>10 Mitre joints</th>
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<td>UMK OP</td>
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<td>UMK QR</td>
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<td>QW</td>
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<td>QX</td>
<td>09.</td>
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</table>

* Add to UMK letters J/K following UM
  * Preloaded joints
  * Knuckle joints
* For adhesive joints, See U/20,65
* For welded joints, Sée U/20,66

Movement joints
  Expansion-contraction joints
  Slip expansion joints
  Bellows joints
  (By degree of freedom of movement)
  Sliding joints
  Ball joints, Ball and socket joints
  Transition pieces

Separating devices
  Collars
  Spacing collars, Spacers
  Grommets
  Washers
  Belleville washers
  Lock washers, Tooth lock washers
  (By seating)
  Taper washers
  Spherical seating washers
  (By shape)
* Add \^\ letters..... to ..........with meanings as at U/80.....to U/80 above

Liners
Bushes
Sleeves
Eyelets
Diaphragms
Release mechanisms
Quick release mechanisms

<6>
(Parts) 0]
[5-Mechanical components & mechanisms UMIB]
[6-(Types of mechanical components) 0]
[7-Separating devices UMKQB]
  . [8-Release mechanisms UMKQW]
  . [9-Quick release mechanisms UMKQX]

UMK R 07(Mechanical energy storage & damping devices)
RN 08. Inertia devices
RP 09. . Flywheels
RR 09. . Gyroscopes
RT 09. . Pendulums
RW 09. . Weights
S 08. Springs
SN 09. . Tension springs
SP 09. . Compression springs
ST 09. . Torsion springs
TF 09. . Flat springs
TG 10. . . Strip springs
TH 10. . . Leaf springs
TJ 10. . . Bar springs
TK 10. . . Disc springs
11. . . . * For Belleville washers, See U/80 below
TL 11. . . . Annular disc springs
TN 09. . Tube springs
TP 09. . Arch springs
TQ 10. . . Snap through springs
TR 09. . Ring springs
TS 09. . Column springs
TT 10. . . Laminated springs, Leaf Springs
TU 11. . . . Carriage springs
TV 11. . . . Elliptical springs
TW 09. . Helical springs
TX 09. . Conical springs
TY 09. . Spiral springs
V 08. Mechanical energy storage devices
W 08. Mechanical damping devices
  09. . . * For vibration dampers, See U/88,30
X 09. . . Shock absorbers
XP 10. . . Plastically deforming shock absorbers
XR 10. . . Resilient shock absorbers
XS 10. . . Buffers
XT 10. . . Fluid shock absorbers
XV 11. . . . Telescopic air springs

UML B 07(Machine controls)
BL 08. Handles
BM 08. Knob controls
BP 08. Push button controls
BR 08. Lever controls
BT 09. . Pedal controls
G 07(Machine housings & mountings
H 08. Machine housings
M 08. Machine mountings
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<td>07</td>
<td>Mechanical power transmission</td>
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<td>08</td>
<td>(Mechanical components by motion)</td>
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<td>09</td>
<td>(Static components)</td>
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<td>10</td>
<td>Slideways</td>
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<td>09</td>
<td>(Moving components)</td>
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<td>11</td>
<td>Reciprocating components</td>
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<tr>
<td>11</td>
<td>Pistons</td>
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<td>11</td>
<td>Piston rods</td>
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<td>Crossheads</td>
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<td>Rotating components, Rotors</td>
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<td>(Shafts)</td>
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<td>13</td>
<td>Shaft ends</td>
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<td>12</td>
<td>Pulleys</td>
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<td>Wheels</td>
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<td>Spindles</td>
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<td>Hubs</td>
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<td>Spokes</td>
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<td>13</td>
<td>Rims</td>
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<tr>
<td>08</td>
<td>(Devices for interconversion of linear,</td>
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<tr>
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<td>reciprocating or rotary motion)</td>
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<td>09</td>
<td>* For Ratchets, See U/80 below</td>
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<tr>
<td>09</td>
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<td>10</td>
<td>Crankshafts</td>
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<td>Cam followers</td>
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<td>11</td>
<td>Tappets</td>
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<td>09</td>
<td>Rockers</td>
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<td>08</td>
<td>(Kinds of mechanical transmissions)</td>
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<td>09</td>
<td>Power take-off shafts</td>
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<td>09</td>
<td>Line shafting</td>
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<td>09</td>
<td>Flexible drives</td>
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<td>10</td>
<td>Friction drives</td>
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<td>11</td>
<td>Belt drives</td>
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<td>11</td>
<td>Chains</td>
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<td>Chain wheels, Sprockets</td>
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<td>Bowden cable drives</td>
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<td>Line shafting</td>
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</tbody>
</table>

<8>
09. Gear drives
   * Drives employing toothed gears
   * For friction gears, See U/80 above

10. Gears

U MO B
11. (Production)
12. Milling
13. Form milling
14. Hobbing
15. Generated surface milling
16. (Other methods of machining)
17. * Add \"letters...\ to... with
18. meanings as at U/20,62

U MO HC
12. Lubrication
11. (Properties)

U MO HP
12. Backlash

U MO HR
12. Friction loss

°
11. (Parts)

U MO IT
12. Gear teeth
13. (Problems of gear teeth)

°
11. (Properties)

U MO ITH T
12. Interference
13. (Properties of gear teeth)

U MO IU
14. Pitch
15. Addendum
16. Dedendum
17. (Depth)
18. (Whole depth)
19. (Working depth)
20. (Size)
21. Diametral pitch
22. (Profile)
23. Involute
24. Cycloidal

°
13. (Parts of gear teeth)

U MO JP
14. Face
15. Flank

°
11. (Kinds of gears)

°
12. (By kind of tooth contact)

U MO L
13. Rolling contact gears

°
12. (By tooth shape)

U MO M
13. Involute gears
15. Cycloidal gears
16. Epicycloidal gears
17. Stub gears

°
12. (By gear wheel geometry)

U MO PE
13. Eccentric gears
14. Non-circular gears

°
12. (By motion transmission role or
13. characteristic)
13. Variable gears
   14. Steplessly variable gears

12 (By shaft alignment)

13. (Parallel shaft gears)
   14. Spur gears
   15. Internal spur gears
   16. External spur gears
   17. Helical gears
   18. Herringbone gears
   19. Double helical gears
   20. Novikov gears, Wildhaber-Novikov gears,
   21. Circular arc gears

13. (Non-parallel shaft gears)
   14. Face gears
   15. (Intersecting shaft gears)
   16. Bevel gears
   17. Spiroid gears, Spiral bevel gears
   18. Zerol gears
   19. Skew gears, Spiral gears
   20. * Non-parallel, non-intersecting shaft
   21. gears

15. Worm gears
   16. Hypoid gears, Off-set helical bevel gears

12 Transducer contact gears

13. Electromagnetic gears

12 Gear trains, Gear boxes, Gear assemblies

13. (Parts of gear trains)

14. Gear housings, Gear cases

14. Driver gears

14. Follower gears

14. Idler gears

14. Step up gears

14. Reduction gears

13. (Kinds of gear trains)

14. (Ordinary gear trains)

14. Epicyclic gear trains

15. (Parts)

16. Sun gears

16. Planet gears

16. Planetary gear trains

16. Differential gears

14. Hypocyclic gear trains

14. Rack & pinion gears
[8-(Kinds of mechanical transmissions) &]
[9-Gear drives UMNX]
  . . [11-(Kinds of gears) &]
  . . . [12-Gear trains UMP]
  . . . . [13-(Kinds of gear trains) &]
  . . . . . [14-Rack & pinion gears UMPR]

UMQ  09Couplings, Shaft couplings
UMQ L  10. Rigid couplings
   LM  11. . Clamp couplings
   LP  11. . Muff couplings, Box couplings, Butt couplings
   LQ  12. . . Coupling sleeves
   LS  11. . Sleeve couplings
   LT  11. . Flange couplings
   M  10. Flexible couplings
       11. . (Kinds of flexible couplings
       12. . . (By material)
   UMQ ML  13. . . . Elastomeric couplings
       12. . . . (By design)
   Q MN  13. . . . Disc couplings
   MQ  14. . . . . Diaphragm couplings
   MP  13. . . . . Spring couplings
   MQ  13. . . . . Pin couplings
   MR  13. . . . . Bellows couplings
   MS  13. . . . . Oldham couplings
   MT  13. . . . . Schmidt couplings
   MV  13. . . . . Geared couplings
   N  10. Universal joints
   NL  11. . Hooke's joints
   NM  12. . . Double Hooke's joints
   NP  13. . . . Rzeppa joints
   NQ  11. . Cardan joints
   NR  11. . Birfield joints
   NS  11. . Cobham joints
   NT  11. . Constant velocity joints
   NW  10. (Transducer contact couplings)
   NX  11. . Electromagnetic couplings
   NY  11. . Permanent magnet couplings
   R  09Ratchets
   RP  10. Pawls
   RW  10. Free wheels

UMR  09Clutches
UMR L  10. Positive clutches
   LN  11. . Square jaw clutches
   LP  11. . Spiral jaw clutches
   LR  11. . Dog clutches
   LS  12. . . Claw clutches
   N  10. Friction clutches
       11. . (Parts)
   UMR NIT  12. . . Clutch linings
   @  11. . . (Kinds)
   @  12. . . (By design)
   UMR NL  13. . . . Cone clutches
   BN  13. . . . Disc clutches
   NP  13. . . . Rim clutches
<11>
[8-(Kinds of mechanical transmissions) @]
[9-Clutches UMR]
  [10-Friction clutches UMRN]
    [11-(Kinds) @]
    [12-(By design) @]
    [13-Rim clutches UMRNP]

UMR NQ 13. . . . Centrifugal clutches
NR 13. . . . Sprag clutches
NS 13. . . . Wrap spring clutches
NT 13. . . . Overload clutches
@ 12. . . . (By transducer contact)
UMR NV 13. . . . Electromagnetic clutches
NVL 14. . . . Eddy current clutches
NVN 14. . . . Hysteresis clutches
NVP 14. . . . Magnetic powder clutches

UMS 09Brakes
@ 11. . . (Parts)
IS 12. . . Brake shoes
IT 12. . . Brake blocks
IV 12. . . Brake linings
@ 11. . . (Kinds)
UMS L 12. . . Aerodynamic brakes
LR 13. . . Drag brakes
M 12. . . (Friction brakes)
ML 13. . . Wedge brakes
MN 13. . . Band brakes
MNP 14. . . Brake bands
MP 13. . . Disc brakes
MQ 14. . . Brake discs
MR 14. . . Brake pads
MS 13. . . Drum brakes
MT 14. . . Brake drums
MX 14. . . Expanding brakes
NB 13. . . Block brakes
NBI T 14. . . Brake blocks
NC 13. . . Spring brakes
NF 13. . . Fluid power actuated brakes
NH 14. . . Hydraulic brakes
NHL 15. . . Brake fluids
NHN 15. . . Water brakes
NJ 14. . . Pneumatic brakes
15. . . . . . . . * For electropneumatic brakes, See
15. . . . . . . . U/943,65
NJL 15. . . . . Air brakes
NK 13. . . Vacuum brakes
NL 13. . . Electric brakes
14. . . . . . . * Electrically actuated friction
14. . . . . . . brakes
NM 14. . . . Electromagnetic brakes
15. . . . . . . * For regenerative, eddy current
15. . . . . . . and hysteresis braking, See
15. . . . . . . U/57,73
NN 15. . . . Solenoid brakes
NP 14. . . . Electrostatic brakes
<12>
[8-(Kinds of mechanical transmissions) Θ]
[9-Brakes UMS]
  . . [11-(Kinds) Θ]
  . . [12-(Friction brakes) UMSM]
  . . . [13-Electric brakes UMSNL]
  . . . . [14-Electrostatic brakes UMSNP]

