

AUTOMAT Following the account of FAC in OSN 18 & 19, here is another system, broadly equivalent in scope, but with a more straightforward approach to the structures on which the mechanical components are mounted. In this case it was never intended that the parts be used for anything other than industrial purposes in making demonstration models, prototypes, mechanisms, and small mechanical units. It was originally produced in Switzerland but is now made in Germany. The founder of the company, H.G. Stumpe, explained in a letter to the late Dennis Higginson in 1993, that as a young mechanical engineer he was responsible for all aspects of producing precision laboratory equipment, and this led him to analyse which parts were most commonly needed for this class of work, and ultimately to produce them commercially. As well as saving time and money, this often allowed machinery to be made more compact, and also allowed changes to be made much more easily. Another major advantage was that it often permitted scientists and others to make up, or have made up, what they needed without resort to detailed engineering drawings, which are costly to produce and sometimes difficult for laymen to interpret.

Production started in earnest in 1958 in Zürich following publicity in the technical press, and this led to orders from technical schools and institutions, as well as from many different industries. In 1965 the firm moved to Schriesheim in the Black Forest, near Heidelberg.

This account is mainly based on the following. • A Parts List which more or less matches a Price List dated August 1961, and several other instructional and promotional items from the same period. Also a small selection of parts which seem to be of that time. • A later Parts List, undated but it fits between the last & next items, so I'll describe it as 'mid-1960s' (m60s). • A 1970 Parts List. • A 1978 Price List, and a Parts List & Leaflet on new parts from about the mid-1970s. • A 1993 Catalogue & Price List. • A 1995 Price Lists of sets.

Since the system has had well over 500 different parts over the years, it will be impracticable to describe all of them in detail, or even mention every one. In particular I'll generally pass over the many Washers, Spacers & Special N&B that have been used. All known parts will be included in Extra MCS Sheets but since some of them are only found in one of the above Lists, there may be others from the intervening years that remain unknown.

THE COMPANY In 1961 the name of the company was Automat Precision Engineering Ltd., of Limmatquai 120,



Zürich 1, and their logo the cam opposite, in red. In the literature the system is usually called THE AUTOMAT. The mid-1960s & 1970 Parts Lists carry the name Automat Service International,



D 6095 Schriesheim, W. Germany. In the 1978 Price List it is COMPACT TECHNIK BAUKASTEN GMBH, Branichstraße 8, D-6905 Schriesheim.

1993 sees 'compact technik gmbh', D6905 Schriesheim (D 69198 on the 1993 & 1995 Price Lists), with the 'ct' logo above in blue.

AN OVERVIEW OF THE SYSTEM In 1961 358 parts were listed. Frameworks were made of steel A/Gs, quite like MECCANO, with holes at ½" pitch but slightly smaller at 4.0mm. To go with them an Angle Bracket, some short Strips, small Plates, & Corner Brackets. Also a Gearbox Side Plate. The thread of the N&B was (& is) M3.5, and Spacers & M3.5 Screwed Rods were also used in assembling structures.

Some Shafts were 2.5mm Ø but the main size was 4mm, and the latter will not always pass through the 4mm holes in the structural parts. Normally bearings would be a ball race or one of the two types of plain bearing provided. There were Bearing Blocks for both Shaft sizes, a 4mm Ball Race with Housing, and Threaded Bushes bored 4mm. The latter could be bolted into oversize holes & slots in various

Bearing Brackets, or in the Gearbox Side Plate.

There was a wide range of Gears including Bevels, Worms & Worm Wheels, Racks, a Toothed Sector, and a Toothed Segment. The spur gear module was .75, slightly coarser than MECCANO, while the Bevels were .8. Sprockets and a Toothed Sector for 5mm pitch Roller Chain were listed.

Collets were used to fasten all the Gears, and the various Pulleys in the system, to both sizes of Shaft.

Other parts listed were various types of Coupling, a wide selection of Levers, Crank Pins, Lead Screws, and numerous parts for special applications. The latter included a planetary gear, a Maltese cross mechanism, a friction ratchet, a cone clutch, and cams.

