

## G11 INFORMATION STORAGE

**G11B INFORMATION STORAGE BASED ON RELATIVE MOVEMENT BETWEEN RECORD CARRIER AND TRANSDUCER** (recording measured values in a way that does not require playback through a transducer G01D 9/00; recording or playback apparatus using mechanically marked tape, e.g. punched paper tape, or using unit records, e.g. punched or magnetically marked cards G06K; transferring data from one type of record carrier to another G06K 1/18; circuits for coupling output of reproducer to radio receiver H04B 1/20; gramophone pick-ups or like acoustic electromechanical transducers or circuits therefor H04R)

### Notes

- (1) This subclass covers:
  - recording or playback of information by relative movement between a record track and a transducer, the transducer directly producing, or being directly actuated by, modulation in the track being recorded or played-back, and the extent of modulation corresponding to the signal being recorded or played-back;
  - apparatus and machines for recording or playback, and parts thereof, such as heads;
  - record carriers for use with such apparatus and machines;
  - associated working of other apparatus with such apparatus and machines.
- (2) In this subclass, the following terms or expressions are used with the meanings indicated:
  - “record carrier” means a body, such as a cylinder, disc, card, tape, or wire, capable of permanently holding information, which can be read-off by a sensing element movable relatively to the record carrier; [7]
  - “head” includes any means for converting sinusoidal or non-sinusoidal electric wave-forms into variations of the physical condition of at least the adjacent surface of the record carrier, or vice versa;
  - “near-field interaction” means a very short distance interaction using scanning-probe techniques, e.g. quasi- contact or evanescent contact between head and record carrier. [7]
- (3) Attention is drawn to the Notes following the titles of class B81 and subclass B81B relating to “micro-structural devices” and “micro-structural systems”. [7]

### Subclass Index

|  |  |                  |
|--|--|------------------|
| RECORDING OF ONE TYPE ASSOCIATED WITH REPRODUCING MEANS OF THE SAME TYPE                                       | APPARATUS CHARACTERISED BY THE SHAPE OF THE RECORD CARRIER | 25/00            |
| Of mechanical type   | DETAILS; GENERAL FEATURES                                  |                  |
| Of magnetical type   | Starting, stopping, driving                                | 15/00, 19/00     |
| Of optical type  | Guiding  | 17/00            |
| Of another type  | HEADS; RECORD CARRIERS                                     | 21/00; 23/00     |
| RECORDING OF ONE TYPE AND ASSOCIATED REPRODUCING MEANS OF DIFFERENT TYPE                                       | ASSOCIATED WORKING WITH OTHER APPARATUS                    | 31/00            |
| SIMULTANEOUS OR SELECTIVE RECORDING OF DIFFERENT TYPES; ASSOCIATED SIMULTANEOUS OR SELECTIVE REPRODUCING MEANS | EDITING, INDEXING, SYNCHRONISING, MONITORING               | 27/00            |
| SIGNAL PROCESSING NOT SPECIFIC TO THE METHOD OF RECORDING OR REPRODUCING                                       | MANUFACTURING  | 3/70, 5/84, 7/26 |
|  | OTHER CONSTRUCTIONAL PARTS, DETAILS OR ACCESSORIES         | 33/00            |

|              |   |             |  |
|--------------|---|-------------|--|
| <b>3/00</b>  | <b>Recording by mechanical cutting, deforming or pressing, e.g. of grooves or pits; Reproducing by mechanical sensing; Record carriers therefor</b> (G11B 11/00 takes precedence) | <b>3/10</b> | . . . Arranging, supporting, or driving of heads or of transducers relatively to record carriers                     |
| <b>3/02</b>  | . Arrangements of heads   | <b>3/12</b> | . . . . Supporting in balanced, counterbalanced, or loaded operative position, e.g. loading in direction of traverse |
| <b>3/04</b>  | . . Multiple, convertible, or alternative transducing arrangements  | <b>3/14</b> | . . . . by using effects of gravity or inertia, e.g. counterweight (G11B 3/28 takes precedence) [4]                  |
| <b>3/06</b>  | . . Determining or indicating position of head  | <b>3/16</b> | . . . . . adjustable   |
| <b>3/08</b>  | . . Raising, lowering, traversing otherwise than for transducing, arresting, or holding-up heads against record carriers  | <b>3/18</b> | . . . . . Damping by using viscosity effect  |
| <b>3/085</b> | . . . using automatic means (G11B 3/095 takes precedence) [4]   | <b>3/20</b> | . . . . . by elastic means, e.g. spring (G11B 3/28 takes precedence) [4]   |
| <b>3/09</b>  | . . . using manual means only (G11B 3/095 takes precedence) [4]   | <b>3/22</b> | . . . . . adjustable   |
| <b>3/095</b> | . . . for repeating a part of the record; for beginning or stopping at a desired point of the record [4]  | <b>3/24</b> | . . . . . acting to decrease pressure on record  |
|              |   | <b>3/26</b> | . . . . . acting to increase pressure on record  |
|              |   | <b>3/28</b> | . . . . . providing transverse bias parallel to record   |

- 3/30 . . . Supporting in inoperative position
- 3/31 . . . . Construction of arms [4]
- 3/32 . . . . Construction or arrangement of support pillars
- 3/34 . . . Driving or guiding during transducing operation
- 3/36 . . . . Automatic-feed mechanisms producing progressive transducing traverse across record carriers otherwise than by grooves, e.g. by lead-screw
- 3/38 . . . . Guiding, e.g. constructions or arrangements providing linear or other special tracking characteristics
- 3/40 . . . . Driving of heads relatively to stationary record carriers for transducing
- 3/42 . . . with provision for adaptation or interchange of heads
- 3/44 . Styli, e.g. sapphire, diamond
- 3/46 . . Constructions or forms, e.g. attachment of point to shank
- 3/48 . . . Needles
- 3/50 . . Anvils or other supports opposing stylus forces
- 3/52 . . Arrangements permitting styli to yield under excessive pressure
- 3/54 . . Storing; Manipulating, e.g. feeding styli to and from heads
- 3/56 . . Sharpening (by grinding B24B 19/16)
- 3/58 . . Cleaning record carriers or styli, e.g. removing shavings or dust
- 3/60 . Turntables for record carriers
- 3/61 . . Damping of vibrations of record carriers on turntables [4]
- 3/64 . Re-recording, i.e. transcribing information from one grooved record carrier on to one or more similar or dissimilar record carriers
- 3/66 . Erasing information, e.g. for reuse of record carrier
- 3/68 . Record carriers
- 3/70 . . characterised by the selection of material or structure; Processes or apparatus specially adapted for manufacturing record carriers [4]
- 3/72 . . Groove formations, e.g. run-in groove, run-out groove
- 3/74 . . . Multiple output tracks, e.g. binaural stereophonic
- 3/76 . . . forming part of cinematograph films
- 3/78 . . Multiple-track arrangements
- 3/80 . . incorporating subsidiary guide means for heads, other than modulated grooves; Part-formed unmodulated grooves for conversion into transducing grooves
- 3/90 . . with means indicating prior or unauthorised use
- 5/00 Recording by magnetisation or demagnetisation of a record carrier; Reproducing by magnetic means; Record carriers therefor (G11B 11/00 takes precedence) [4]**

**Note**

Groups G11B 5/02 to G11B 5/86 take precedence over groups G11B 5/004 to G11B 5/012. [2]