UMS NQ 14. . . . Magnetic powder brakes
NV 13. . . . Bovet brakes

UMT 09Bearings
@ 10. (Parts of bearings)
UMT IS 11. . Linings
IV 11. . Housings
@ 10. (Kinds of bearings)
@ 11. . (By design)
UMT LE 12. . . Elastohydrodynamic bearings
@ 11. . (By load direction)
LH 12. . . Thrust bearings, Axial thrust bearings
LL 12. . . Radial bearings
@ 11. . (By support or contact)
UMT LP 12. . . Plummer block bearings
M 12. . . Plain bearings
ML 13. . . Journal bearings
MM 14. . . Slipper bearings
MN 14. . . Foil bearings
MP 14. . . Stepped journal bearings
MT 13. . . Tilting pad bearings, Michell bearings
MV 13. . . Slide bearings
N 12. . . Rolling element bearings, Anti-friction bearings
Ω 13. . . (Parts of rolling element bearings)
UMT NIT 14. . . Rolling elements
NIV 14. . . Races
NIX 14. . . Cages
@ 13. . . (Kinds of rolling element bearings)
@ 14. . . (By element action)
UMT NL 15. . . Recirculating bearings
NM 15. . . Self-aligning bearings
@ 14. . . (By element form)
UMT P 15. . . Ball bearings
® 16. . . . (Parts)
UMT PIT 17. . . . Balls
® 16. . . . (Kinds)
UMT PN 17. . . . Angular contact ball bearings
R 15. . . . Roller bearings
® 16. . . (Parts)
UMT RIT 17. . . . Rollers
® 16. . . (Kinds)
UMT RM 17. . . . Cylindrical roller bearings
RN 18. . . . . Needle roller bearings
RP 17. . . . . Taper roller bearings
RR 17. . . . . Barrel roller bearings
RS 18. . . . . Spherical roller bearings
[10- (Kinds of bearings) @]
[11- (By support or contact) @]
. . . . [15- Roller bearings UMT]  
. . . . [16- (Kinds) @]
. . . . . [17- Barrel roller bearings UMTRR]
. . . . . [18- Spherical roller bearings UMTS]

UMT S 11 Electromagnetic bearings, Magnetic bearings
T 11 (By material
12. * Add letters Following UE
U 12. (By specific materials)
13. . * Add letters following V
@ 11 (By lubricant)

UMT V 12. (Fluid lubricant bearings)
VL 13. . (Fluid static bearings)
VM 14. . . Self-pressurised bearings
VN 14. . . Externally pressurised bearings
VP 13. . (Fluid dynamic bearings)
VQ 13. . Gas bearings
VS 13. . (Liquid lubricant bearings)
VT 14. . . Pressurised oil film bearings, hydrostatic
14. . . bearings
WV 14. . . Water lubricated bearings
WD 12. Solid lubricant bearings
WE 12. Dry bearings
WG 13. . Plastic bearings
WL 13. . Self lubricating bearings
Fluid engineering, Applied fluid mechanics

** file un.sch (from bc2u84) 8.1.99
* For Fluid control systems, See U/12,40
* For Fluidic computers, See U/12,55

<Instruments>

Flowmeters
* For Liquid flow meters, See U/84,60
* For Gas flow meters, See U/84,70

Inferential flowmeters
(By transducer input)
* Add to UN7_6AL letters following U5L
* Add to UN7_6AM letters following U5M
together with additions listed
below; eg

<Electromagnetic flowmeters>
<Inductive flowmeters>

<Magnetic flowmeters>
Nuclear magnetic resonance
flowmeters

<Optical flowmeters>
Laser doppler velocimeters

<Thermal transducer flowmeters>

<Ultrasonic flowmeters>
Contrapropagating ultrasonic
flowmeters
Axial contrapropagating ultrasonic
flowmeters
Correlation ultrasonic flowmeters
Deflection ultrasonic flowmeters,
drift ultrasonic flowmeters

Tracer flow measurement
Flow visualisation

Quantity flowmeters
Volume flowmeters
Vortex cage flowmeters
* For Vortex flowmeters, See
U/84 below

Rate flowmeters
Anemometers
Glow discharge anemometers
Hot wire anemometers
Hot film anemometers
Thermistor anemometers

Differential pressure flowmeters,
head meters
Orifice meters
Nozzle flowmeters
Flow tube meters
Venturi meters
Pitot tubes
Averaging Pitot tubes
Shunt flowmeters
Bell flowmeters
Diaphragm flowmeters

<1>
Force balance flowmeters
Bellows flowmeters
Mass flow rate meters
Axial flow mass flow rate meters
Gyroscopic mass flow rate meters
Gyroscopic-Coriolis mass flow rate meters
Ribbed disc Coriolis mass flow rate meters
Vortex flowmeters
* For Vortex cage flowmeters, See
Fluidic oscillator flowmeters, Coanda effect flowmeters
Fluid pressure measurement instruments
Pressure gauges
(By transducer input)
* Add to UN7_6LL letters following U5L
* Add to UN7_6LM letters following U5M with additions listed below
<Magnetic>
Reluctance pressure gauges
Resonant transducer pressure gauges
(Primary gauges)
Free-piston pressure gauges
Dead weight pressure gauges
Manometers
Differential manometers
U tube manometers
Inclined tube manometers
Bell manometers
Bellows manometers
Diaphragm manometers
Ring balance manometers
Well manometers
(Secondary gauges)
Bourdon gauges
Resistance gauges
Piezoelectric pressure gauges
Leak detectors
(Working fluids in fluid engineering)
<Materials technology of fluid engineering equipment)
* Add letters as UE
(Parts of fluid mechanical systems)
(Fluid containment structures and devices)
Seals
(Parts)
Stuffing boxes, Glands
Packings
(Types)
(By material)
Polymer seals
Plastic seals
<2>
Rubber seals, Elastomeric seals
Ceramic seals
Metallic seals
(Other materials):
  * Add letters as at V/23,68
to V/78
(By design)
Static seals
Gaskets
Dynamic seals
Mechanical seals
Positive contact seals
  Cup seals
  Diaphragm seals
  Disc seals
  Taper seals
  Radial seals
  End seals
  Split ring seals
Face seals
  O-rings
  Double convex sealing rings
  Bellows seals
  Lip seals
  Radial lip seals
  Flange seals
Circumferential seals
Squeeze seals
Controlled clearance seals
Peripheral seals
Labyrinth seals
Diffuser seals
Centrifugal seals
Reciprocating seals
Hydrostatic seals
Magnetic fluid seals
Pipes, Piping, Pipework
* For Pipelines for transporting fluids or fluid dispersions beyond the confines of an individual plant, see U/940...
(Parts & ancillaries)
Pipe fittings
(Kinds of pipe fittings)
(By joining method)
Compression fittings
Plain fittings
Screwed fittings
Soldered fittings
Flanged fittings
(Parts)
  Pipe flanges
  Detachable flanges
Rotatable flanges
Connecting flanges
Screwed flanges
Slip-on flanges
Clamping flanges
Welding flanges
Integral flanges
Plain flanges, Flat flanges
Blank flanges, Blind flanges
Neck flanges
Socket flanges
Hub type flanges
Lapped flanges
Safety flanges

Pipe connections
Clamped piped connections
Hinged bolt connections
Pipe unions, Quick release pipe couplings
Swivel pipe connections
Pipe couplings, Pipe joints
(Straight pipe couplings)
Pipe collars
Pipe coupling sleeves
Pipe bends
Pipe elbows
Reducing couplings, Pipe reducers
Pipe junctions
Tee junctions
Pipe cross fittings

(Kinds of pipes)
(By material)
* ^\Add\ letters as UE
   meanings as V/23,60 to V/77
(By manufacture design)
Seamed pipes
Seamless pipes
(By mechanical property)
Rigid pipes
Flexible pipes, Hoses
(By shape)
Tapered pipes
Venturis, Convergent-divergent pipe sections
(By duty)
High pressure pipes
UNJS  Pressure vessels
UNJT  Fluid receivers

(Fluid apertures)
UNKC  Fluid inlets
UNKC  Fluid outlets
UNKC  Orifices
UNKC  Nozzles
UNKC  Manifolds
(Fluid handling & control devices)
UNM  Valves
   * For Liquid handling valves, See
   * For Gas handling valves, See
   * For Refrigeration valves, See
   * For Vacuum valves, See U/86...
   * For Poppet & Tappet valves, See
   * For Sleeve valves, See
(Parts)
UNMLC  Actuators
UNMLC  Valve gear
   (Bodies)
   (Yokes)
UNMLC  Seatings
UNMLC  Valve packings
UNMLC  Valve plates
UNMLC  Valve plugs
UNMLC  Valve ports
(Types of valves)
   (By position in flow circuit)
UNMMC  Inlet valves
UNMMC  Outlet valves
   Exhaust valves
UNMMC  Pilot valves
UNMMC  Bypass valves
(By part)
UNMM  Disc valves
   Pivoted disc valves
   Butterfly valves
UNMM  Diaphragm valves
UNMM  Needle valves
UNMM  Piston valves
UNMM  Spool valves
(By mechanical action)
UNMNC  Sliding valves
UNMNC  Reciprocating valves
UNMNC  Rotary valves
(By number of ways)
UNMNH  Two way valves
UNMNH  Three way valves
UNMNH  Four way valves
UNMNH  Five way valves
UNMNH  Multiway valves
(By action on flow)
UNMO
Stop valves, Shut-off valves
Gate valves, Screw down valves
Sliding gate valves
Plug cocks

UNMP
Directional control valves
Check valves, Non-return valves, reflux valves, Back

pressure valves
Ball valves
Swing valves
Flap valves

UNMQ
Flow control valves, Flow regulators
Globe valves
Draw-off taps

UNMR
Pressure regulators, Pressure control valves
Balance valves
Throttle valves
Pinch valves
Pressure reducing valves, reducing valves
Differential pressure valves
(By control function)

UNMS
Relief valves
Damping valves

UNMT
Safety valves, Expansion valves
Selector valves
Sequence valves
Proportional valves
Servo valves
Solenoid valves
Thermostatic valves
Metering valves

UNMV
High pressure valves
Cryogenic valves?

UNNC
(Fluid power machinery)
* Devices which either convert solid body motion to fluid motion, or convert externally propelled fluid motion to solid body motion, or

with solid body motion input and output mediated by fluid motion
* For devices utilising fluid expansion to produce solid body motion output See U/73

UNND
Reciprocating machinery

UNNE
Rotary machinery

UNNF
Turbomachines

UNNG
Turbines

UNNH
Compressors

UNO
Pumps

<6>
* For Vacuum pumps, See U/86...
* For Gas pumps, See U/84,70..
* For Pumps for liquids, See U/84,60
* For Pumps for solids, See U/25...
* For Jet pumps, See U/25
* For Airlift pumps, See U/84,60
* For Pulsometer pumps, See

U/73,20...