Most of the Gears and many other parts were made of aluminium alloy.

The major change by the mid-1960s was the use of ½" Square Girders, made from square alloy tubing, perforated at standard pitch, as an alternative to A/Gs for frameworks. Special Connectors were provided to join them, but all the other structural parts could of course be used as well. The Tubes and their Connectors were called 'The AUTOMAT COMPACT Frame System (DBGM pend.)'.

Among the new parts were a 12t Pinion, a 24*17h Perforated Plate, a Self-aligning Plain Bearing, and special parts for a Pen Recorder.

The introductions in 1970 included mating Dovetail Sections, to allow sliding movement with minimum play, Toothed Pulleys & Belts for them, and Helical Gears. Also parts to allow gears etc to be easily moved, one a Hub with a hex bore to slide on the hex portion of a new Shaft. 6mm Shafts & Bearings had not yet been introduced but were perhaps not far away, because a 6mm version of a Ball Bearing Housing was listed, as well as a 4mm.

By 1978 a good many changes had taken place including a full range of 6mm Shafts and associated parts. The A/Gs & Angle Bracket were no longer listed and all frameworks were made from the Square Girders (and various other alloy Girders, see below). However the Corner Connectors for the Girders had been replaced by Corner Cubes & Tenons which were screwed together to make up any of the original configurations.

As well as Square Girders, 5 other extruded alloy Girders were listed, each up to 16½" long. The sections are shown below - the U, 1T-slot (½*¼" o/a), Angled 2T-slot, 3T-slot, & 4T-slot - and they allowed much more rigid structures to be built when necessary.



1993 saw the end of the 2.5mm Ø parts. A new idea was a number of press-fit Bosses for use where parts were not unduly loaded. A few fittings and other parts were now made of plastic.

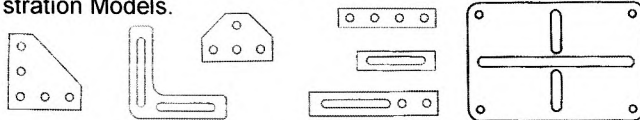
Many of the special parts for gear & clutch mechanisms were no longer listed, probably because their main use was in demonstration models, and by this time these were all available in the range of 75 ready built COMPACT Gear Demonstration Models. Also many of the small fittings and other special parts had been discontinued, but nevertheless the total number of parts has risen to about 440. This increase over the 1961 figure largely reflected the additional structural parts that had been introduced.

THE PARTS In the notes that follow the few dimensions that have been taken from actual parts are shown in italics. Parts for which the material isn't known are usually alloy, but the N&B, and many similar parts are steel, and many of the smaller fittings brass. Alloy parts were anodised, natural colour originally, but by 1993 all, apart from the alloy Girders, were in a variety of colours; brass & most steel parts were nickel plated, but some steel parts (and the few die-cast zinc) were, as noted below where known, chemically

blackened. The PNs consist of a 2-figure group number (broadly denoting the type of part) plus a 3-figure part number, eg 40.006. The names of parts used below are not always the AUTOMAT ones. Asterisked items are illustrated.