- 5/004 . Recording on, or reproducing or erasing from, magnetic drums (G11B 19/00 takes precedence) [2]
- 5/008 . Recording on, or reproducing or erasing from, magnetic tapes or wires (G11B 15/00 takes precedence) [2]
- 5/012 . Recording on, or reproducing or erasing from, magnetic discs (G11B 17/00, G11B 19/00 take precedence) [2]
- 5/016 . . using magnetic foils [2]
- 5/02 . Recording, reproducing or erasing methods; Read, write or erase circuits therefor [2]
- 5/024 . . Erasing [4]
- 5/027 . . Analogue recording [2]
- 5/03 . . . Biasing [4]
- 5/035 . . . Equalising [4]
- 5/09 . . Digital recording [2]
- 5/10 . Structure or manufacture of housings or shields for heads [4]
- 5/105 . . Mounting of head within housing [2]
- 5/11 . . Shielding of head against electric or magnetic fields [2]
- 5/115 . . . Shielding device arranged between heads or windings (G11B 5/29 takes precedence) [2]
- 5/127 . Structure or manufacture of heads, e.g. inductive [4]
- 5/133 . . with cores composed of particles, e.g. with dust cores, with ferrite cores [4]
- 5/147 . . with cores being composed of metal sheets, i.e. laminated cores [4]
- 5/153 . . . with tape-wound cores [4]
- 5/17 . . Construction or disposition of windings [4]
- 5/187 . . Structure or manufacture of the surface of the head in physical contact with, or immediately adjacent to, the recording medium; Pole pieces; Gap features (G11B 5/265, G11B 5/31 take precedence) [4]
- 5/193 . . . the pole pieces being ferrite [4]
- 5/21 . . . the pole pieces being of ferrous sheet metal [4]
- 5/23 . . . Gap features [4]
- 5/235 . . . . Selection of material for gap filler [4]
- 5/245 . . . comprising means for controlling the reluctance of the magnetic circuit (G11B 5/255 takes precedence) [4]
- 5/255 . . . comprising means for protection against wear [4]
- 5/265 . . Structure or manufacture of a head with more than one gap for erasing, recording or reproducing on the same track (G11B 5/33 takes precedence) [4]
- 5/29 . . Structure or manufacture of unitary devices formed of plural heads for more than one track [4]
- 5/31 . . using thin film (G11B 5/33 takes precedence) [4]
- 5/325 . . Erasing heads using permanent magnets (general details therefor G11B 5/133 to G11B 5/255) [4]
- 5/33 . . Structure or manufacture of flux-sensitive heads (general details therefor G11B 5/133 to G11B 5/255) [4]
- 5/335 . . . with saturated jig, e.g. for detecting second harmonic, balanced-flux head [4]
- 5/35 . . . having vibrating elements [4]
- 5/37 . . . using galvano-magnetic devices, e.g. Hall-effect devices (G11B 5/39 takes precedence) [4]
- 5/39 . . . using magneto-resistive devices [4]
- 5/40 . Protective measures on heads, e.g. against excessive temperature (G11B 5/31 takes precedence; protection against wear G11B 5/255) [4]
- 5/41 . Cleaning of heads [2]
- 5/455 . Arrangements for functional testing of heads; Measuring arrangements for heads [4]
- 5/465 . Arrangements for demagnetisation of heads [4]
- 5/48 . Disposition or mounting of heads relative to record carriers

- 5/49 . . . Fixed mountings [2]
  - 5/50 . . . Interchangeable mountings, e.g. for replacement of head without readjustment
  - 5/52 . . . with simultaneous movement of head and record carrier, e.g. rotation of head (G11B 5/588 takes precedence) [4]
  - 5/53 . . . Disposition or mounting of heads on rotating support [4]
  - 5/54 . . . with provision for moving the head into, or out of, its operative position or across tracks [2]
  - 5/55 . . . Track change, selection, or acquisition by displacement of the head [2]
  - 5/56 . . . with provision for moving the head for the purpose of adjusting the position of the head relative to the record carrier, e.g. manual adjustment for azimuth correction or track centering (G11B 5/54, G11B 5/58 take precedence) [2]
  - 5/58 . . . with provision for moving the head for the purpose of maintaining alignment of the head relative to the record carrier during transducing operation, e.g. to compensate for surface irregularities of the latter or for track following [2]
  - 5/584 . . . for track following on tapes [4]
  - 5/588 . . . . by controlling the position of the rotating heads (by controlling the speed of the record carrier G11B 15/467; by controlling the speed of the rotating heads G11B 15/473) [4]
  - 5/592 . . . . . using bimorph elements supporting the heads [4]
  - 5/596 . . . for track following on discs [4]
  - 5/60 . . . Fluid-dynamic spacing of heads from record carriers
  - 5/62 . . . Record carriers characterised by the selection of the material
- Note**
- This group does not cover compositions, materials or processes, per se, which are covered by the relevant subclasses of section B or C. [4]
- 5/627 . . . of leaders for magnetic tapes, e.g. non-magnetic strips on the tapes or for connection [4]
  - 5/633 . . . of cinematographic films or slides with integral magnetic track [4]
  - 5/64 . . . comprising only the magnetic material without bonding agent
  - 5/65 . . . characterised by its composition (G11B 5/66 takes precedence) [7]
  - 5/66 . . . the record carriers consisting of several layers
  - 5/667 . . . . including a soft magnetic layer [7]
  - 5/673 . . . . comprising the repeated occurrence of two or more layers [7]
  - 5/68 . . . comprising one or more layers of magnetisable particles homogeneously mixed with a bonding agent
  - 5/70 . . . . on a base layer [1,7]
  - 5/702 . . . . characterised by the bonding agent [4]
  - 5/706 . . . . characterised by the composition of the magnetic material [4]
  - 5/708 . . . . characterised by the addition of non-magnetic particles to the magnetic layer [4]
  - 5/71 . . . . characterised by the lubricant [4]
  - 5/712 . . . . characterised by the surface treatment or coating of magnetic particles [4]
  - 5/714 . . . . characterised by the dimension of the magnetic particles [4]
  - 5/716 . . . . characterised by two or more magnetic layers [4]
  - 5/718 . . . . . at least one on each side of the base layer [4]
  - 5/72 . . . Protective coatings, e.g. anti-static
  - 5/725 . . . . containing a lubricant [7]
  - 5/73 . . . Base layers [7]
  - 5/733 . . . characterised by the addition of non-magnetic particles [7]
  - 5/735 . . . characterised by the back layer [7]
  - 5/738 . . . characterised by the intermediate layer [7]
  - 5/74 . . . Record carriers characterised by the form, e.g. sheet shaped to wrap around a drum
  - 5/76 . . . Drum carriers
  - 5/78 . . . Tape carriers
  - 5/80 . . . Card carriers
  - 5/82 . . . Disc carriers
  - 5/84 . . . Processes or apparatus specially adapted for manufacturing record carriers
  - 5/842 . . . Coating a support with a liquid magnetic dispersion [4]
  - 5/845 . . . . in a magnetic field [4]
  - 5/848 . . . Coating a support with a magnetic layer by extrusion [4]
  - 5/85 . . . Coating a support with a magnetic layer by vapour deposition [4]
  - 5/851 . . . Coating a support with a magnetic layer by sputtering [7]
  - 5/852 . . . Orientation in a magnetic field (G11B 5/845 takes precedence) [4]
  - 5/855 . . . Coating only part of a support with a magnetic layer [4]
  - 5/858 . . . Producing a magnetic layer by electro-plating or electroless plating [4]
  - 5/86 . . . Re-recording, i.e. transcribing information from one magnetisable record carrier on to one or more similar or dissimilar record carriers
  - 7/00 Recording or reproducing by optical means, e.g. recording using a thermal beam of optical radiation, reproducing using an optical beam at lower power; Record carriers therefor** (G11B 11/00, G11B 13/00 take precedence) [4,7]
  - 7/002 . . . Recording, reproducing or erasing systems characterised by the shape of the carrier [7]
  - 7/0025 . . . with cylinders or cylinder-like carriers, e.g. truncated cones [7]
  - 7/003 . . . with webs, e.g. belts, spooled tapes or films of quasi-infinite extent [7]
  - 7/0033 . . . with cards [7]
  - 7/0037 . . . with discs [7]
  - 7/004 . . . Recording, reproducing or erasing methods; Read, write or erase circuits therefor [7]
  - 7/0045 . . . Recording (G11B 7/006, G11B 7/0065 take precedence) [7]
  - 7/005 . . . Reproducing (G11B 7/0065 takes precedence) [7]
  - 7/0055 . . . Erasing (G11B 7/006, G11B 7/0065 take precedence) [7]
  - 7/006 . . . Overwriting (G11B 7/0065 takes precedence) [7]
  - 7/0065 . . . Recording, reproducing or erasing by using optical interference patterns, e.g. holograms [7]
  - 7/007 . . . Arrangement of the information on the record carrier, e.g. form of tracks [4]