(By duty)
UNOPB 
Suction pumps
UNOPC 
Circulating pumps
UNOPD 
Transfer pumps
UNOPE 
Metering pumps
(By performance characteristic)
UNOPH 
Self priming pumps
UNOPJ 
Variable delivery pumps
(By fluid displacement mode)
UNOPK 
Positive displacement pumps
UNOQ 
Reciprocating pumps
UNOOQ 
Piston pumps
Plunger pumps
/Force pumps (?? Liquids only)
Diaphragm pumps
Rotary cylinder pumps
/Ram pumps
Bellows pumps
UNOR 
Rotary pumps
UNORR 
Rotating cylinder pumps
Gear pumps
Vane pumps
Lobe pumps
Screw pumps
/Cam pumps
/Roller pumps
Peristaltic pumps
UNOT 
Kinetic pumps, Rotodynamic pumps,
turbopumps
Centrifugal pumps, Radial pumps
(Parts)
Impellers
(Kinds)
Propeller pumps
Volute pumps
/Diffuser pumps
UNOUC 
Axial pumps
Mixed flow pumps
/Turbine pumps (??<Centrifugal)
Chain pumps
Ejectors
/Eductors
Supercavitating pumps
** allow more devices for pneumatic
blowers, fans,, compressors

<7>
Fluid power cylinders
  Single rod cylinders
  Through rod cylinders
  Single acting cylinders
  Double acting cylinders
  Telescopic cylinders

Fluid power accumulators
  Piston accumulators
  Diaphragm accumulators

Fluid power motors
  (Kinds)
  * Add letters...... to........ with meanings as at U/84,35.... to U/84,35...

Fluidics
  * The use of fluid jets moving within specially designed pipework circuits for the performance of tasks normally performed by electronic circuits.
  * Use this class only for material dealing with fluidics without reference to particular end-applications. Most of the application literature is located at U/11,30...Fluidic components in instruments
  U/12,40...Fluidic control systems
  U/12,55...Fluidic-computers

(Fluidic elements)
  * ^\Add^\ letters as Electronic engineering; meanings as at U/53 (Amplifiers to Delay circuits), with the following additions:

Hydraulic machinery, Applied liquid mechanics
  * The sequence of parts and kinds of hydraulic equipment, follows that of the parts & kinds of Fluid power equipment given above.
  * ^\Add^\ letters......to...... with meanings as U/84.... above. The schedule below lists only the broader concepts which may be notationally specified by this Add facility, together with topics which are special to hydraulic equipment.
  * For Hydraulic civil engineering works, see U/912,87

<Instruments>
  <Flowmeters>
    * For Flowmeters for both liquids and gases, See UN7_6 above

<Volume flowmeters>
Displacement flowmeters
   Piston flowmeters
   Nutating disc flowmeters
   Oval gear flowmeters
   Pulsating flowmeters
   Spiral flowmeters
   Vane displacement flowmeters
      Rotary vane displacement flowmeters
      Sliding vane flowmeters
      Rotary abutment flowmeters

Rotating impeller flowmeters
   Helical impeller flowmeters
   Propeller flowmeters
   Turbine flowmeters
   Vane flowmeters
      * For Vane displacement flowmeters see U/84 above

   <Rate flowmeters>
   <Differential pressure flowmeters>
      Pipe elbow flowmeters
      Variable aperture flowmeters
      Rotameters
      Piston variable aperture flowmeters
      Plug variable area flowmeters

   Liquid level meters
      a Float gauges
      Diaphragm box liquid level gauges
      Bellows tank liquid level gauges
      Dip sticks

   Hydraulic fluids
   <Hydraulic valves>
      Electrohydraulic valves

   <Hydraulic pumps>
      Force pumps
      Airlift pumps
      Submersible pumps

   Hydraulic cylinders
   Hydraulic accumulators
   Hydraulic motors
   Hydraulic drives, Fluid drives, Hydraulic trans
      missions
      Fluid couplings, Hydraulic couplings
      Hydrostatic devices

Pneumatic machinery, Applied gas mechanics
   * The first two notes at U/84,60
   Hydraulic machinery apply here also
)

   Instruments>
   <Flowmeters>
      <Gas volume flowmeters>
      Liquid sealed drum flowmeters
Fluidic sensing flowmeters
<Gas handling valves>
  Electropneumatic valves
UNSM
<Gas pumps>
  Liquid ring pumps
UNSOV
Blowers
  Roots blowers
UNSOX
Fans
UNSPC
Compressors
  Positive displacement compressors
  Turbo compressors
  Air compressors
  Compressed air equipment
UNSPG
Pneumatic cylinders
UNSPH
Pneumatic accumulators
UNSPJ
Air motors
UNSPN
Wind driven devices
UNSPP
Inflatable devices
UNSX
Electrically conductive fluid technology
  <Pumps>
    Electromagnetic pumps
    Conduction pumps
    Induction pumps
UNT
Magnetohydrodynamic technology,
  magnetogasdynamic technology,
  hydromagnetics technology
* For Magnetohydrodynamic power
  generation See U/57,48.....
UNU
Vacuum technology
  (Equipment)
  (Plant)
UNU5
( instrumentation)
  Vacuum pressure gauges, Vacuum gauges
  McLeod gauges
  Knudsen gauges
  Pirani gauges
  Thermocouple vacuum gauges
  Conductivity vacuum gauges
  Ionisation gauges
  Alphatrons
  Penning gauges
  Philips gauges
  Bayard-Alpert gauges
  Molecular gauges, Viscosity manometers
  Decrement gauges, Quartz fibre
UNUHN
<Containment structures & devices>
UNUHP
Vacuum chambers
UNUI
<Vacuum seals>
  Vacuum traps, Vacuum locks
<10>
UNUO

< Pumps >
  Backing pumps, Fore pumps
  Filter pumps, Water aspirators
  Rotary vacuum pumps
  Liquid ring vacuum pumps
  Diffusion pumps
  Sublimation pumps
  Getter ion pumps
  Getters
  Sputter ion pumps
  Sorption pumps
  Cryopumps
  Turbo-molecular pumps

( Processes )
  Degassing
  Outgassing
  * Removal of occluded, absorbed or dissolved gases from a liquid or solid.

UNUS

Residual gases

UNUT
UNUU

(Kinds of vacuum, by hardness)
  High vacuum technology
  Ultra-high vacuum technology

UNIX

(Vacuum applications)
  * Applications generally, for particular applications, See BC2 notation for the particular application

UNV

Vibration & acoustic technology

( Testing )
  Anechoic chambers, Free field rooms, dead rooms

UNVA

Vibration & acoustic modes
Vibration & acoustic transmission
  * Add to UNV_J letters BE; eg

UNVJ

UNVJCM

Attenuation
Absorption
Refraction
Reflection
Polarisation
Diffraction
Interference
Scattering
Wave diffusion
Dispersion
Vibration engineering
Vibration detectors
Vibration control
  Vibration dampers, Vibration isolators
  Viscous damping
Friction damping  
Inherent damping  
Magnetic damping  

UNVM  
Vibration transmission  
Vibration admittance  
Vibration impedance  

UNVN  
Vibration media  
Strings  
Rods  
Membranes  
Diaphragms  
Plates  
(Kinds of vibration)  

UNVWD  
Torsional vibrations  

UNVWJ  
Linear--  

UNVWL  
Non-linear--  

UNVWR  
Transverse vibrations  
Shear vibrations  

UNVWU  
Longitudinal vibrations  
Axial vibrations  
(By degree of freedom)  
One degree of freedom  
Two degrees of freedom  
(Several degrees of freedom)  

UNVXC  
Free--  

UNVXH  
Forced--  

UNVYB  
Time dependent--  

UNVYC  
Random--  

UNVYP  
Rotational vibrations  
Transient vibrations  

UNX  
Acoustic engineering, Sound engineering  
* Vibration engineering at frequency  
  range 20 to 20,000 Hz  

UNX2A  
Noise  
(Instruments)  
  Sound level meters  
  Rayleigh discs  
Sound pressure  
Acoustic resonance  

UNXJ  
Sound generation  
Bells  
Buzzers  
Horns  
Sirens  

UNXX  
Reverberation  
(Testing)  
Reverberation rooms, Echo chambers  

UNXL  
Sound transmission, Sound propagation  
  Acoustic admittance  
  Acoustic impedance  
  Acoustic signals  
  Acoustic filters  
  Distributed acoustic filters  
  Acoustic receivers  

<12>
Sound transducers

UNXU
Ultrasonic engineering, Applied ultrasonics

UNXW
Sound control
Silencers
   * For internal combustion engine silencers, See U/73,40.....
Sound insulation
Soundproofing

UNY
Hydroacoustics, Underwater sound
<Detectors>
   Hydrophones
   Sonobuoys
Signal processing
Echo ranging
Echo sounding
Sonar
02 OUTLINE OF TECHNOLOGY CLASSES UO/UXB

03. ** uoycrg.sch for CRG 6.4.u4.1.
03. ** ) (means the class is synthesized (usually retro).
03. ** FES is First enumerated subclass (after retros).

UO 03. Construction technology

UO4 04. Construction planning... Site planning...(5C...)

5P 04. Project management... Financial... Contracting...(7...)

9 04. Environmental aspect... Safety...(A...)

9 05. )Unwanted effects... Faults... (A...)

A 04. )Equipment...Scaffolding...

UQA C 04. (General operations) Starting...Extending...

05. Surveying...

E 04. )Testing... Inspection... (P...)

04. )Design... Appearance, aesthetic design...

UOI 04. Structural engineering [FES]

UOI L 04. Construction services... Restoration... Conversion...

UOJ C 04. Construction work... Restoration... Earthwork...

UOO 04. Materials... Concrete... Bricks... Timber...

@ 04. (Parts of structures)

S E 05. Structural... Beams... Frames... Coverings...

SOU 05. (Dividing elements) Roofs... Floors... Walls...

UPB 05. Openings... Spaces... Rooms...

UPF B 05. Subsurfaces... Foundations...

UPI 05. Engineering services... Heating... Lighting...

@ 04. (Kinds of structures)

UPQ B 05. (By process) Prefabricated... (By form) Tall...

UPR P 05. (By special function) Earthquake resistant...

@ 05. (By general function & scale)

UQ 06. Civil engineering structures, civil engineering

07. * UQ/UR are divided like UO/UP; eg

URI 07. )Engineering services(

URQ B 07. )Tall structures( Towers... Pylons...

URS B 07. Public works [FES]...

08. * For transport structures (roads, etc), see VA Transport technology.

08. Water control structures... Dams...

US 06. Buildings, building construction & services

07. * US/UT are divided like UO/UP; eg

@ 07. (Special relationship activities)

US4 2 08. Architectural practice

09. * When practical management,

09. design, etc predominate over

09. aesthetic. In doubt, prefer WB in

09. Arts class.

USA P 07. )Design(

USO 07. )Materials(

@ 07. (Parts of buildings)

USU 08. )Dividing elements( Roofs... Floors...

UTB 08. )Openings( Windows... Doors...

UTC B 08. )Spaces( Wings... Rooms... Stairs...

08. Built-in equipment

UTI 08. )Engineering services( Heating...