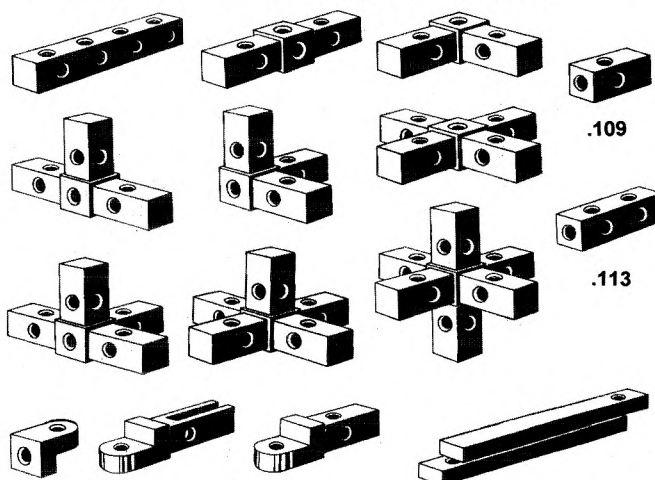
STRUCTURAL PARTS In 1961 the main members were MECCANO-like **A/Gs** with 5,7,10,15,20h, 9mm long slots, & slightly rounded corners. 2 & 3h ones were added in the mid-60s List and the 20h was not listed in 1970. None were in the 1978 List (or in a 1973 dealer's list). Most of the other 1961 parts were used to make and reinforce joints: an **Angle Bracket** similar to the A/G but 10mm wide, a **4h Strip*** & a **Short Slotted Strip***, both 10mm wide, and a **Long Slotted Strip***, 12mm wide. The slots were 30 & 35mm long. These parts were steel, 1.2mm thick except the 2.0mm thick Long Slotted Strip. In 1993 they were all listed as 1.5mm thick with a black finish. Also **Rectangular Plates** 2*2,3,5h; 2*2 & 3*3h* **Corner Brackets**; a 5h wide **Double Corner Bracket**; and a **Flat Slotted Angle***. The 2h **Corner Bracket** was not listed in 1978 but by 1993 a new 3h wide **Double Corner Bracket*** had appeared. All these parts had sharp or slightly rounded corners and were made of 2.0mm alloy. For a few years in the mid-1970s **Flat Girders**, like MECCANO but 25mm wide, were listed, 1,2,3,4,5,7 & 10h long.

The **Gearbox Side Plate*** was 147*96mm and made of 4mm perspex; the slots are wide enough to take the Threaded Bushes. Two such Plates were normally held apart by Spacers. These parts were not listed in 1978 but continued to be used in the ready-built COMPACT Demonstration Models.

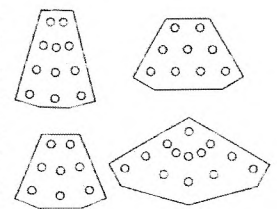


The mid-60s & 1970 Lists contain a 4mm thick **Perforated Plate**, 17*24h, made of Preßspan (composition material?), colour red or blue, carrying a cladding plate. 12 sizes of 2mm thick alloy **Cover Plates** ranging from 1½*2½" to 3½*10", all with 3 holes at each corner replaced it in the 1993 List. In one of the models shown a similar looking Plate is used as a Gearbox side plate with extra holes in it to take Threaded Bushes.

In the mid-1960s the main additions were **Square Girders** made from a ½" square alloy tubular section, with holes at ½" pitch. 9 were listed from 3 to 33 holes long, and 7 more in-between lengths had been added by 1993. The 9 main **Connectors** used to join them are shown below, plus, at the right, an End Fitting (00.109), & 00.113, described as a 'Connector + Bearing'. Underneath are 3 Hinge Connectors, to allow parts to be attached at an angle, with, to the right, a 'Telescoping Connecting Pair'. These were used to join 2 Girders where a length was needed that wasn't a multiple of ½", as in diagonal bracing for instance. One Girder was bolted to one of the Pair, and the other to the other, but nothing seems to hold the Pair together. Nearly all the holes in all these parts appear to be tapped.

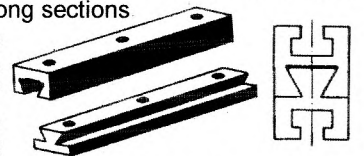


By 1993 the Corner Connectors had been replaced by steel **Corner Cubes** with square section **Tenons**, 17mm long, joined to the Cubes using M3.5 Grub Screws as studs. The small Plates & Brackets could be used to reinforce Square Girder frameworks, & 4 new **Angled Corner Brackets*** had appeared by 1978, which allowed Tubes etc to be joined at angles of 30, 45, 60 & 120°, and to make triangulated structures.