- 7/013 . . . for discrete information, i.e. where each information unit is stored in a distinct location [4]
- 7/08 . Disposition or mounting of heads or light sources relatively to record carriers
- 7/085 . . . with provision for moving the light beam into, or out of, its operative position (modulating by information signals G11B 7/12) [4]
- 7/09 . . . with provision for moving the light beam or focus plane for the purpose of maintaining alignment of the light beam relative to the record carrier during transducing operation, e.g. to compensate for surface irregularities of the latter or for track following [4]
- 7/095 . . . specially adapted for discs, e.g. for compensation of eccentricity or wobble [4]
- 7/10 . . Interchangeable mountings, e.g. for replacement of head without readjustment
- 7/12 . Heads
- 7/125 . . Optical beam sources therefor; Modulators, e.g. means for controlling the size or intensity of the optical spot or of the optical trace [4]
- 7/13 . . Optical detectors therefor [4]
- 7/135 . . Means for guiding the beam from source to record carrier or from record carrier to detector [4]
- 7/14 . . adapted to record on, or to reproduce from, more than one track simultaneously (G11B 7/20 takes precedence)
- 7/16 . . using filters, e.g. colour filter
- 7/18 . . using optical slits
- 7/20 . . Dual-recording arrangements, i.e. in which the information is recorded in two different forms simultaneously on the same or related tracks, e.g. recording instantaneous and mean values (sound-recording combined with cinematography G03C 5/14)
- 7/22 . . Apparatus or processes specially adapted for the manufacture of heads, e.g. assembly
- 7/24 . Record carriers characterised by the selection of the material or by the structure or form (characterised by the arrangement of information on the carrier G11B 7/007) [4]
- 7/241 . . characterised by the selection of the material [8]
- 7/242 . . . of recording layers [8]
- 7/243 . . . comprising inorganic material only, e.g. ablative layers [8]
- 7/244 . . . comprising organic material only [8]
- 7/245 . . . containing a polymeric component [8]
- 7/246 . . . containing dyes [8]
- 7/247 . . . Methine or polymethine dyes [8]
- 7/248 . . . Porphines; Azaporphines, e.g. phthalocyanines [8]
- 7/249 . . . containing organo-metallic compounds (G11B 7/246 takes precedence) [8]
- 7/25 . . . containing liquid crystals [8]
- 7/251 . . . comprising inorganic material dispersed in an organic matrix [8]
- 7/252 . . . of layers other than recording layers [8]

#### Note

In group G11B 7/252, multi-aspect classification is applied, so that if subject matter is characterised by aspects covered by more than one of its subgroups, the subject matter should be classified in each of those subgroups. [8]

- 7/253 . . . . Base layers [8]

- 7/254 . . . . Protective topcoat layers [8]
- 7/256 . . . . Layers improving adhesion between layers [8]
- 7/257 . . . . Layers having properties involved in recording or reproduction, e.g. optical interference layers or sensitising layers [8]
- 7/258 . . . . Reflective layers [8]
- 7/26 . . Apparatus or processes specially adapted for the manufacture of record carriers
- 7/28 . Re-recording, i.e. transcribing information from one optical record carrier on to one or more similar or dissimilar record carriers using optical sensing means
- 7/30 . Rewritable carriers (G11B 7/24 takes precedence) [7]
- 9/00 Recording or reproducing using a method or means not covered by one of the main groups G11B 3/00 to G11B 7/00; Record carriers therefor** (G11B 11/00 takes precedence) [4]

#### Note

Group G11B 9/12 takes precedence over groups G11B 9/02 to G11B 9/10 [7]

- 9/02 . . using ferroelectric record carriers; Record carriers therefor
- 9/04 . . using record carriers having variable electric resistance; Record carriers therefor
- 9/06 . . using record carriers having variable electrical capacitance; Record carriers therefor (G11B 9/02 takes precedence)
- 9/07 . . Heads for reproducing capacitive information [4]
- 9/08 . . using electrostatic charge injection; Record carriers therefor
- 9/10 . . using electron beam; Record carriers therefor (G11B 9/08 takes precedence) [4]
- 9/12 . . using near-field interactions; Record carriers therefor [7]
- 9/14 . . using microscopic probe means [7]

- 11/00 Recording on, or reproducing from, the same record carrier wherein for these two operations the methods or means are covered by different main groups of groups G11B 3/00 to G11B 7/00 or by different subgroups of group G11B 9/00; Record carriers therefor**

#### Note

Group G11B 11/24 takes precedence over groups G11B 11/03 to G11B 11/16. [7]

- 11/03 . . using recording by deforming with non-mechanical means, e.g. laser, beam of particles [4]
- 11/05 . . with reproducing by capacitive means [4]
- 11/06 . . with reproducing by mechanical sensing [4]
- 11/08 . . using recording by electric charge or by variation of electric resistance or capacitance
- 11/10 . . using recording by magnetisation or demagnetisation [4]
- 11/105 . . using a beam of light or a magnetic field for recording and a beam of light for reproducing, e.g. light-induced thermo-magnetic recording, Kerr effect reproducing [7]
- 11/11 . . using a beam other than a beam of light for recording [7]
- 11/115 . . using a beam other than a beam of light for reproducing [7]