09. Ventilation & airconditioning...

@ 07. (Kinds of buildings)
[3-Construction technology UO]
  [4-(Kinds of structures) @]
    [5-(By general function & scale) @]
      [6-Buildings US]
        [7-(Kinds of buildings) @]

UTQ B 08. . . . . )Tall(... )Mobile(... )Public service(...
UTS B 08. . . . . Detached [FES]... Residential...
  08. . . . . Commercial...
UV 03Landscape architecture, landscaping, landscapes & gardens
04. * Landscaping for particular structures (eg
04. hospitals) or sites (eg mining sites), see
04. structure or site.
UV4 5C 04. )Planning(
UVA P 04. )Design(
  @ 04. (Other construction technology activities)
  05. . . * Add to UVB letters B/Y following UO;
  05. . . * Add to UVC letters A/Y following UP; eg
"VVB IL 04. )Site operations(
  04. (Elements of landscaped spaces)
  "UVF C 05. . . Natural features (general) [FES]... Artificial...
  G 05. . . Physiographic elements... Water features...
  K 05. . . Biofeatures... Vegetation...
  N 05. . . Boundaries... Decorative features...
  Y 05. . . Structures as elements
UVG 06. . . Boundary structures... Walls... Hedges...
UVJ 06. . . Ornamental, decorative... Surfaces (eg paving)...
  @ 04. (Kinds of landscaped spaces)
UVK B 05. . . (By ownership) Public... Private...
  F 05. . . (By design) Formal... Informal...
  @ 05. . . (By style) Exotic... Ornamental...
UVK M 05. . . (By physiography) Mountainous areas... Coastal...
  @ 05. . . (By land use)
UVN B 06. . . Administrative areas... Educational...
  H 06. . . Public health... Cemeteries...
  J 06. . . Agricultural... Industrial... Residential...
UVO 06. . . Leisure areas... Tourist... Playing fields...
  @ 05. . . (By scale)
JP 06. . . Landscapes
  06. . . * General, excluding gardens.
UVP P 06. . . Commons... Parks...
UVO 06. . . Gardens
  07. . . . . . * For horticulture, see GU Applied biology.
UVQ BJC 07. . . . . )Operations( Site preparation... Drainage...
  @ 07. . . . . (Elements)
UVQ FJ 08. . . . . )Water features(...
HS 08. . . . . )Surface elements ( Paving... Drives...
HY 08. . . . . )Structures ( Fences... Walls... Gates...
J 09. . . . . . . . . Outhouses... Pergolas... Rockeries...
  @ 07. . . . . (Kinds of gardens)
UVQ MB 08. . . . . (By ownership)...) (By design)...
  R 08. . . . . (By support) Roof gardens [FES]...
  09. . . . . . Hanging gardens...
UVR 08. . . . . (By purpose) Botanical gardens...
[3-Landscape architecture UV]
  . [4-Kinds of landscaped spaces] @
  . . [5-(By scale) @]
  . . . [6-Gardens UVQ]
  . . . . [7-(Kinds of gardens) @]
  . . . . . [8-(By purpose) Botanical gardens... UVR]

UWS 09. . . . . Domestic ornamental gardens
10. . . . . . * Alternative (recommended) to
10. . . . . . locating with horticulture under
10. . . . . . GV Applied biology.

UW 03Physical planning, town & country planning, environmental
03planning

UW2 9T 04. )Economics(
9T 05. . Land use economics

UW3 L 04. )Theory( Land use planning (theory)
@ 04. )Operations(

UW4 5 05. )Planning procedures... Planning applications...
05. )Planning control...

7 04. )Environmental aspects(
05. . * The pre-existing environment as affecting the
05. . planning process & the effect of the
05. . implemented plan on the environment.

@ 05. . Land use
@ 06. . (By ownership)

UW4 9B 07. . . . Public land use... Private...
9F 06. . . . (By factor used) Space use...
07. . . . Resource use... Energy use...

@ 06. . (By functional use)

UW4 9K 07. . . . Agricultural use... Industrial use...
90 07. . . . Open spaces... Vegetation... Wildlife use..
9S 07. . . . Urban development... Recreation...
9T 07. . . . Movement & access use, transport
9X 04. )Unwanted effects(... Planning blight...

UWA P 04. )Design(... Appearance design...
@ 04. )Other construction technology activities(
05. . * Add to UWB letters B/Y following UO;
05. . * Add to UWC letters A/Y following UP; eg

JWB O 05. . )Materials(

UWD 04. Unplanned development [FES]
05. . Overspill... Ribbon development...
@ 04. )Kinds of physical planning(
@ 05. . (By initial site conditions)

UWE 06. . . . New site... Redevelopment... Change of use...
@ 05. . (By purpose)

UWF 06. . . . Amenity preservation & control

UWG 07. . . . Visual amenity
08. . . . * For aesthetic design, see UWA_W

UWH 07. . . . Nuisance control... Noise... Pollution...

UWI 07. . . . Historical remains preservation...
@ 05. . (By area or unit subjected to planning)
@ 06. . . . (Elements of physical plan units)
@ 97. . . . (By land use)
08. . . . . * Add to UWJ letters B/T following
08. . . . . UWJ_9; eg

UWJ B 08. . . . Public land... Private land...
[3-Physical planning UW]

[4-(Kinds of physical planning) @]
[5-(By area or unit subjected to planning) @]
[6-(Elements of physical plan units) @]
[7-(By land use) @]
[8-Public land... Private land... UWJB]

UWJ T 08. * )Transport(  * Use UWN
UWN 09. . Movement & access use, transport
10. . . . Rights of way
UWO 10. . . . Land transport... Streets...Vehicles...
UWP B 11. . . . Pedestrian movement facilities...
M 11. . . . Terminals... Railways...
UWQ 10. . . . Water transport... Air transport...
UWR Q 07. Structures... Civil engineering... Buildings...
V 07. Mineral workings

θ 06(Parts, zones, sub-units of planning areas)
07. * Most relate chiefly to urban planning (UW).

'TWS G 07. (Geographically differentiated) * See eg UWX SG
M 07. (Multi-functional) * See eg UWX SM

UWT 07. Recreational zones... Parks... Residential zones...
θ 06(Kinds of planning areas)
07. * Divide each kind like UWA/UWT (+ additions); eg

UWV 07. Regional planning
UWW 07. Rural planning
UWW PB 08. * )Pedestrian facilities( Footpaths... Bridlepaths...
θ 08. (Parts, zones)
UWW V 09. . . . Villages [FES]... Beauty spots...
W 09. . . . . . Camping sites... Caravan sites...

UWX 07. Urban planning
UWX D 08. . )Unplanned development( Urban sprawl...
E 08. . (By initial site conditions) New towns...
O 08. . )Transport facilities)

UWO 09. . . )Streets( Motorways... By-passes... Cycleways...
09. . . Traffic intersections... Flyovers...
UWP B 09. . . )Pedestrian facilities( Pedestrian crossings...
UWX PM 09. . . )Terminals( Coach stations... Car parks...
R 09. . . )Rail transport( Underground railways...

θ 08. (Parts, sub-units, zones)
UWX SG 09. . . . Inner cities.... Suburbs... Neighbourhoods...
θ 08. (Kinds of urban areas)
UWX VG 09. . . . (By planform) Grid plan cities [FES]...
VP 09. . . . (By physiography) Riverside cities... Coastal...
W 09. . . . (By landscaping) Garden cities...
XC 09. . . . (By dominant activity) Capitals...
10. . . . . . Industrial cities...

UXB 06Environmental technology... Pollution control... Safety
07. * Indent code should be 03
07. * NB: Environment in general is EHI/EHS (Biology_- Ecology) & Human environment (general) is
07. GY, following Applied biology.

<4>
UO  03 Construction technology
  04. ** file uo1.sch 31.12.98: first bit of orig. uo.sch
  04. ( from bc2u91) having given indent codes &
  04. aligned (after layout refused to work without).
  04. * For works covering the construction of both civil
  04. engineering structures and buildings.
  04. * For Civil engineering, See UQ
  04. * For Building construction, See US
UO2 9U  04. (Standardisation)
  05. . Agreement certification
UO3 AC  04. Construction planning
  AD  05. . Site planning
   ADE  06. . . Site selection
   ADI  06. . . Site investigation
   AE  06. . . Relations to existing buildings ]
   07. . . . * Special to Architectural practice.
   AET  06. . . Site layout planning
   AF  05. . Functional requirement planning
   APG  06. . . Space requirement planning
   AFP  07. . . . Size requirement planning
   AFL  06. . . Life span requirement planning
   AFM  07. . . . Obsolescence planning
   AFN  06. . . Structure use planning
   AG  05. . . Legal requirement planning ]
  06. . . . ** leave AG/P for Architectural practice
B  04. Project management
  BD  05. . Project documentation
  BD  06. . . Programmes
  BD  06. . . Control plans
  BD  06. . . Project information manuals
  BE  06. . . Drawings
  BF  05. . Specification drafting
  BG  06. . . Specifications
  BJ  05. . Scheduling
  BL  06. . . Schedules
  07. . . . ** now parallel at TVE G et seq. Add like?
C  05. . (Financial management)
  06. . . (Costing)
  07. . . . Quantity surveying
  08. . . . . Taking off
  08. . . . Working up
  08. . . . . Cost planning
  08. . . . . Cost analysis
  08. . . . . Bills of quantities
D  06. . . Estimating
  07. . . . **Leave notation sp. for Special/Bldg/Prime
  07. . . . . cost + Provisional cost
DH  08. . . . Tendering, Procurement
DHL  07. . . . Firm price tendering
DHN  07. . . . Selective tendering
DJ  06. . . Contracting
  07. . . . Contracts
  08. . . . . (Conditions)
  09. . . . . Penalties
  09. . . . . Contract period
  10. . . . . . Delay of work, Postponement of work
  09. . . . . . Abandonment of work

<1>
[3-Construction technology UO]
[4-Project management UO3B]
  [5-(Financial management) UO3C]
  [6-Contracting UO3DJ]

08. . . . (Kinds)
09. . . . . Fixed price contracts
09. . . . . . Measured term contracts
09. . . . . . Cost reimbursement contracts

UO3 DT 07. . . Sub-contracting
04(General operations)
DU 05. (Starting)
  05. (Finishing)
  05. Extending
  05. Relocating
E 04(Surveying)
05. * For Quantity surveying, See above
F 04)Environmental health and safety aspects(
J 04)Product defects(

UO4 T 04)Equipment(
TC 05. Access equipment
  06. . Staging
  06. . Scaffolds
  07. . . Bracing
  07. . . Tying in
  06. . Climbing equipment
  07. . . Ladders

U 05. (Plant)
V 05. Temporary buildings on construction sites

UO5 05. Instrumentation(
UO8 Q 04)Control systems in construction technology(
  05. )Closed loop control systems, Automatic control(
UO9 04)Computers in construction technology(
UA 04)(Testing)
"OA 04)Inspection
  04)Reliability in construction technology(
UA 04)Design(
UC 04)Materials handling(
  05. * See also special at UOK
UOE 04)Materials(
  05. * See UO0

UOI 04)Structural engineering
UOI J 05. Structural analysis
  JL 06. . Elastic analysis
  07. . . Moment area analysis
  07. . . Permissible stress analysis
  06. . Plastic analysis, Collapse analysis
  07. . . Ultimate load analysis
  08. . . Yield line analysis
  06. . Elastoplastic analysis
  06. . Limit analysis
  06. . Statically determinate analysis
KB 06. . Statically indeterminate analysis, hyperstatic
  06. . analysis
  07. . . Displacement methods, Equilibrium methods

<2>
08. . . . End displacement methods
08. . . . Load displacement methods
08. . . . Moment distribution methods
08. . . . Slope deflection methods

UOI KN 06. . Energy methods
07. . . Virtual work method, Mohr’s method

L 04Construction services engineering

M 05. Maintenance
06. . Caretaking
06. . (Kinds of maintenance)
07. . . * Add letters from AM/O
07. . . **BC2U17 Planned maintenance to emergency
07. . . maintenance

P 05. Preservation
05. Repair
05. Restoration
05. Modernisation, Updating
05. Conversion, Adaptation

UOJ C 04Constructing
05. Site organisation
05. Wet construction
05. Dry construction

G 05. (Production processes)
06. . **The array which follows–mostly accords with U/2
06. . Production processes. Parallel notate if
06. . possible. Add Letters device not used as
06. . many U/2 details do not apply
06. . Casting, Pouring
06. . Deposition
07. . Spraying
06. . Compacting, Ramming
06. . Forming
06. . Cutting
07. . . Drilling
07. . . Grinding
06. . Joining
06. . Coating
06. . Assembly
06. . (Specials)
07. . . ** allow for concreting, carpentry, etc.