The alloy **U & T-slot Girders** allowed more substantial frameworks to be made. The U Girders had been introduced by 1973 and probably the T-slot Girders as well. The 1T-slot, Angled 2T-slot, & U-Girders all had the usual ½" pitch holes; the 3T- & 4T-Girders weren't pierced but any part with a T-slot could be bolted to a perforated part by Bolts with their heads housed in the slot, and corner joints could be made using the original Brackets and small Plates. It was suggested that the Girders be glued together to give special purpose or very strong sections

Dovetail Slides* were shown in 1970, with the male sections up to 14" long, and the female up to 6½". Both had tapped



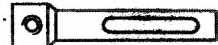
holes for attachment, probably at 1" pitch. Additional lengths were included in 1978, and by 1993 they had been changed to incorporate a T-slot* for attachment purposes.

The U & T-slot Girders, and the male Dovetail were available up to 16½" long, but all, including the female Dovetail, could also be supplied in 1m unperforated lengths.

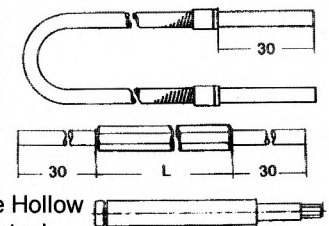
SHAFTS All were stainless steel with square ends. In 1961 there were 7 **4.00mm Shafts** from 50 to 250mm long. An additional 4 (50-125mm) had a short flat on one end, and one, about 18mm long had a flat along its whole length. A **Sliding Shaft**, had a tapping for a Set Screw, the head of which slid within the slot in a **Slotted Sleeve***. **2.5mm Ø Shafts** were 75, 100, & 125mm long, and would run inside 4mm o.d. **Hollow Shafts**, 40 & 80mm long.

The mid-1960s List contained **Flexible Shafts*** 100, 150, & 200mm long. Also a 4mm **Axle Pin**, about 45mm long, threaded M3.5, with the 4mm end grooved for a Circlip. The short Flatted Shaft wasn't listed.

In 1970 none of the Flatted Shafts



appeared, nor the two Sliding Shaft parts, but there were 2 new Shafts, 70 & 90mm long o/a, with 10mm of thread at one end. Also **Hexagonal Shafts***, 6mm A/F, 120, 180, & 240mm long, plus 30mm of 4mm Ø shaft at each end. The Hollow & Hex Shafts were blackened steel.



Additional lengths of 4mm Shaft were included in 1978, plus 8 lengths of **6mm Shaft**, from 50 to 300mm. The Axle Pin wasn't listed but there were two 4 & two 6mm **Threaded Pins**, the latter* stepped down to 4mm at the threaded end to pass through the holes in the Square Girders. They were 57 & 62, and 70 & 90mm long o/a, respectively. There were also 5 lengths of 6mm **Stepped Shaft**, from 50 to 150mm, including the 18mm long, 4mm Ø extension at one end. They were not in later Lists.

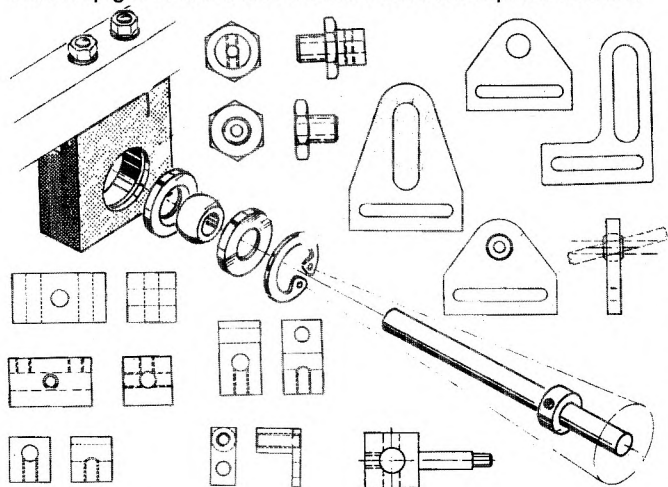
In 1993 15 lengths of 4mm Ø Shaft were listed, from 25 to 250mm, and the 8 of 6mm. All now had grooved ends to take a Circlip. The 4mm Shafts could be used inside 6mm **Hollow Shafts**, 36,50,100,200mm long. Discontinued parts included the 2.5mm Shafts, the 4/2.5mm Hollow Shafts, and the Flexible Shafts.