- 11/12 . . . using recording by optical means (G11B 11/03 takes precedence) [4]
- 11/14 . . . with reproducing by magnetic means
- 11/16 . . . using recording by mechanical cutting, deforming or pressing
- 11/18 . . . with reproducing by optical means
- 11/20 . . . with reproducing by magnetic means
- 11/22 . . . with reproducing by capacitive means [4]
- 11/24 . . . using recording by near-field interactions [7]
- 11/26 . . . using microscopic probe means [7]
- 13/00 Recording simultaneously or selectively by methods or means covered by different main groups; Record carriers therefor; Reproducing simultaneously or selectively therefrom [1,7]**
- Notes**
- (1) This group covers arrangements in which there are at least two recordings of information involving two different methods or means or two different physical properties, at the same or different locations, on the same record carrier, the recordings being made or reproduced simultaneously or selectively. [7]
- (2) Where such combinations of means are used for changing only one main property, classification is only made in one of the relevant main groups G11B 3/00, G11B 5/00, G11B 7/00, G11B 9/00 or G11B 11/00. [7]
- 13/02 . . . magnetically and by styli (G11B 13/08 takes precedence) [1,7]
- 13/04 . . . magnetically and optically (G11B 13/08 takes precedence) [1,7]
- 13/06 . . . optically and by styli (G11B 13/08 takes precedence) [1,7]
- 13/08 . . . using near-field interactions or transducing means and at least one other method or means for recording or reproducing [7]
- 15/00 Driving, starting or stopping record carriers of filamentary or web form; Driving both such record carriers and heads; Guiding such record carriers or containers therefor; Control thereof; Control of operating function (driving or guiding heads G11B 3/00 to G11B 7/00, G11B 21/00) [2]**
- 15/02 . . . Control of operating function, e.g. switching from recording to reproducing
- 15/03 . . . by using counters [4]
- 15/04 . . . Preventing, inhibiting, or warning against accidental erasing or double recording (G11B 15/05 takes precedence) [4]
- 15/05 . . . by sensing features present on, or derived from, record carrier or container (G11B 15/16 takes precedence) [4]
- 15/06 . . . by sensing auxiliary features on record carriers or containers, e.g. to stop machine near the end of a tape
- 15/07 . . . on containers [4]
- 15/08 . . . by photoelectric sensing (G11B 15/07 takes precedence) [4]
- 15/087 . . . by sensing recorded signals [4]
- 15/093 . . . by sensing driving condition of record carrier, e.g. travel, tape tension [4]
- 15/10 . . . Manually-operated control; Solenoid-operated control
- 15/12 . . . Masking of heads; Selecting or switching of heads between operative and inoperative functions; Masking of beams, e.g. of light beams
- 15/14 . . . Masking or switching periodically, e.g. of rotating heads
- 15/16 . . . by sensing presence, absence or position of record carrier or container
- 15/17 . . . of container [4]
- 15/18 . . . Driving; Starting; Stopping; Arrangements for control or regulation thereof
- 15/20 . . . Moving record carrier backwards or forwards by finite amounts, i.e. back-spacing, forward-spacing
- 15/22 . . . Stopping means (slowing-down preparatory to stopping by means which are different from the stopping means G11B 15/48; slowing-down preparatory to stopping by a mechanical linkage which is different from the stopping means G11B 15/50)
- 15/24 . . . Drive-disengaging means
- 15/26 . . . Driving record carriers by members acting directly or indirectly thereon
- 15/28 . . . through rollers driving by frictional contact with the record carrier, e.g. capstan; Multiple arrangements of capstans or drums coupled to means for controlling the speed of the drive; Multiple capstan systems alternately engageable with record carrier to provide reversal
- 15/29 . . . through pinch-rollers (G11B 15/295 takes precedence) [4]
- 15/295 . . . with single capstan or drum simultaneously driving the record carrier at two separate points of an isolated part thereof, e.g. the capstan acting directly on the tape rollers [4]
- 15/30 . . . through the means for supporting the record carrier, e.g. mandrel, turntable
- 15/32 . . . through the reels or cores on to which the record carrier is wound
- 15/34 . . . through non-slip drive means, e.g. sprocket
- 15/38 . . . Driving record carriers by pneumatic means
- 15/40 . . . Driving record carriers otherwise than by electric motor
- 15/42 . . . manually
- 15/43 . . . Control or regulation of mechanical tension of record carrier, e.g. tape tension
- 15/44 . . . Speed-changing arrangements; Reversing arrangements; Drive-transfer means therefor
- 15/46 . . . Controlling, regulating, or indicating speed
- 15/467 . . . in arrangements for recording or reproducing wherein both record carriers and heads are driven [4]
- 15/473 . . . by controlling the speed of the heads [4]
- 15/48 . . . Starting; Accelerating; Decelerating; Arrangements preventing malfunction during drive change
- 15/50 . . . by mechanical linkage, e.g. clutch
- 15/52 . . . by using signals recorded on, or derived from, record carrier
- 15/54 . . . by stroboscope; by tachometer
- 15/56 . . . the record carrier having reserve loop, e.g. to minimise inertia during acceleration
- 15/58 . . . with vacuum column
- 15/60 . . . Guiding record carriers (guiding devices structurally associated with magazines or cassettes G11B 23/04) [4]
- 15/61 . . . on drum, e.g. on drum containing rotating heads [4]
- 15/62 . . . Maintaining desired spacing between record carrier and head
- 15/64 . . . by fluid-dynamic spacing

- 15/66 . . . Threading; Loading; Automatic self-loading
- 15/665 . . . by extracting loop of record carrier from container [4]
- 15/67 . . . by extracting end of record carrier from container or spool [4]
- 15/675 . Guiding containers [4]
- 15/68 . . Automatic cassette-changing arrangements [2]
- 15/70 . the record carrier being an endless-loop record-carrier [2]
- 17/00 Guiding record carriers not specifically of filamentary or web form, or of supports therefor (guiding cards or sheets G06K 13/00)**
- 17/02 . Details
- 17/022 . . Positioning or locking of single discs [4]
- 17/025 . . . of discs which are stationary during transducing operation [4]
- 17/028 . . . of discs rotating during transducing operation [4]
- 17/03 . . . . in containers or trays [4]
- 17/032 . . . . Positioning by moving the door or the cover [4]
- 17/035 . . . . Positioning by moving the loading station [4]
- 17/038 . . Centering or locking of a plurality of discs in a single cartridge [4]
- 17/04 . . Feeding or guiding single record carrier to or from transducing unit
- 17/041 . . . specially adapted for discs contained within cartridges [8]
- 17/043 . . . . Direct insertion, i.e. without external loading means [8]
- 17/044 . . . . Indirect insertion, i.e. with external loading means [8]
- 17/046 . . . . . with pivoting loading means [8]
- 17/047 . . . . . with sliding loading means [8]
- 17/049 . . . . Insertion of discs having to be extracted from the cartridge prior to recording or reproducing [8]
- 17/05 . . . specially adapted for discs not contained within cartridges [8]
- 17/051 . . . . Direct insertion, i.e. without external loading means [8]
- 17/053 . . . . Indirect insertion, i.e. with external loading means [8]
- 17/054 . . . . . with pivoting loading means [8]
- 17/056 . . . . . with sliding loading means [8]
- 17/057 . . . specially adapted for handling both discs contained within cartridges and discs not contained within cartridges [8]
- 17/08 . from consecutive-access magazine of disc records
- 17/10 . . with horizontal transfer to the turntable from a stack arranged with a vertical axis
- 17/12 . . with axial transfer to the turntable from a stack with a vertical axis
- 17/14 . . . by mechanism in rotating centre post, e.g. permitting the playing of both sides of a record
- 17/16 . . . by mechanism in stationary centre post, e.g. with stepped post, using fingers on post
- 17/18 . . . by mechanism operating on the edge of the disc record
- 17/20 . . with transfer away from stack on turntable after playing
- 17/22 . from random-access magazine of disc records

**Note**

Group G11B 17/30 takes precedence over groups G11B 17/24 to G11B 17/28.

- 17/24 . . the magazine having a toroidal or part-toroidal shape
- 17/26 . . the magazine having a cylindrical shape with vertical axis
- 17/28 . . the magazine having a cylindrical shape with horizontal axis
- 17/30 . . wherein the playing unit is moved accordingly to the location of the selected record
- 17/32 . Maintaining desired spacing between record carrier and head, e.g. by fluid-dynamic spacing [2]
- 17/34 . Guiding record carriers during transducing operation, e.g. for track following (G11B 17/32 takes precedence) [4]
- 19/00 Driving, starting, stopping record carriers not specifically of filamentary or web form, or of supports therefor; Control thereof; Control of operating function**
- 19/02 . Control of operating function, e.g. switching from recording to reproducing [4]
- 19/04 . . Arrangements for preventing, inhibiting, or warning against, double recording on the same blank, or against other recording or reproducing malfunctions
- 19/06 . . by counting or timing of machine operations
- 19/08 . . by using devices external to the driving mechanisms, e.g. coin-freed switch (coin actuated mechanisms G07F 5/00) [4]
- 19/10 . . by sensing presence or absence of record in accessible stored position or on turntable
- 19/12 . . by sensing distinguishing features of records, e.g. diameter
- 19/14 . . by sensing movement or position of head, e.g. means moving in correspondence with head movements
- 19/16 . . Manual control
- 19/18 . . . Manual action on one element producing control effect indirectly by consequent action of driving mechanism
- 19/20 . Driving; Starting; Stopping; Control thereof [4]
- 19/22 . . Brakes other than speed-regulating brakes
- 19/24 . . Arrangements for providing constant relative speed between record carrier and head
- 19/247 . . . using electrical means [4]
- 19/253 . . . using mechanical means [4]
- 19/26 . . Speed-changing arrangements; Reversing arrangements; Drive-transfer means therefor [4]
- 19/265 . . . Friction wheel drive [4]
- 19/27 . . . Belt drive [4]
- 19/275 . . . Gear wheel drive [4]
- 19/28 . . Speed controlling, regulating or indicating (G11B 19/24 takes precedence)
- 20/00 Signal processing not specific to the method of recording or reproducing; Circuits therefor [4]**
- 20/02 . Analogue recording or reproducing [4]
- 20/04 . . Direct recording or reproducing [4]
- 20/06 . . Angle-modulation recording or reproducing [4]
- 20/08 . . Pulse-modulation recording or reproducing (pulse-code-modulation recording G11B 20/10) [4]
- 20/10 . Digital recording or reproducing [4]