UOK 05. Mechanical handling
06. . * Add letters as at UC
06. . Fluid handling
07. . . * Add letters.....to....with meanings as at
07. . . U/84 (Fluid handling & control devies) to
07. . . U/84 (Fluid power motors)

UOL B 05. Holding
06. . Anchors
05. Supporting
06. . Shoring
06. . Underpinning
UOL E 05. Earthwork
06. * For Soil as a material of erected structures, See U/91.... below
06. * For Land reclamation, See U/912,67 below
N 06. Soil mechanics (construction technology)
07. * As DIN/DIR
V 06. Stabilisation
07. Bentonite
07. Cement
X 06. Excavation
07. (By products)
08. Fill
07. (Kinds of excavation)
08. Cuttings
09. Trenches
08. Pits
09. Shafts
10. Boreholes
UOM C 06. Levelling
06. Embankments
G 06. Land retention works
07. * For Sheet piles, See U/91.... below
H 07. Retaining walls
08. Fixed retaining walls
08. Free retaining walls
09. Gravity retaining walls, Mass retaining walls
10. Crib retaining walls
09. Flexible retaining walls
10. Cantilever retaining walls
09. Counterforted retaining walls
09. Buttressed retaining walls
09. Tied retaining walls
09. Diaphragm walls
08. Revetments
07. Avalanche protection works
Q 06. Landslide protection works
S 05. Frozen ground

UON B 04 Protection of structures
05. (Barriers)
06. Infilling
E 06. Insulation
07. Thermal insulation
08. * For Thermal engineering services,
08. See U/91.... below
08. * For Thermal engineering services in Civil engineering structures, see below
08. * For Thermal engineering in Buildings, See below
08. Vibration insulation
08. * For anti-vibration mountings, See
08. See (Parts of structures)
08. . . . Vibration isolators
08. . . . Sound insulation, acoustic insulation
09. . . . . Sound reflectors
09. . . . . Sound absorbers

UON I 06. . Weatherproofing
07. . . Weather strips
07. . . Weather bars

J 06. . Waterproofing
07. . . Damp proof courses
08. . . . Lead damp proof courses
08. . . . Electrolytic damp proof courses
08. . . . Injected damp proof courses
07. . . Tanking
08. . . . Bitumen tanking

N 05. Corrosion protection
05. (Special forms of protection)
06. . ** allow for glazing (windows) here?

X 04 Demolition

UO 04 (Materials)
05. * This heading is for the various construction
05. materials as such, including construction processes
05. carried out exclusively on particular materials.
05. * For particular kinds of structures, specified by
05. material, e.g. (all) concrete structures, (all)
05. timber structures, and the processes contributing to
05. their construction, see below

UOO I 05. (General technology of construction materials)
05. * Add Letters I/Y following UE
06. . * For Stress analysis, without reference to
06. . particular materials, see V/91... Structural
06. . engineering

B 06. . Masonry
07. . . (Operations, Masonry work)

G 07. . . (Kinds of masonry materials)

UOF C 08. . . Stone
09. . . . . Igneous stone
10. . . . . Acid igneous stone
11. . . . . . Granite
10. . . . . . (Intermediate igneous stone)
10. . . . . . Basic igneous stone
11. . . . . . Gabbro
09. . . . . Metamorphic stone
10. . . . . . Slate
10. . . . . . Marble

UOF B 09. . . Sedimentary stone
10. . . . . . Limestone
11. . . . . . Dolomite
11. . . . . . Chalk
10. . . . . . Sandstone
[5-(Particular materials) @]
[6-Masonry UOPB]
  . [7-(Kinds of masonry materials) @]
  .  [8-Stone UOPC]
  .   . [9-Sedimentary stone UOFB]
  .   .   [10-Limestone UOF C]
10. . . . Diatomaceous earth, Diatomite, Kieselguhr,
10. . . . tripolite
11. . . . Moler
10. . . Argillaceous rock, Clay minerals

UOP G 06Hydrated materials
07. * Materials, initially in the anhydrous state,
07. reacted with water to form hydrates, and
07. subsequently with atmospheric carbon dioxide to
07. yield rigid construction materials
07. * For the production of these materials,
07. See V/52
07. * For plasters in construction, See ....below (**
07. under Coating)
07. (Materials in anhydrous state)
08. . Pastes
08. . Mortars
07. (Materials in hydrated states)
07. (Materials in set condition)

I 07. Lime
08. . Quicklime, Burnt lime, Anhydrous lime, caustic lime,
08. . calcium oxide
08. . Hydrated lime, Slaked lime, Calcium hydroxide
08. . High calcium lime, White lime
08. . Chalk lime, Grey lime
08. . Stone lime
08. . Mountain lime
08. . Magnesian lime
08. . Dolomitic lime
08. . Blue lias lime

J 06Sand-Lime materials, Calcium silicate materials
07. Dicalcium silicate
07. Tricalcium silicate
06Calcium aluminate
06Calcium aluminoferrite
06Slag, Blast furnace slag
07. Air cooled slag, Massive slag
07. Foamed slag
07. Granulated slag

ME 06Cement, Hydraulic cement
07. * For the technology of cement, irrespective of
07. application, See V/52,50
07. * For Oilwell cement, See V/86...
07. * For Cement stabilisation of soil, See
07. * For the use of cement as a constituent of concrete
07. for constructional purposes,
07. * See U/91.... below
07. Quick setting cement
07. Rapid hardening cement

<6>
07. Expanding cement
07. Water resistant cement
07. Acid resisting cement
07. Sulphate resisting cement
07. Low heat cement

07. Portland cement
07. Portland blast furnace cement, Portland slag cement,
07. Trieff cement
07. Metallurgical cement, Supersulphated cement
07. Slag cement
07. Alumina cement, Aluminous cement, High alumina cement,
07. ciment fondu
07. Sorel’s cement, Magnesium oxychloride cement
07. Magnesium oxy sulphate cement
07. Roman cement, Parker’s cement
07. Masonry cement
07. Pozzolanic cement
07. Bituminous cement
07. Asbestos cement
06Cement-Lime materials
06Concrete

UOP O
07. * For the technology of concrete irrespective of
07. application, See V/52,60
07. (Processes)
08. . Mixing
09. . . Mixers
08. . Vibrating
09. . . Vibrators
08. . Concreting
09. . . Placing
10. . . Spreading
07. (Constituent materials)

P
08. . Cement
09. . . * The use and behaviour of cement in
09. . . conjunction with water and aggregate in the
09. . . formation of concrete for structures
09. . . * For the use of cement in structural
09. . . materials generally, See above

PW 08. . Water

QB 08. . Aggregates
09. . . All in aggregates
10. . . . Ballast
09. . . Single size aggregates
10. . . . Fine aggregates
10. . . . Coarse aggregates
09. . . Heavyweight aggregates
09. . . Lightweight aggregates
09. . . Sand
09. . . Gravel
09. . . Crushed rock, Crushed stone

<7>
[3-Construction technology UO]
[4-(Materials) UOO]
[5-(Particular materials) @]
[6-Concrete UOPO]
[7-Lime UOPI]
  . [8-Aggregates UOPQB]

09. . Graded aggregates
09. . Gap graded aggregates
09. . Pozzalanic aggregates
09. . Saturated surface dry aggregates
09. . (Residue & waste product aggregates)
10. . . Blast furnace slag aggregates
11. . . . Granulated blast furnace slag aggregates
11. . . . Foamed blast furnace slag aggregates
11. . . . Pelletised blast furnace slag aggregates
10. . . Clinker
10. . . Power station waste aggregates

UOP R
08. Additives, Admixtures
09. . Accelerators
09. . Retarders
09. . Permeability reducing agents
09. . Pozzalans
09. . Pigments

@

UOP SC
08. Fresh concrete
08. Green concrete
08. Gunite, Air blown concrete
08. Spun concrete
08. Steam cured concrete
09. . Low pressure steam cured concrete
09. . Autoclaved concrete, High pressure steam cured
09. . concrete
08. Vacuum concrete
08. Precast concrete
08. In situ cast concrete
08. Lean concrete
08. Granolithic concrete
08. Cast stone, Artificial stone, Reconstructed stone
08. Mass concrete, Bulk concrete
08. Sulphur modified concrete
08. Polymer modified concrete
08. Lightweight concrete
09. . Aerated concrete, Cellular concrete, Gas
09. . concrete
09. . Lightweight aggregate concrete
08. Dense concrete, No voids concrete
08. High density concrete, Heavy concrete
08. Self stressing concrete, Expansive cement concrete
08. Shrinkage compensatory concrete
08. High strength concrete
08. Acid resisting concrete
08. Reinforced concrete
09. . Steel reinforced concrete
10. . . Prestressed concrete
[3-Construction technology UO]
[4-(Materials) UOO]
[5-(Particular materials) 0] [6-Concrete UOP]
. [7-(Kinds of concrete) 0]
.. [8-Reinforced concrete UOPTC]

09. . . Fibre reinforced concrete
10. . . . Glass fibre reinforced concrete
08. . . Coloured concrete

UOP TL
06Soil
07. * Soil as a material for structures
07. * For Soil mechanics, See U/912,21 above
07. * For Earthwork, See U/912,25 above
07. * For soil stabilisation, See U/912,25 above
07. (Operations)
07. (Kinds of soil construction)
08. . Adobe
08. . Pise de terre, Cob, Rammed earth

U
06Metals
07. (Operations, Metal construction work)
07. (Kinds of metals)
08. . Steel
09. . . * Add letters........ to........ with meanings
09. . . as at V/66,40...to V/66,4........
08. . Iron
09. . . * Add letters........ to........ with meanings
09. . . as at V/66,30...to V/66,3
09. . . Non-ferrous metals
09. . . * \Add\ letters........ to...... with meanings
09. . . as at V/67...to V/67...

UOQ
06Timber, Wood

UOQ 3J
07. (Defects)
08. . Bark pockets
08. . Calluses
08. . Flecks
08. . Burrs
08. . Knots
08. . Resin pockets
08. . Rind galls
08. . Gum streaks
08. . Stains
08. . Reaction wood
09. . . Tension wood
09. . . Compression wood
08. . Fibre separation defects
09. . . Shakes
09. . . Honeycombing
08. . Checks
08. . Holes
09. . . Knot wholes
09. . . Worm holes

3K
08. . Rot, Decay
09. . . Timber preservatives
10. . . . Tar oil preservatives
11. . . . . Creosote

<9>
[3-Construction technology UO]
[4-(Materials) UOO]
   [5-(Particular materials) E]
      [6-Timber UOQ]
      [7-(Defects) UOQ3J]
      [8-Rot UOQ3K]

10. . . . . . Organic solvent preservatives
10. . . . . . Water based preservatives
E
09. . . . . . Kinds of rot)
10. . . . . . Dry rot
10. . . . . . Wet rot
10. . . . . . Soft rot
10. . . . . . Brown rot
10. . . . . . White rot
10. . . . . . Butt rot