BEARINGS There were a number of different types. In 1961 for 4mm Shafts, **Threaded Bushes** (Long* & Short*, threaded M8, and 3 **Brackets*** to carry them. In 1978 two

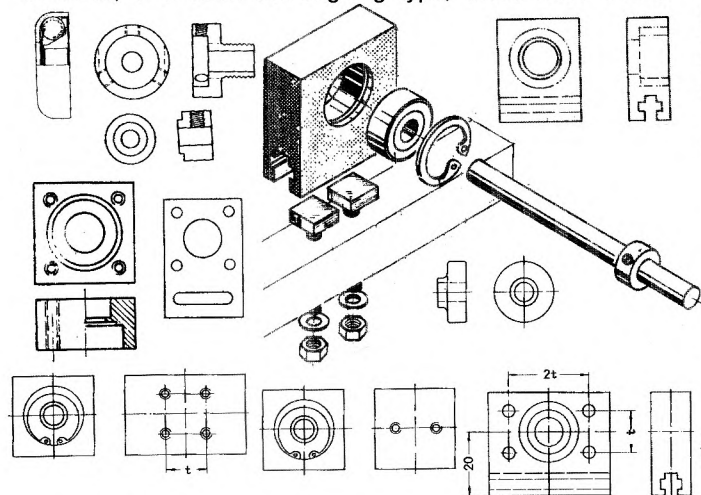
rather similar parts were added but with smaller, 12mm rather than 16mm A/F, hexagons. The longer one scales at 15mm o/a. Also added, a 6mm version with no hexagon and threaded along its whole length, apparently M10 but if so there seems no part in which it could be mounted.

From the mid-1960s, a 4mm **Self-aligning Bearing*** was available, fitted to one of the Mounting Brackets, and for a period from around the mid-1970s a 6mm **Spherical Bearing*** was listed which could be mounted in a standard Bearing Housing* of the time (see below), held between Special Washers*.

Another type was the **Bearing Block** made of brass and usually rectangular (typically 1/2" square and less than 1" long) with plain or tapped holes for mounting. Of the 8 in 1961 only 2 were actually called Bearing Blocks, one for 4mm & one for 2.5mm Shafts - the others were all for 4mm. and had names like Connector, Slider, & Support, no doubt indicating their original use. Shown below are the 4mm Bearing Block (top left) & 4 of the others. By 1978 only 3 (block-type ones) remained (with some additional tapped bores), and all were then called Bearing Blocks. Another type had been added by this time, bored both 4 & 6mm*, with a spigot to allow it to be used with the Square Girders.



Finally ball bearings. In 1961 there was a combined radial and thrust **Ball Bearing*** of about 12mm o.d.; it fitted into the **Housing*** shown, which could be mounted in place of the Threaded Bush, and a **Special Collar*** was used with it. Two additional Housings* with mounting holes, elongated in one case, were shown in the mid-1960s and the Ball Bearing, without the curved thrust face, was described as 'radial'. One of the Housings had different diameter openings on the front & rear face but only one size of Ball Bearing was listed. In 1970 these Housings were replaced by one mounted by Bolts with their heads in an internal X-recess (top right below). In 1978 only Square-headed Bolts* were shown holding this Housing*. 1978 saw the previous Ball Bearing replaced by a different one of 4mm bore, one of 6mm, & a 6mm self-aligning type; these fitted into 5



rectangular Housings. 2 were the 1970 type, one for 4mm and the other for 6mm Shafts. The 3 others were all for 6mm Bearings, and are shown along the bottom row. The 38mm wide one on the left takes a Bearings at each end. New in 1993, a 19mm o.d., 6mm bore, white **Nylon Bearing*** which would fit into all the 6mm Housings, and is shown under the 1978 Bearing assembly.