- 20/12 . . Formatting, e.g. arrangement of data block or words on the record carriers [4]
- 20/14 . . using self-clocking codes [4]
- 20/16 . . using non self-clocking codes, i.e. the clock signals being either recorded in a separate clocking track or in a combination of several information tracks [4]
- 20/18 . . Error detection or correction; Testing [4]
- 20/20 . for correction of skew for multitrack recording [4]
- 20/22 . for reducing distortions [4]
- 20/24 . for reducing noise [4]

#### **21/00 Head arrangements not specific to the method of recording or reproducing**

- 21/02 . Driving or moving of heads
- 21/03 . . for correcting time base error [4]
- 21/04 . . Automatic feed mechanism producing a transducing traverse of the head in a direction which cuts across the direction of travel of the recording medium, e.g. helical scan
- 21/06 . . . the record carrier having means to ensure traverse movement of the head
- 21/08 . . Track changing or selecting (G11B 21/12 takes precedence)
- 21/10 . . Track finding or aligning by moving the head
- 21/12 . . Raising and lowering; Back-spacing or forward-spacing along track; Returning to starting position
- 21/14 . . . manually
- 21/16 . Supporting the heads; Supporting the sockets for plug-in heads
- 21/18 . . while the head is moving
- 21/20 . . while the head is in operative position but stationary or permitting minor movements to follow irregularities in surface of record carrier
- 21/21 . . . with provision for maintaining desired spacing of head from record carrier, e.g. fluid-dynamic spacing, slider [4]
- 21/22 . . while the head is out of operative position
- 21/24 . . Head support adjustments
- 21/26 . . Means for interchange or replacement of head or head element

#### **23/00 Record carriers not specific to the method of recording or reproducing; Accessories, e.g. containers, specially adapted for co-operation with the recording or reproducing apparatus [4]**

#### **Note**

In group G11B 23/00, recording or reproducing apparatus does not include the record carriers. [5]

- 23/02 . Containers; Storing means (cabinets, cases, stands, modified to store record carriers G11B 33/04) [4]
- 23/023 . . Containers for magazines or cassettes [4]
- 23/027 . . Containers for single reels or spools [4]
- 23/03 . . Containers for flat record carriers [4]
- 23/033 . . . for flexible discs [4]
- 23/037 . . Single reels or spools [4]
- 23/04 . . Magazines; Cassettes (G11B 23/12 takes precedence)
- 23/06 . . . for housing endless webs or filaments
- 23/07 . . . . using a single reel or core [4]
- 23/08 . . . for housing webs or filaments having two distinct ends
- 23/087 . . . . using two different reels or cores [4]
- 23/093 . . . . the reels or cores being coaxial [4]

- 23/107 . . . . using one reel or core, one end of the record carrier coming out of the magazine or cassette [4]
- 23/113 . . Apparatus or processes specially adapted for the manufacture of magazines or cassettes [4]
- 23/12 . . Bins for random storage of webs or filaments
- 23/14 . providing ability to repeat location, e.g. using sprocket holes
- 23/16 . Record carriers with single track for recording at spaced intervals along the track thereof, e.g. for speech or language training
- 23/18 . Record carriers with multiple tracks, e.g. with complementary and partial tracks such as paired "stereo" tracks
- 23/20 . with provision for splicing to provide permanent or temporary connections
- 23/22 . . of endless belts; of tapes forming Möbius loops
- 23/24 . . of tapes having multiple tracks parallel to edge of record carrier by offset splicing to form endless loop with one or more helical tracks
- 23/26 . . of leaders for loading or threading, e.g. to form a temporary connection
- 23/28 . indicating prior or unauthorised use
- 23/30 . with provision for auxiliary signals
- 23/32 . . Electrical or mechanical contacting means; Tape stop foils
- 23/34 . . Signal means additional to the main recording track, e.g. photoelectric sensing of sprocket holes for timing
- 23/36 . . Signals on record carriers or on containers and recorded by the same method as the main recording
- 23/38 . Visual features other than those contained in record tracks or represented by sprocket holes
- 23/40 . . Identifying or analogous means applied to, or incorporated in, the record carrier and not intended for visual display simultaneously with the playback of the record carrier, e.g. label, leader, photograph
- 23/42 . . Marks for indexing, speed-controlling, synchronising, or timing
- 23/44 . . Information for display simultaneously with playback of the record, e.g. photographic matter (associated working of cameras or projectors with sound-recording or -reproducing means G03B 31/00) [4]
- 23/50 . Reconditioning of record carriers; Cleaning of record carriers (G11B 3/58 takes precedence) [2]

#### **25/00 Apparatus characterised by the shape of record carrier employed but not specific to the method of recording or reproducing [4]**

- 25/02 . using cylindrical record carriers
- 25/04 . using flat record carriers, e.g. disc, card
- 25/06 . using web-form record carriers, e.g. tape
- 25/08 . using filamentary record carriers, e.g. wire
- 25/10 . Apparatus capable of using record carriers defined in more than one of the groups G11B 25/02 to G11B 25/08

#### **27/00 Editing; Indexing; Addressing; Timing or synchronising; Monitoring; Measuring tape travel [2,4]**

- 27/02 . Editing, e.g. varying the order of information signals recorded on, or reproduced from, record carriers [5]
- 27/022 . . Electronic editing of analogue information signals, e.g. audio or video signals [5]