E
07. . . . (Operations, Timber work)
UOQ JP
08. . . . Carpentry
08. . . . Joinery
07. . . . (Kinds of timber)
08. . . . (By growth ring separation)
09. . . . . Narrow ringed wood, Close grown wood, Fine
09. . . . . grown wood, slow grown wood
09. . . . . Wide ringed wood, Coarse grown wood, fast
09. . . . . grown wood, open grown wood
E
08. . . . (By cut grain type)
UOQ PF
09. . . . Straight grain
PG
09. . . . Cross grain
10. . . . . Diagonal grain, Oblique grain
10. . . . . Sloping grain
10. . . . . Wavy grain
11. . . . . Mottle grain
10. . . . . Curly grain
10. . . . . Bird’s eye grain
10. . . . . Spiral grain
10. . . . . Interlocking grain
11. . . . . Ribbon grain
08. . . . (By part of tree)
09. . . . . Cambium
09. . . . . Heartwood
09. . . . . Sapwood
08. . . . (By kind of tree)
09. . . . . Softwood
09. . . . . Hardwood
08. . . . (By process applied)
09. . . . . Wrought timber
09. . . . . Processed wood
09. . . . . Impregnated wood
09. . . . . Compressed wood
Q
05. (Other materials)
06. . . . \Add\ letters as st V/23,60 to V/87
RB
06. . . Waste materials
07. . . Rubble
E
04(Properties of structures)
UOQ SB
05. (Form)
06. . . * In architecture = Built form
<table>
<thead>
<tr>
<th>UOQ SC 06.</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>06.</td>
<td>Height</td>
</tr>
<tr>
<td>06.</td>
<td>Area</td>
</tr>
<tr>
<td>06.</td>
<td>Layout</td>
</tr>
<tr>
<td>06.</td>
<td>Orientation</td>
</tr>
<tr>
<td>05.</td>
<td>Flexibility</td>
</tr>
<tr>
<td>05.</td>
<td>Expansibility</td>
</tr>
<tr>
<td>U 05.</td>
<td>Movement</td>
</tr>
<tr>
<td>06.</td>
<td>(Agents of movement)</td>
</tr>
<tr>
<td>07.</td>
<td>Soil</td>
</tr>
<tr>
<td>07.</td>
<td>Wind</td>
</tr>
<tr>
<td>07.</td>
<td>Man-made sources</td>
</tr>
<tr>
<td>@ 06.</td>
<td>(Kinds of movements)</td>
</tr>
<tr>
<td>UOQ V 07.</td>
<td>Linear</td>
</tr>
<tr>
<td>08.</td>
<td>Settlement</td>
</tr>
<tr>
<td>08.</td>
<td>Upheave</td>
</tr>
<tr>
<td>07.</td>
<td>Rotational</td>
</tr>
<tr>
<td>07.</td>
<td>Periodic movement</td>
</tr>
<tr>
<td>08.</td>
<td>Shaking</td>
</tr>
<tr>
<td>09.</td>
<td>Vibrations</td>
</tr>
<tr>
<td>08.</td>
<td>Rocking</td>
</tr>
<tr>
<td>08.</td>
<td>Swinging</td>
</tr>
<tr>
<td>@ 04.</td>
<td>(Parts of structures)</td>
</tr>
<tr>
<td>UOQ WB 05.</td>
<td>Rods</td>
</tr>
<tr>
<td>05.</td>
<td>Bars</td>
</tr>
<tr>
<td>05.</td>
<td>Shafts</td>
</tr>
<tr>
<td>05.</td>
<td>Cylinders</td>
</tr>
<tr>
<td>06.</td>
<td>Tubes, Pipes</td>
</tr>
<tr>
<td>05.</td>
<td>Barrels</td>
</tr>
<tr>
<td>05.</td>
<td>Spheres</td>
</tr>
</tbody>
</table>

**WL 05 Sections**

<table>
<thead>
<tr>
<th>WM 06.</th>
<th>Thin walled sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>06.</td>
<td>Thick walled sections</td>
</tr>
<tr>
<td>06.</td>
<td>Rectangular sections</td>
</tr>
<tr>
<td>07.</td>
<td>Square sections</td>
</tr>
<tr>
<td>06.</td>
<td>Trapezoidal sections</td>
</tr>
<tr>
<td>06.</td>
<td>Hollow sections</td>
</tr>
<tr>
<td>06.</td>
<td>T sections Z sections</td>
</tr>
<tr>
<td>06.</td>
<td>Channel sections</td>
</tr>
<tr>
<td>06.</td>
<td>Angle sections</td>
</tr>
<tr>
<td>05.</td>
<td>Strips</td>
</tr>
<tr>
<td>05.</td>
<td>Sheets</td>
</tr>
<tr>
<td>06.</td>
<td>Corrugated sheets</td>
</tr>
<tr>
<td>05.</td>
<td>Laminates</td>
</tr>
<tr>
<td>06.</td>
<td>&lt;Wood&gt;</td>
</tr>
<tr>
<td>07.</td>
<td>Plywood</td>
</tr>
<tr>
<td>05.</td>
<td>Sandwich elements</td>
</tr>
<tr>
<td>05.</td>
<td>Quilts</td>
</tr>
<tr>
<td>05.</td>
<td>Meshes, Nets, Webs</td>
</tr>
<tr>
<td>05.</td>
<td>Panels</td>
</tr>
</tbody>
</table>

**XK 05.** Boards
06. Cellulose boards
07. . Cardboards
07. . Millboards
07. . Strawboards
06. Wood particle boards
07. . Wood chipboards
07. . Wood wool slabs
06. Fibre boards
07. . Hardboard
07. . Softboard
08. . . Insulating boards
09. . . . Acoustic boards

UOQ YB
06. Laminated wood boards
07. . Blockboards
06. Flaxboards
06. Plasterboards, Gypsum plasterboards
06. (Board assemblies)
07. . Matchboarding
07. . Weatherboarding

UOR BS
05Plates
05Slabs

BF
05Blocks
06. (Operations)
07. . (Assembly)
06. (Kinds of blocks)
07. . (By method of forming)
08. . . Cut blocks
09. . . . Sawn blocks
08. . . Split blocks
07. . (By form)
08. . . Hollow blocks
09. . . . Pierced blocks
09. . . . Cavity blocks
08. . . Angle blocks
08. . . Wedge shaped blocks
07. . (By material)
08. . . (Stone)
09. . . . Ashlar
09. . . . Scantlings
08. . . (Timber)
09. . . . Baulks
06. Blockwork assemblies

UOR D
05Bricks
06. (Operations)
07. . Assembly
08. . Bricklaying
06. (Parts of bricks)
07. . Frogs
07. . Keys
07. . Bats
07. . Closers
06(Kinds of bricks)
07. (By method of forming)
08. . Wire cut bricks
08. . Pressed bricks
09. . . Dry pressed bricks
08. . Soft moulded bricks
09. . . Machine soft moulded bricks
09. . . Hand made bricks
07. By form)
08. . Solid bricks
08. . Hollow bricks
08. . Cellular bricks
08. . Perforated bricks
08. . Shippers
07. (By material)
08. . Sand-Lime bricks, Calcium silicate bricks
08. . Concrete bricks
07. Stocks
07. Common bricks
08. . Fletton bricks
07. Facing bricks

UOR H
07. Engineering bricks
08. . Non-cavity producing brickwork bonds
09. . . Raking bonds
10. . . . Herringbone bonds
10. . . . Basket weave bonds

IB
09. . . Horizontal bonds
10. . . . Stretcher bonds
11. . . . . Facing bonds
10. . . . Header bonds
10. . . . Header & stretcher bonds
11. . . . . English bonds
12. . . . . . Dutch bonds
12. . . . . . English cross bonds
11. . . . . Garden wall bonds
11. . . . . English garden wall bonds, Common
11. . . . . bonds, American bonds
11. . . . . Flemish bonds
11. . . . . Flemish cross bonds
11. . . . . Monk bonds, Flying bonds
12. . . . . . Flemish garden wall bonds
13. . . . . . . Sussex garden wall bonds
08. . Cavity producing bonds
09. . . Quetta bonds
09. . . Rat trap bonds, Silverlock bonds
09. . . Honeycomb bonds
07. (Kinds of brickwork)

K
08. . Fairfaced brickwork
08. . Flush brickwork
08. . Indented brickwork
09. . . Honeycomb brickwork
[3-Construction technology UO]
[4-(Parts of structures) Ø]
[5-Bricks UORD]
  .  [6-Laminated wood boards UOQYB]
  .  .  .  [7-Engineering bricks UORH]
  .  .  .  .  [8-Fairfaced brickwork UORK]

08.  .  .  Projecting brickwork
09.  .  .  .  String courses
08.  .  .  Moulded brickwork
08.  .  .  Half brick brickwork
08.  .  .  One brick brickwork
08.  .  .  One and a half brick brickwork
08.  .  .  Two brick brickwork
UOS  05(Spatially and geometrically specified parts)
Construction technology

Parts

Spatially & geometrically specified

** file uo2.sch (31.12.98). Second bit of orig. file uo.sch (first bit UO2/UPB is uo1.sch); 5.1.98

Spatially and geometrically specified parts

Tops
Bottoms
Middles
Fronts
Facades
Backs
Sides
Interiors
Cavities
Exteriors
Boundaries
Prominences

Projections
Ledges
Mouldings
Beads
Cornices

Structural elements

Lateral force resistant members

Flexural members, Bending members

Beams

Webs

Kinds

H_beams
I_beams
T_beams
U_beams
Omega beams
Girders
Plate girders
Vierendeel girders
Bowstring girders
Box girders
Cantilevers

Axial force resisting members

Compression members

Struts
Columns, Pillars
Pedestals

Ties, Tension members

Collars

Shear force resisting members

Arches

Parts

Crows
Haunches
Spandrels
Voussoirs, Arch blocks
09. . . Springers
09. . . Keystone
07. (Kinds)
08. . (By form)

UOS KJ
09. . . Straight arches, Gauged arches
10. . . . Dutch arches, French arches
09. . . Curved arches
09. . . Queen Anne arches, Venetian arches
09. . . Single centre arches
09. . . Semicircular arches
10. . . . Barrel arches
09. . . Gothic arches, Pointed arches
10. . . . Equilateral arches
11. . . . . Horseshoe arches, Moorish arches
09. . . Three centred arches
10. . . . Florentine arches
10. . . . Trefoil arches
10. . . . Ogive arches, Ogee arches
09. . . . . Four centred arches
09. . . . Five centred arches, Elliptical arches
09. . . . . Parabolic arches
08. . . By function)
09. . . . Relieving arches
08. . . . By application)
09. . . . (Roofs & ceilings)
10. . . . Vaults

LB 06 Abutments
06 Buttresses
06 Supports
07. Bearers
08. . Joists
07. Seatings
08. . Beds
08. . Mounting plates
07. Plinths
07. Corbels
07. Anti-vibration mountings
06 Stiffeners
06 Anchorages

M 06 Frames
07. Lattice frames
07. (By element section)
08. . Frame-Tube systems
07. (By material)

NO 08. . Concrete
09. . . Tube-in-tube systems
08. . Steel
09. . . Rigid belt systems
09. . . Bundled tube systems

<2>
[3-Construction technology UO]
[4-(Parts) @]
  [5-Structural elements UOSE]
    * [6-Frames UOSM]
      . . [7-Ties UOSI]
      . . . [8-Concrete UOSNO]

UOS NQ 08. . . Wood, Timber
09. . . . (Parts)
10. . . . . Stiles
10. . . . . Rails
07. . (By rigidity/freedom of connection)

NR 08. . Rigid connected frames, Monolithic frames
08. . . Semi-rigid connected frames
08. . . Simple frames
09. . . . * Frames with free rotating connections
07. . . (By dimensions)

P 08. . Plane frames
09. . . Portal frames
Q 09. . . Trusses
10. . . . Rigid belt steel trusses
10. . . . Column-Diagonal tube steel trusses

R 08. . Space frames

S 09. . . Grid space frames
10. . . . Single layer grid space frames
10. . . . Double layer grid space frames
10. . . . Rectangular grid space frames
11. . . . . Square grid space frames
10. . . . . Diagonal grid space frames
10. . . . . Three way grid space frames

T 06. (Configural parts)
07. . . . ** special to buildings

U 05Fixings
06. . * Add letters as at fasteners (mech eng)

V 05Joints
06. . * ^\Add^ \ letters as at U/80 Joints
06. (Operations)

VJP 07. . Filling
08. . . Grouting

UOT B 05Coverings
C 06. (By material)
E 06. Plastering
07. . Plasters
06. Rendering
07. . Stucco
06. Decorating
07. . Painting

K 06. Cladding
07. . Barge boards

L 06. Linings
07. . ** not sure that this is OK; at URU_B have
07. . . treated as special part, not a covering.