|        |  |              |   |
|--------|--|--------------|---|
| 27/024 | . . . on tapes (G11B 27/028, G11B 27/029 take precedence) [5]  | 27/24        | . . . by sensing features on the record carrier other than the transducing track  |
| 27/026 | . . . on discs (G11B 27/028, G11B 27/029 take precedence) [5]  | 27/26        | . . . by photoelectric detection, e.g. of sprocket holes  |
| 27/028 | . . . with computer assistance [5]   | 27/28        | . . . by using information signals recorded by the same method as the main recording  |
| 27/029 | . . . Insert-editing [5]   | 27/30        | . . . on the same track as the main recording   |
| 27/031 | . . . Electronic editing of digitised analogue information signals, e.g. audio or video signals [5]  | 27/32        | . . . on separate auxiliary tracks of the same or an auxiliary record carrier   |
| 27/032 | . . . on tapes (G11B 27/036, G11B 27/038 take precedence) [5]  | 27/34        | . . . Indicating arrangements   |
| 27/034 | . . . on discs (G11B 27/036, G11B 27/038 take precedence) [5]  | 27/36        | . . . Monitoring, i.e. supervising the progress of recording or reproducing   |
| 27/036 | . . . Insert-editing [5]   | <b>31/00</b> | <b>Arrangements for the associated working of recording or reproducing apparatus with related apparatus</b> (with cameras or projectors G03B 31/00) [1,7] |
| 27/038 | . . . Cross-faders therefor [5]  | 31/02        | . . . with automatic musical instruments  |
| 27/04  | . . . using differential drive of record carrier and head  | <b>33/00</b> | <b>Constructional parts, details or accessories not provided for in the other groups of this subclass [4]</b>   |
| 27/06  | . . . Cutting and rejoining; Notching, or perforating record carriers otherwise than by recording styli (record carriers with provision for splicing G11B 23/20) | 33/02        | . . . Cabinets; Cases; Stands; Disposition of apparatus therein or thereon [4]  |
| 27/10  | . . . Indexing; Addressing; Timing or synchronising; Measuring tape travel [2]   | 33/04        | . . . modified to store record carriers [4]   |
| 27/11  | . . . by using information not detectable on the record carrier [4]  | 33/06        | . . . combined with other apparatus having a different main function [4]  |
| 27/13  | . . . the information being derived from movement of the record carrier, e.g. using tachometer [4]   | 33/08        | . . . Insulation or absorption of undesired vibrations or sounds [4]  |
| 27/15  | . . . using mechanical sensing means [4]   | 33/10        | . . . Indicating arrangements; Warning arrangements [4]   |
| 27/17  | . . . using electrical sensing means [4]   | 33/12        | . . . Disposition of constructional parts in the apparatus, e.g. of power supply, of modules [4]  |
| 27/19  | . . . by using information detectable on the record carrier [4]  | 33/14        | . . . Reducing influence of physical parameters, e.g. temperature change, moisture, dust [4]  |
| 27/22  | . . . Means responsive to presence or absence of recorded information signals  |              |   |

**G11C** **STATIC STORES** (information storage based on relative movement between record carrier and transducer G11B; semiconductor devices for storage H01L, e.g. H01L 27/108 to H01L 27/115; pulse technique in general H03K, e.g. electronic switches H03K 17/00)

#### Notes

- (1) This subclass covers devices or arrangements for storage of digital or analogue information:
  - (i) in which no relative movement takes place between an information storage element and a transducer;
  - (ii) which incorporate a selecting-device for writing-in or reading-out the information into or from the store.
- (2) This subclass does not cover elements not adapted for storage and not provided with such means as referred to in Note (3) below, which elements are classified in the appropriate subclass, e.g. of H01, H03K.
- (3) In this subclass, the following terms are used with the meaning indicated: [8]
  - “storage element” is an element which can hold at least one item of information and is provided with means for writing-in or reading-out this information; [8]
  - “memory” is a device, including storage elements, which can hold information to be extracted when desired. [8]

#### Subclass Index

|   |             |
|---|-------------|
| WRITING OR READING INFORMATION.....                 | 7/00        |
| ADDRESS SELECTING .....                             | 8/00        |
| DIGITAL STORES CHARACTERISED BY THE TYPE OF ELEMENT |             |
| Electric, magnetic types; details thereof.....      | 11/00; 5/00 |
| Mechanical types.....                               | 23/00       |
| Fluidic types .....                                 | 25/00       |
| Other types.....                                    | 13/00       |
| DIGITAL STORES CHARACTERISED BY BACK-UP MEANS ..... | 14/00       |

|  |                     |
|--|---------------------|
| ERASABLE PROGRAMMABLE READ-ONLY MEMORIES .....                         | 16/00               |
| DIGITAL STORES CHARACTERISED BY INFORMATION DISPLACEMENT               |                     |
| Shift; circulation .....   | 19/00; 21/00        |
| STORES CHARACTERISED BY FUNCTION                                       |                     |
| Associative; analogue; for reading-out only .....                      | 15/00; 27/00; 17/00 |
| CHECKING OF STORES .....   | 29/00               |
| SUBJECT MATTER NOT PROVIDED FOR IN OTHER GROUPS OF THIS SUBCLASS ..... | 99/00               |



|             |  |              |   |
|-------------|--|--------------|---|
| <b>5/00</b> | <b>Details of stores covered by group G11C 11/00</b>   |              |   |
| 5/02        | . Disposition of storage elements, e.g. in the form of a matrix array  | 8/08         | . Word line control circuits, e.g. drivers, boosters, pull-up circuits, pull-down circuits, precharging circuits, for word lines [7]  |
| 5/04        | . . Supports for storage elements; Mounting or fixing of storage elements on such supports   | 8/10         | . Decoders [7]  |
| 5/05        | . . . Supporting of cores in matrix [2]  | 8/12         | . Group selection circuits, e.g. for memory block selection, chip selection, array selection [7]  |
| 5/06        | . Arrangements for interconnecting storage elements electrically, e.g. by wiring   | 8/14         | . Word line organisation; Word line lay-out [7]   |
| 5/08        | . . for interconnecting magnetic elements, e.g. toroidal cores   | 8/16         | . Multiple access memory array, e.g. addressing one storage element via at least two independent addressing line groups [7]   |
| 5/10        | . . for interconnecting capacitors   | 8/18         | . Address timing or clocking circuits; Address control signal generation or management, e.g. for row address strobe (RAS) or column address strobe (CAS) signals [7]  |
| 5/12        | . Apparatus or processes for interconnecting storage elements, e.g. for threading magnetic cores   | 8/20         | . Address safety or protection circuits, i.e. arrangements for preventing unauthorized or accidental access [7]   |
| 5/14        | . Power supply arrangements (auxiliary circuits for stores using semiconductor devices G11C 11/4063, G11C 11/413, G11C 11/4193; in general G05F, H02J, H02M) [5,7]   |              |   |
| <b>7/00</b> | <b>Arrangements for writing information into, or reading information out from, a digital store</b><br>(G11C 5/00 takes precedence; auxiliary circuits for stores using semiconductor devices G11C 11/4063, G11C 11/413, G11C 11/4193) [2,5]  | <b>11/00</b> | <b>Digital stores characterised by the use of particular electric or magnetic storage elements; Storage elements therefor</b> (G11C 14/00 to G11C 21/00 take precedence) [5]  |
| 7/02        | . with means for avoiding parasitic signals  |              |   |
| 7/04        | . with means for avoiding disturbances due to temperature effects  | <b>Note</b>  | Group G11C 11/56 takes precedence over groups G11C 11/02 to G11C 11/54. [2]   |
| 7/06        | . Sense amplifiers; Associated circuits (amplifiers <i>per se</i> H03F, H03K) [1,7]  | 11/02        | . using magnetic elements   |
| 7/08        | . . Control thereof [7]  | 11/04        | . . using storage elements having cylindrical form, e.g. rod, wire (G11C 11/12, G11C 11/14 take precedence) [2]   |
| 7/10        | . Input/output (I/O) data interface arrangements, e.g. I/O data control circuits, I/O data buffers (level conversion circuits in general H03K 19/0175) [7]   | 11/06        | . . using single-aperture storage elements, e.g. ring core; using multi-aperture plates in which each individual aperture forms a storage element   |
| 7/12        | . Bit line control circuits, e.g. drivers, boosters, pull-up circuits, pull-down circuits, precharging circuits, equalising circuits, for bit lines [7]  | 11/061       | . . . using elements with single aperture or magnetic loop for storage, one element per bit, and for destructive read-out [2]   |
| 7/14        | . Dummy cell management; Sense reference voltage generators [7]  | 11/063       | . . . . bit-organized, such as, 2L/2D-, 3D-organization, i.e. for selection of an element by means of at least two coincident partial currents both for reading and for writing [2]   |
| 7/16        | . Storage of analogue signals in digital stores using an arrangement comprising analogue/digital (A/D) converters, digital memories and digital/analogue (D/A) converters [7]  | 11/065       | . . . . word-organized, such as 2D-organization, or linear selection, i.e. for selection of all the elements of a word by means of a single full current for reading [2]  |
| 7/18        | . Bit line organisation; Bit line lay-out [7]  | 11/067       | . . . using elements with single aperture or magnetic loop for storage, one element per bit, and for non-destructive read-out [2]   |
| 7/20        | . Memory cell initialisation circuits, e.g. when powering up or down, memory clear, latent image memory [7]  | 11/08        | . . using multi-aperture storage elements, e.g. using transfluxors; using plates incorporating several individual multi-aperture storage elements (G11C 11/10 takes precedence; using multi-aperture plates in which each individual aperture forms a storage element G11C 11/06) [2] |
| 7/22        | . Read-write (R-W) timing or clocking circuits; Read-write (R-W) control signal generators or management [7]   | 11/10        | . . using multi-axial storage elements  |
| 7/24        | . Memory cell safety or protection circuits, e.g. arrangements for preventing inadvertent reading or writing; Status cells; Test cells [7]   | 11/12        | . . using tensors; using twistors, i.e. elements in which one axis of magnetisation is twisted  |
| <b>8/00</b> | <b>Arrangements for selecting an address in a digital store</b> (auxiliary circuits for stores using semiconductor devices G11C 11/4063, G11C 11/413, G11C 11/4193) [2,5]  | 11/14        | . . using thin-film elements  |
| 8/02        | . using selecting matrix [2]   | 11/15        | . . . using multiple magnetic layers (G11C 11/155 takes precedence) [2]   |
| 8/04        | . using a sequential addressing device, e.g. shift register, counter (using first in first out (FIFO) registers for changing speed of digital data flow G06F 5/06; using last in first out (LIFO) registers for processing digital data by operating upon their order G06F 7/00) [5] | 11/155       | . . . with cylindrical configuration [2]  |
| 8/06        | . Address interface arrangements, e.g. address buffers (level conversion circuits in general H03K 19/0175) [7]   | 11/16        | . . using elements in which the storage effect is based on magnetic spin effect   |
|             |  | 11/18        | . using Hall-effect devices   |
|             |  | 11/19        | . using non-linear reactive devices in resonant circuits [2]  |
|             |  | 11/20        | . . using parametrons [2]   |

- 11/21 . . . using electric elements [2]
- 11/22 . . . using ferroelectric elements [2]
- 11/23 . . . using electrostatic storage on a common layer, e.g. Forrester-Haeff tubes (G11C 11/22 takes precedence) [2]
- 11/24 . . . using capacitors (G11C 11/22 takes precedence; using a combination of semiconductor devices and capacitors G11C 11/34, e.g. G11C 11/40) [2,5]
- 11/26 . . . using discharge tubes [2]
- 11/28 . . . using gas-filled tubes [2]
- 11/30 . . . using vacuum tubes (G11C 11/23 takes precedence) [2]
- 11/34 . . . using semiconductor devices [2]
- 11/35 . . . with charge storage in a depletion layer, e.g. charge coupled devices [7]
- 11/36 . . . using diodes, e.g. as threshold elements [2]
- 11/38 . . . using tunnel diodes [2]
- 11/39 . . . using thyristors [5]
- 11/40 . . . using transistors [2]
- 11/401 . . . forming cells needing refreshing or charge regeneration, i.e. dynamic cells [5]
- 11/402 . . . with charge regeneration individual to each memory cell, i.e. internal refresh [5]
- 11/403 . . . with charge regeneration common to a multiplicity of memory cells, i.e. external refresh [5]
- 11/404 . . . with one charge-transfer gate, e.g. MOS transistor, per cell [5]
- 11/405 . . . with three charge-transfer gates, e.g. MOS transistors, per cell [5]
- 11/406 . . . Management or control of the refreshing or charge-regeneration cycles [5]
- 11/4063 . . . Auxiliary circuits, e.g. for addressing, decoding, driving, writing, sensing or timing [7]
- 11/4067 . . . for memory cells of the bipolar type [7]
- 11/407 . . . for memory cells of the field-effect type [5]
- 11/4072 . . . Circuits for initialization, powering up or down, clearing memory or presetting [7]
- 11/4074 . . . Power supply or voltage generation circuits, e.g. bias voltage generators, substrate voltage generators, back-up power, power control circuits [7]
- 11/4076 . . . Timing circuits (for regeneration management G11C 11/406) [7]
- 11/4078 . . . Safety or protection circuits, e.g. for preventing inadvertent or unauthorised reading or writing; Status cells; Test cells (protection of memory contents during checking or testing G11C 29/52) [7]
- 11/408 . . . Address circuits [5]
- 11/409 . . . Read-write (R-W) circuits [5]
- 11/4091 . . . Sense or sense/refresh amplifiers, or associated sense circuitry, e.g. for coupled bit-line precharging, equalising or isolating [7]
- 11/4093 . . . Input/output (I/O) data interface arrangements, e.g. data buffers (level conversion circuits in general H03K 19/0175) [7]
- 11/4094 . . . Bit-line management or control circuits [7]
- 11/4096 . . . Input/output (I/O) data management or control circuits, e.g. reading or writing circuits, I/O drivers, bit-line switches [7]
- 11/4097 . . . Bit-line organisation, e.g. bit-line layout, folded bit lines [7]
- 11/4099 . . . Dummy cell treatment; Reference voltage generators [7]
- 11/41 . . . forming cells with positive feedback, i.e. cells not needing refreshing or charge regeneration, e.g. bistable multivibrator or Schmitt trigger [5]
- 11/411 . . . using bipolar transistors only [5]
- 11/412 . . . using field-effect transistors only [5]
- 11/413 . . . Auxiliary circuits, e.g. for addressing, decoding, driving, writing, sensing, timing or power reduction [5]
- 11/414 . . . for memory cells of the bipolar type [5]
- 11/415 . . . Address circuits [5]
- 11/416 . . . Read-write (R-W) circuits [5]
- 11/417 . . . for memory cells of the field-effect type [5]
- 11/418 . . . Address circuits [5]
- 11/419 . . . Read-write (R-W) circuits [5]
- 11/4193 . . . Auxiliary circuits specific to particular types of semiconductor storage devices, e.g. for addressing, driving, sensing, timing, power supply, signal propagation (G11C 11/4063, G11C 11/413 take precedence) [7]
- 11/4195 . . . Address circuits [7]
- 11/4197 . . . Read-write (R-W) circuits [7]
- 11/42 . . . using opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled
- 11/44 . . . using super-conductive elements, e.g. cryotron [2]
- 11/46 . . . using thermoplastic elements
- 11/48 . . . using displaceable coupling elements, e.g. ferromagnetic cores, to produce change between different states of mutual or self-inductance
- 11/50 . . . using actuation of electric contacts to store the information (mechanical stores G11C 23/00; switches providing a selected number of consecutive operations of the contacts by a single manual actuation of the operating part H01H 41/00)
- 11/52 . . . using electromagnetic relays
- 11/54 . . . using elements simulating biological cells, e.g. neuron
- 11/56 . . . using storage elements with more than two stable states represented by steps, e.g. of voltage, current, phase, frequency (counting arrangements comprising multi-stable elements of this type H03K 25/00, H03K 29/00) [2]
- 13/00 Digital stores characterised by the use of storage elements not covered by groups G11C 11/00, G11C 23/00, or G11C 25/00**
- 13/02 . . . using elements whose operation depends upon chemical change (using electrochemical charge G11C 11/00)
- 13/04 . . . using optical elements
- 13/06 . . . using magneto-optical elements (magneto-optics in general G02F) [2]