R 05Carcasses
06. . * See Buildings

<3>
UOT V  05 Dividing elements
     06. Horizontal dividing elements
UOU  07. Roofs
     08. (Parts)
UOU SQ  09. (Trusses)
     10. Rafters
     10. Purlins
     10. Roof ties
ST  09. (Configurational parts)
     10. Valleys
     10. Hips
     10. Eaves
TB  09. Coverings, Roofing, Decking
TCO  10. (Materials)
     11. * Add\ letters.......to....... with
     11. meanings as at V/23,60 to V/77
     11. plus additional topic special to
     11. this application
     11. <Metals>
     12. . Roofwork plumbing
     13. **Notate to file between V/67
     10. (Parts)
TCS W  11. Joints
     12. . Flashings
     10. (Kinds)
UC  11. Sheets
     12. . Felts
     11. . Slabs
     11. . Slates
     11. . Tiles
UI  12. Pantiles
     08. (Kinds of roofs)
UP  09. (By material)
     10. * Add to UOU_U letters P/Q following
     10. UOE.
     10. **Position for (By associated wall)/
     10. Gabled roofs, in Buildings
     10. only)......
UPE  10. Slate roofs
     09. (By structure)
US  10. Shell roofs
UT  11. Lattice roofs
     10. Lamellar roofs
     09. (By form)
VC  10. Single roofs
     11. . Couple roofs
     11. . Couple-close roofs, Close-couple roofs
     10. . Collar beam roofs
     09. Flat roofs, Platform roofs
UOV F  09. Pitched roofs
G  10. Gable roofs
     11. ** special to buildings
<4>
[5-Dividing elements UOTV]
[6-Linings UOTL]
   . [7-Roofs UOU]
     . . [8-Space frames UOSR]
       . . . [9-Pitched roofs UOVF]
       . . . . [10-Gable roofs UOVG]

10. . . . Single pitched roofs, Monopitch roofs
11. . . . . Cut roofs, Terrace roofs
11. . . . . Lean to roofs
10. . . . . Double pitched roofs
10. . . . . Four pitched roofs
11. . . . . Mansard roofs
11. . . . . Hipped roofs
09. . . . Arched roofs, Vaults
09. . . . Cylindrical roofs
10. . . . . Barrel vaults, Wagon vaults, Tunnel vaults,
10. . . . . annular vaults
09. . . . Cross vaults, Groin vaults
09. . . . Conical roofs
UOV P 09. . . Domes
Q 09. . . Canopies
10. . . . . ** special to buildings
R 07. Ceilings
08. . Suspended ceilings
T 07. Decks
08. . . ** in buildings, = storeys
V 07. Floors
VTC 08. . (Coverings)
09. . . Screeds
08. . (Kinds of floors)
W 09. . . Slab floors
09. . . (By surface properties))
09. . . (By structure))
XC 10. . . . Composite floors, Assembled floors
11. . . . . Beam and slab floors
11. . . . . Pot and beam floors, Rib and hollow pot
11. . . . . floors, beam & block floors
11. . . . . Hollow beam floors
11. . . . . Joist and board floors
10. . . . . Suspended floors, Cavity floors
11. . . . . Spring floors
11. . . . . . Floated floors
11. . . . . . Jointless floors
UOW B 06Walls, Vertical dividing elements
07. (Parts)
BY 08. . Copings
07. (Kinds of walls)
C 08. . Non-loadbearing walls
08. . Loadbearing walls, Bearing walls
09. . . (Reinforced concrete loadbearing walls)
10. . . . Shear walls
F 08. . External walls
G 09. . . Gables }
10. . . . ** special to Buildings

<5>
[4-(Parts) ]
[5-Dividing elements UOTV]
 . [6-Walls UOWB]
   . . [7-Floors UOVV]
   . . . [8-External walls UOWF]
   . . . . [9-Gables ] UOWG]

  09. . . . Cavity walls
  09. . . . Curtain walls
  09. . . . Parapets
  08. . . Internal walls
  09. . . . Partitions
  UOW S 09. . . . Screen walls

UOX 06. (Intercalators for qualifying structures)
  07. . ** X/Y are reserved here to allow retro
      qualification of later classes by UO
  07. . (following X) and UP (following Y). See
      note (following UPP) re (Kinds of
      structures).

UPB B 06. Openings
  07. . Windows
  08. . . ** special to buildings; see UTBD

UPC B 05Spaces
      06. * For roof spaces, see UPD_FV.
      F 06. Rooms
      07. . * special to buildings; see UTCF
      Q 06. Access spaces
      07. . Maintenance access spaces

UPD FV 06. Roof spaces
      07. . . * special to buildings
      B 07. . . Stairs
      08. . . . * Special to buildings; see UTDB

UPE 05Superstructures

UPF B 05Subsurface parts
      BYC B 06. )Spaces(
      07. . * See UPG
      06. (Structural members)
      D 07. . Piles
      08. . . (Operations)

DJP 09. . . Piling
      10. . . . (Inserting)
      10. . . . (Withdrawing), Pile drawing, Pile
      10. . . . . extraction
      08. . . (Parts)

DXR 09. . . Pile caps

DXS 09. . . Pile shoes
      08. . . (Kinds of piles)
      09. . . . (By form)

EB 10. . . . Open end piles
      10. . . . Closed end piles
      10. . . . Tapered piles
      11. . . . . Step tapered piles
      10. . . . . Straight shaft piles
      10. . . . . H piles
[3-Construction technology ]

[4-(Parts) ]

[5-Subsurface parts ]

[6-Spaces ]

[7-Piles ]

[8-External walls ]

[9-Pile shoes ]

[10-Open end piles ]

Box piles
Tube piles
Shell piles
Belld out piles, Enlarged toe piles
Screw piles
(By material)
Concrete piles
Steel piles
Wood piles
(By method of construction)
Preformed piles, Displacement piles
Driven piles
Pile driving
Jacked piles
In situ piles
Bored piles
Uncased piles
Cased piles
(By function)
Bearing piles
Bearing capacity
End bearing piles, Point bearing piles
Friction piles
Raking piles
Sheet piles
* For Land retention works, See U/912,25: above
Pile groups

Foundations
Solum
Footings
Strip footings
Pad footings
Shallow foundations
Deep foundations
Caissons
Ground water barriers
Cofferdams
Grillages
Raft foundations
Pile foundations

Subsurface spaces
Basements

** special to buildings; see UTG

External parts & spaces

** special to buildings; see UTH

Engineering services

<7>
05. * For heating & cooling systems, lighting, plumbing...
05. see Buildings UTO/UTO

**UPP 04(Parts special to a particular structure)**

05. * Whatever is being qualified, these (Parts) shd file
05. before the first (Kinds), which begin with the
05. general categories at UPQ/R. Provision of this
05. classmark ensures this. But on occasions it may be
05. replaced by shorter classmarks; eg under Water
05. control structures - Conduits URS_J...
04(Kinds of structures)

05. * Any kind of structure may be qualified as follows
05. (unless special provision is made):
05. * Add to - (where the hyphen represents the classmark
05. to be qualified) thus:
05. * Add to - letters A/W following UO;
05. * Add to -X letters A/R following UP;
05. (By process)

**UPQ B 06.** Prefabricated structures, Industrialised construction

06. systems
05. (By location)

**D 06.** Subsurface structures

**H 05.** (By resistance factor)

06. * Special to hydraulic engineering structures.

**J 05.** (By material)

06. * Add letters... as the Materials per se facet
06. above
05. (By form)
06. Tall structures
06. Large span structures
05. (By proportions)
06. Modular structures
05. (By joining method)
06. Welded structures
06. Fastened structures
05. (By support characteristics)

**U... A 06.** Stressed skin structures, Geodesic structures

**B 07.** Shell structures

08. Singly curved shells
09. Cylindrical sheels
08. Multiply curved shells
09. Spherical shells
09. Hyperbolic shells
09. Hyperbolic paraboloid shells
07. Folded plate structures
06. Suspended structures

**K 06.** Inflated structures, Pneumatic structures, Air
06. inflated structures

**L 06.** Floating structures
07. * Structures supported by raft foundations or
07. vibration isolators
05. (By service life)
06. Short life structures, Temporary structures
05. (By mobility)

<8>
[3-Construction technology UO]
[4-(Parts special to a particular structure) UPP]
[5-(By material) UPQJ]
[6-Floating structures UPRL]

UPR O 06. Mobile structures
06. Demountable structures
06. Transportable structures
05. (By special purpose)
06. Earthquake resistant structures
06. Fire resistant structures

UPS 04 (Other kinds of structures)
05. ** letters S/Y here are reserved for the special kinds
05. in Civil engineering (at URS/URY) and in Buildings
05. (at UTS/UTY).

UQ 04 Civil engineering * use UQ for energy technology
05. * The distinction between Civil engineering and
05. Building construction (see U/916 below) is now a
05. somewhat arbitrary one. Traditionally Civil
05. engineering has embraced all kinds of structures,
05. other than military structures, but has excluded
05. relatively small scale building construction in
05. which considerations of engineering design are
05. relatively non-elaborate.
05. * In BC2, works exclusively on the construction of
05. buildings are placed at US/UT, under Building
05. construction, even though civil engineering methods
05. may have been used in their construction.
05. * Add to UQ letters A/W following UO;
05. * Add to UR letters A/R following UP, with the
05. additions indicated:
05. <Parts of civil engineering structures>

URI 06. )Engineering services in civil engineering structures(
07. * Add to UR letters I/O following UT; eg
07. Lighting of civil engineering structures URL.
05. <Kinds of civil engineering structures>
06. <By process>

B 07. Prefabricated(06.
06. <By location>
07. <Subsurface structures>

E 08. Tunnels
09. Bored tunnels
09. Cut and cover tunnels
06. <By material>

URQ 06. <By support characteristics>
06. <By form>
07. Tall structures>
08. Masts
08. Towers
08. Pylons

URR O 06. <By mobility>
06. <By purpose>
07. * For structures serving the purposes of
07. Transport, See U/94
07. * For Bridges, See U/94, 80
07  * For Road engineering, See U/94,28
07  * For Waterway, dock and port engineering
07  See U/94,58
07  * For Airport engineering, See U/94,78,50

URS B
07 Public works structures
D
07 (Land reclamation & drainage structures & engineering
08.  * For Earthwork, See U/912,25
08.  * For Irrigation engineering, See GS....
08.  Land reclamation structures & engineering
09.  Polders
08.  Land drainage structures & engineering
J
07 Water control structures, Hydraulic construction
07 engineering
08.  * For Waterway, dock and port engineering
08.  See U/94,58

JJP
08. (Operations)
09.  Dredging

JXP
08. (Special parts)
09.  * See URS_K...
09.  * This replaces the normal provision for
09.  special Parts filing before the general
09.  kinds of structures taken from UPQ/UPR.
09.  These are given at URS_X/Y below.

K
09.  Conduits

L
10.  Culverts

M
10.  Channels

N
11.  Spillways, Bye-channels, Diversion cuts
P
11.  Flumes
Q
11.  Sluices
R
10.  Aqueducts

S
09.  Water flow control structures

T
10.  Hydraulic gates

UB
11.  Tainter gates, Radial gates
11.  Drum gates
11.  Sector gates
11.  Vertical lift gates
11.  Inclined lift gates
11.  Slide gates
11.  Segmental gates
11.  Tractor gates
12.  Roller gates
12.  Wheel gates
11.  Ring gates
11.  Hinged leaf gates
12.  Bascule gates
11.  Rolling gates

X
08. (Kinds of water control structures)
09.  ** strictly, all indent codes from URTC to
09.  URXV shd be increased by one (to indent
09.  under Kinds).
09.  * Add to URS_X letters following URQ
<10>
URT C
08 Water retention structures
CJC 09. Construction
CO 09. Materials
CYF N 09. Foundations
CYI 09. Engineering services
CYP 09. (Special parts)
10. * Add to URT_CYP letters K/U following
10. URS; eg URT_CYP_K Conduits.
09. (Kinds)
10. (By purpose)
11. Storage
12. . Reservoirs
11. . Diversion
11. . Detention
J 11. . Dams, Barrages
12. . * Add to URT_J letters J/Y following
12. . URS; eg
@ 12. . (Special parts)
13. . * For Penstocks, See U/57,43....
URT JN 13. . <Spillways>
14. . . (Kinds of spillways)
JOC 15. . . . Overflow spillways
15. . . . Channel spillways
16. . . . . . Overflow weir spillways
17. . . . . . Side channel overflow
17. . . . . . weir spillways
17. . . . . . Deep inlet spillways,
17. . . . . . Morning glory spillways
17. . . . . . Open chute spillways
17. . . . . . Tunnel spillways
JVC 12. . . Stilling basins
JVF 12. . . Flip buckets
JVO 12. . . Outlet structures
JVQ 13. . . Overflow dams
12. . (Kinds)
13. . (By resistance feature)
L 14. . . Gravity dams
M 14. . . Buttress dams
NB 15. . . Flat slab buttress dams,
15. . . . Amberen dams
15. . . . Diamond headed buttress dams
15. . . . T-headed buttress dams
15. . . . Round headed buttress dams
15. . . . Multiple arch dams
15. . . . Multiple dome dams
O 14. . . Arch dams
15. . . . Thick arch dams
15. . . . Thin arch dams
<11>
16. . . . . . . . Dome shape dams, Cupola dams

URT P 13. . . . . <By material>
14. . . . . . . Earth dams, Earthfill dams
15. . . . . . . Homogeneous earth dam
15. . . . . . . Zoned earth dams
15. . . . . . . Rockfill dams
15. . . . . . . Hydraulic fill dams
14. . . . . . . Masonry dams
15. . . . . . . Concrete dams

T 13. . . . . Inflatable dams

W 12. . . . . Weirs
13. . . . . * Special to rivers


08 Water erosion & sedimentation control structures
09. (Parts)
10. . . . . . . Armouring, Linings
11. . . . . . **see note at UOTL querying connotation of
11. . . . . . . linings.
11. . . . . . . Vegetation
11. . . . . . . Rock rip-rap
11. . . . . . . Fascines
11. . . . . . . Gabions
11. . . . . . . Asphaltic concrete linings
09. (Kinds)
10. . . . . . . Groynes
10. . . . . . . Articulated concrete mattresses

URV B 08 Flood control structures
09. Flood control canals

URW B 08 River control works, Potomology
09. * Add to URW_B letters J/Y following URR
09. * Add to URW_C letters URT

BK 09. <Conduits>

BM 10. . <Channels>
11. . . . Meander cut-off channels
12. . . . **Note to follow brought down sluices

C 09. <Water retention structures>
10. . . . Weirs
11. . . . Frame weirs
12. . . . Suspended frame weirs
12. . . . Rolling up curtain weirs

D 09. Training works
10. . . . Levees
10. . . . Dykes
10. . . . Ground sills

H 08 Canal works
09. * Canals for conveying water and navigation canals
09. taken together
09. * For Flood control canals, See U/91+
09. **Civil engng/Water control structures/ Flood control
09. structures/ above
[3-Construction technology  UO]
[4-Civil engineering  UQ]
[5-(By material)  UPQJ]
[6-(By mobility)  URRO]
[7-Water control structures  URSJ]
[8-Canal works  URWH]

09.  * For Irrigation canals, See GW ??
09.  * For Navigation canals, See U/945,82.

URW L
08.  Lake control works
08.  Coast protection works, Sea defence works
09.  * For Port & harbour engineering, See
09.    U/945,85

URW N
09.  Sea walls, Bulwarks
09.  Breakwaters, Moles
10.  * Mound breakwaters, Rubble mound breakwaters
10.  Blockwork breakwaters
10.  Perforated breakwaters
10.  Slotted breakwaters
10.  Floating breakwaters

URX B
08.  Marine structures
09.  * On- & off-shore marine structures, taken
09.  together

O
070cean engineering structures
08.  Undersea technology
09.  Submarine environment, Undersea environment
09.  Undersea communication
10.  * For Hydroacoustics, See U/88,56
09.  Deep sea diving
10.  Bathyspheres

URX V
08.  Offshore structures
09.  * For offshore drilling rigs, See V/66,60...
[0-5] Modelling
[1-Technology U]
[2-(Particular technologies) 0]
[3-Fluid engineering UN]
[4-)Materials( UNF]

** FES

04. (Parts of systems)
05. Hydraulic machinery
06. Pneumatic machinery
06. ** I assume the reversal of the usual filing order (Gases ... Liquids) is in order to collocate gases with Vacuum technology?

03Vacuum technology

03Vibration & acoustic technology
04. Transmission(
05. . . . Attenuation... Absorption...
06. . . ** Useful to follow the order in BE for these?

03Ventilation & air conditioning (general)
04. ** This class & UNIX appear as 2 separate files from yr original disk. Neither have any subclasses &
04. I'm not sure they belong in this position at all. UNIX shd go at the end of thermal eng? Ditto UNIX?

03Lighting engineering (general)

03Construction technology
04. Construction planning... Project management...
04. )Environmental aspects(
04. )Equipment(
04. )Testing(... Design...
04. )Production( * For Inspection, see Production UOB
06. . . Starting... Extending... Surveying...
06. . . Inspecting...

03Materials( * See UOS

04. Structural engineering ** FES

04. Materials
04. (Properties of structures)
04. (Parts)

04. (Kinds of structures)

05. Civil engineering
06. . ** I've indented here since civil engineering seems to be a branch of construction technology defined by a particular range of structures. The same goes for building construction? See note re hierarchy at UV.
06. . . * As UO/UQ with notation amended to accommodate UP/UQ.

06. Water control structures

05. Building construction

06. (Special operations) Architectural practice
06. )Building planning... Project management(Testing(
06. . . Inspection
08. . . . . ** You file this after Design - shd be before?

08. . . . . )Design(

06. . . . UTA P ** FES

06. . . . )Design(

06. . . . (Properties of buildings) ** FES

06. . . . (Types of buildings)

05. . . . Landscape architecture

06. . . . ** Shd this be subordinated to Construction

06. . . . technology in general &/or structures in

06. . . . particular? It's crucial that we decide all

06. . . . problems of hierarchy before we finalize

06. . . . notation & begin finalizing schedule layout

06. . . . & indent codes. I wasted many hours through

06. . . . not doing this in AY/B.

06. . . . )Landscape planning... Project management(

06. . . . )Design(

07. . . . Composition

06. . . . (Elements, parts) ** FES

06. . . . Physical planning

06. . . . (Preliminary operations)

07. . . . Planning procedures... Planning control...

06. . . . )Unwanted effects(

07. . . . Planning blight

08. . . . . . . . . . . . . . . . . . . * For Unplanned development, see UWH

06. . . . UWH

06. . . . Land use ** FES

07. . . . Unplanned development

07. . . . (By affluence)

07. . . . Deprived areas

07. . . . (By ownership)

07. . . . UXB

03. . . Environmental technology

04. . . UXC ** FES

04. . . Pollution control

05. . . . UXC 3C (Preliminary operations)

06. . . Separation of pollutants... Waste disposal...

07. . . . . . . . . . . . . . . . ** Or shd these be FES?

05. . . . 76 Measurement(

04. . . . UY

04. . . Safety engineering

03. . . VA 3Transport technology

04. . . ** Note that I've not used V2/V9, although by the

04. . . principles of ordinal notation they shd be

04. . . perfectly acceptable. Is this a question of not

04. . . being strong minded or a concession to the

04. . . puzzlement non-indexers undoubtedly feel sometimes

04. . . over non-expressiveness? I'm pretty sure I know

04. . . what CAMBUG wd say.

04. . . (Special processes & operations)

05. . . VA3 T ** FES

05. . . . . Traffic engineering...

06. . . . . ** Or shd be FES?

04. . . VAB

04. . . )Production technology(

04. . . VAG O)

04. . . )Construction technology(

04. . . VAH

04. . . Vehicles ** FES

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05. (Special operations)
  06. Course navigation...
  05. )Instruments(
        06. * See also VAH_J
        06. ** or See VAH_J? Good example of clash of
        06. general/special provision?

9 05. Computer technology(
  05. ** shd follow whatever treatment we decide for
      05. instruments?

A 05. )Testing(
B 05. )Production technology(
F 05. )Materials(
H 05. (Properties of vehicles)
  05. ** reserved here for amplification under
  05. aircraft, etc.

J 05. (Parts)
VAM 04. (Transport structures)
  05. Bridges...
VAM 04. (Transport systems)
VAR 05. (By transport medium)
  05. * Add to the c-m for each medium nos. &
  06. letters 2/U following VA; eg Road freight
  06. transport VBQ.

VAY 06. Land transport
VB 07. Road transport
VC 07. Railway transport
VD 06. Water transport
VE 07. Sea transport
VF 06. Air transport, aviation, aeronautics
VG 07. Space transport systems, astronautics

03Military science & technology
04. ** As a technology this is virtually sui generis.
    04. Since its central function is the hurling of
    04. various forms of energy or matter in order to
    04. coerce others & is also centrally concerned with
    04. transport in the more usual sense, this seems
    04. to be as good a location for it as any. I don’t
    04. think it warrants the expenditure of notation
    04. on an alternative.

03Mining technology
VI3 F 04. )Environmental aspects(
VI4 G 04. )Mining geophysics(
U 04. )Equipment(
VIH 04. Mines ** FES
VL 03Process industrial technology
VLH 04. Chemical technology ** FES
VLI 05. Chemical engineering
VLI B 06. )Production technology(
  07. * For Unit operations, see VLI_H
F 06. )Materials(
0-5 Modelling
[1-Technology U]
. . . [3-Process industrial technology V]L
. . . [4-Chemical technology ** FES VLH]
. . . [5-Chemical engineering VLI]
. . . [6-)Materials( VLIF]

07. . . . . . . . . . * See VLI_M
VLH 06. . . . . . Unit operations ** FES
VLK 06. . . . . . Chemical engineering processes
VLL 06. . . . . . Applied physical chemistry
07. . . . . . . . . * Add letters following CB? Is yr
07. . . . . . . . . enumeration of dispersions just one
07. . . . . . . . . example of many classes likely to
07. . . . . . . . . come here?
VLN 05. . . . . (Chemical products)
06. . . . . . . . . . "You subordinate this to chemical
06. . . . . . . . . . engineering?
VM 06. . . . . . . Petroleum technology
06. . . . . . . . . . Polymers
06. . . . . . . . . . Plastics
VPB 05. . . . . (By function)
θ 05. . . . . (With a variety of end-purposes)
VQ 06. . . . . . Metals
VR 05. . . . . . Other materials as products
VS 04. . . . . . . Other manufactured products
04. . . . . * Add numbers & letters from the whole
04. . . . . . . . . . classification?

VTB 01 Useful arts & personal services
VTC 02 Household management & services
VUB 03 Domestic & individual
VV 03 Social & corporate... Restaurants... Hotels...
WV 01 Recreation arts
02. * For works covering recreative & imaginative arts
02. . together.
WVC 01 Recreation arts
01 The Arts

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