- 14/00 Digital stores characterised by arrangements of cells having volatile and non-volatile storage properties for back-up when the power is down [5]**
- 15/00 Digital stores in which information comprising one or more characteristic parts is written into the store and in which information is read-out by searching for one or more of these characteristic parts, i.e. associative or content-addressed stores (in which information is addressed to a specific location G11C 11/00) [2]**
- 15/02 . using magnetic elements [2]
  - 15/04 . using semiconductor elements [2]
  - 15/06 . using cryogenic elements [2]
- 16/00 Erasable programmable read-only memories (G11C 14/00 takes precedence) [5]**
- 16/02 . electrically programmable [5]
  - 16/04 . . using variable threshold transistors, e.g. FAMOS [5]
  - 16/06 . . Auxiliary circuits, e.g. for writing into memory (in general G11C 7/00) [5]
  - 16/08 . . . Address circuits; Decoders; Word-line control circuits [7]
  - 16/10 . . . Programming or data input circuits [7]
  - 16/12 . . . Programming voltage switching circuits [7]
  - 16/14 . . . Circuits for erasing electrically, e.g. erase voltage switching circuits [7]
  - 16/16 . . . . for erasing blocks, e.g. arrays, words, groups [7]
  - 16/18 . . . . Circuits for erasing optically [7]
  - 16/20 . . . . Initialising; Data preset; Chip identification [7]
  - 16/22 . . . Safety or protection circuits preventing unauthorised or accidental access to memory cells [7]
  - 16/24 . . . Bit-line control circuits [7]
  - 16/26 . . . Sensing or reading circuits; Data output circuits [7]
  - 16/28 . . . . using differential sensing or reference cells, e.g. dummy cells [7]
  - 16/30 . . . Power supply circuits [7]
  - 16/32 . . . Timing circuits [7]
  - 16/34 . . . Determination of programming status, e.g. threshold voltage, overprogramming or underprogramming, retention [7]
- 17/00 Read-only memories programmable only once; Semi-permanent stores, e.g. manually-replaceable information cards (erasable programmable read-only memories G11C 16/00; coding, decoding or code conversion, in general H03M) [2,5]**
- 17/02 . using magnetic or inductive elements (G11C 17/14 takes precedence) [2,5]
  - 17/04 . using capacitive elements (G11C 17/06, G11C 17/14 take precedence) [2,5]
  - 17/06 . using diode elements (G11C 17/14 takes precedence) [2,5]
  - 17/08 . using semiconductor devices, e.g. bipolar elements (G11C 17/06, G11C 17/14 take precedence) [5]
  - 17/10 . . in which contents are determined during manufacturing by a predetermined arrangement of coupling elements, e.g. mask-programmable ROM [5]
  - 17/12 . . . using field-effect devices [5]
  - 17/14 . . in which contents are determined by selectively establishing, breaking or modifying connecting links by permanently altering the state of coupling elements, e.g. PROM [5]
  - 17/16 . . using electrically-fusible links [5]
  - 17/18 . . Auxiliary circuits, e.g. for writing into memory (in general G11C 7/00) [5]
- 19/00 Digital stores in which the information is moved stepwise, e.g. shift registers (counting chains H03K 23/00)**
- 19/02 . using magnetic elements (G11C 19/14 takes precedence) [2]
  - 19/04 . . using cores with one aperture or magnetic loop [2]
  - 19/06 . . using structures with a number of apertures or magnetic loops, e.g. transfluxors [2]
  - 19/08 . . using thin films in plane structure [2]
  - 19/10 . . using thin films on rods; with twistors [2]
  - 19/12 . using non-linear reactive devices in resonant circuits [2]
  - 19/14 . using magnetic elements in combination with active elements, e.g. discharge tubes, semiconductor elements (G11C 19/34 takes precedence) [2,7]
  - 19/18 . using capacitors as main elements of the stages [2]
  - 19/20 . using discharge tubes (G11C 19/14 takes precedence) [2]
  - 19/28 . using semiconductor elements (G11C 19/14, G11C 19/36 take precedence) [2,7]
  - 19/30 . using opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled [2]
  - 19/32 . using super-conductive elements [2]
  - 19/34 . using storage elements with more than two stable states represented by steps, e.g. of voltage, current, phase, frequency [7]
  - 19/36 . . using semiconductor elements [7]
  - 19/38 . two-dimensional, e.g. horizontal and vertical shift registers [7]
- 21/00 Digital stores in which the information circulates (stepwise G11C 19/00)**
- 21/02 . using electromechanical delay lines, e.g. using a mercury tank
- 23/00 Digital stores characterised by movement of mechanical parts to effect storage, e.g. using balls; Storage elements therefor (storing by actuating contacts G11C 11/48)**
- 25/00 Digital stores characterised by the use of flowing media; Storage elements therefor**
- 27/00 Electric analogue stores, e.g. for storing instantaneous values**
- 27/02 . Sample-and-hold arrangements (G11C 27/04 takes precedence; sampling electrical signals, in general H03K) [2,4]
  - 27/04 . Shift registers (charge coupled devices per se H01L 29/76) [4]
- 29/00 Checking stores for correct operation; Testing stores during standby or offline operation [1,8]**
- 29/02 . Detection or location of defective auxiliary circuits, e.g. defective refresh counters [8]
  - 29/04 . Detection or location of defective memory elements [8]
  - 29/06 . . Acceleration testing [8]

|       |  |       |   |
|-------|--|-------|---|
| 29/08 | . . . . . Functional testing, e.g. testing during refresh, power-on self testing (POST) or distributed testing [8] | 29/34 | . . . . . Accessing multiple bits simultaneously [8]  |
| 29/10 | . . . . . Test algorithms, e.g. memory scan (MScan) algorithms; Test patterns, e.g. checkerboard patterns [8]      | 29/36 | . . . . . Data generation devices, e.g. data inverters [8]  |
| 29/12 | . . . . . Built-in arrangements for testing, e.g. built-in self testing (BIST) [8]                                 | 29/38 | . . . . . Response verification devices [8]   |
| 29/14 | . . . . . Implementation of control logic, e.g. test mode decoders [8]   | 29/40 | . . . . . using compression techniques [8]  |
| 29/16 | . . . . . using microprogrammed units, e.g. state machines [8]   | 29/42 | . . . . . using error correcting codes (ECC) or parity check [8]  |
| 29/18 | . . . . . Address generation devices; Devices for accessing memories, e.g. details of addressing circuits [8]      | 29/44 | . . . . . Indication or identification of errors, e.g. for repair [8]   |
| 29/20 | . . . . . using counters or linear-feedback shift registers (LFSR) [8]   | 29/46 | . . . . . Test trigger logic [8]  |
| 29/22 | . . . . . Accessing serial memories [8]  | 29/48 | . . . . . Arrangements in static stores specially adapted for testing by means external to the store, e.g. using direct memory access (DMA) or using auxiliary access paths (external testing equipment G11C 29/56) [8] |
| 29/24 | . . . . . Accessing extra cells, e.g. dummy cells or redundant cells [8]   | 29/50 | . . . . . Marginal testing, e.g. race, voltage or current testing [8]   |
| 29/26 | . . . . . Accessing multiple arrays (G11C 29/24 takes precedence) [8]  | 29/52 | . . . . . Protection of memory contents; Detection of errors in memory contents [8]   |
| 29/28 | . . . . . Dependent multiple arrays, e.g. multi-bit arrays [8]   | 29/54 | . . . . . Arrangements for designing test circuits, e.g. design for test (DFT) tools [8]  |
| 29/30 | . . . . . Accessing single arrays [8]  | 29/56 | . . . . . External testing equipment for static stores, e.g. automatic test equipment (ATE); Interfaces therefor [8]  |
| 29/32 | . . . . . Serial access; Scan testing [8]  | 99/00 | <b>Subject matter not provided for in other groups of this subclass [8]</b>   |