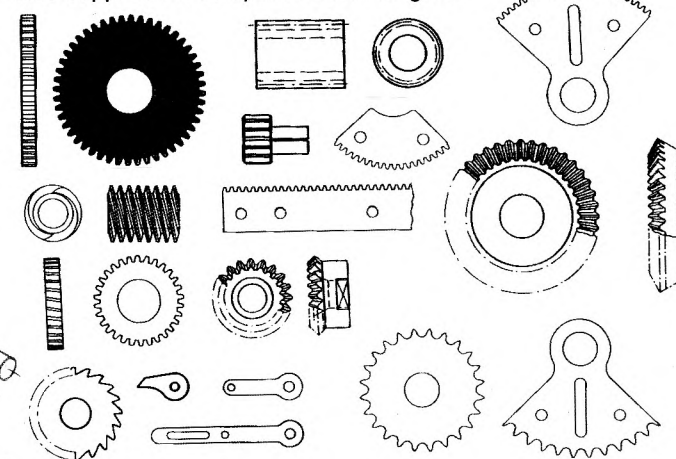
GEARS/SPROCKETS/PULLEYS All were alloy, 4mm wide and bored 12mm unless otherwise stated. Except as shown, none had holes in their faces. In 1961 there were: an 18t **Pinion***, 15mm long, bored 8mm; **Gear Wheels** with 24,30,36,48*,54,60,72,96,108,120t; a 24t **Toothed Sector*** & a 18t **Toothed Segment***, both 2mm thick. A 12t **Pinion*** (probably brass) was shown in the mid-1960s List, 4mm bore and held by a Collar over its split end. More Gears were added until in 1978 there were 14 from 24t to 144t, plus by 1993 a 30t & 36t in PVC as well as alloy. 4 **Helical Gears** were introduced in 1970, with 24,36,48t, plus a 36 LH version. All were alloy, 4mm wide. In 1993 their PNs were the same but they were shown with much coarser teeth, and if this is correct a Wheel of about 2" Ø would have 24t instead of the 48 earlier. **Racks**, 15mm deep by 2mm thick, were brass with 25,51*,76 teeth. In 1970 the numbers of teeth were 16,27,54,81, but the 16t one wasn't listed afterwards. In a 1993 drawing of the parts the holes are shown spaced at multiples of 1/2" but in the 51 & 76t parts to hand 2 holes in each are at 41mm centres. There was also a **Gear Ring** for the Planetary Gear, see later.

2-* & 3-start **Worms**, bored 8mm, each running with a matching alloy **Worm Wheel** (24* & 39mm o.d.). In the mid-1960s the Worm Wheels were listed as before but the numbers of teeth were given (by overstamping the diameter) as 30 for the small sizes, and 60 & 59 for the larger 2- & 3-start ones. Those to hand are 30 & 50 for both types of Worm. Probably there was a change about this time because in the 1970 list the numbers of teeth were given as 24 & 60, with a new Wheel of 48 teeth for both Worms. These sizes but with different PNs are in the '78 & '93 Lists.

20t **Bevels*** match for a 1:1 ratio, and a different 20t ran with a 40t* for 2:1. All were brass and both 20t types (of about 21mm o.d.) were bored 8mm and tapered to take a Collet Chuck. By 1970 the number of teeth had changed to 24 & 24/48 and the Mod. from .8 to .75.

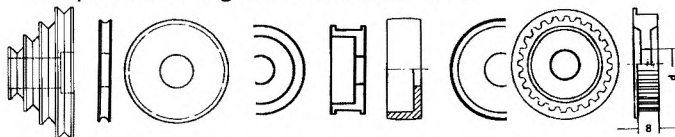
Another toothed part was an alloy 20t **Ratchet Wheel***, 35mm o.d. (PVC in 1993). To go with it a **Pawl*** of 20mm o/a, and 2 **Levers***.

The 3 **Sprockets** had 12,24*,36t and the 24t was about 40mm Ø. They were probably brass and scale at about 2 1/2mm thick. There's also a **Sector*** shown but it wasn't listed in 1993. The 5mm pitch **Roller Chain** was made up from Links held on the Rollers by Circlips, and a Tool was available to help with assembly. After the mid-60s it was also supplied made up into 50cm lengths.



In 1961 **V-Pulleys** were 20,25,30mm Ø, plus a **4-step*** from 20 to 50mm Ø. By the mid-1960s, 5 **V-Pulleys** from

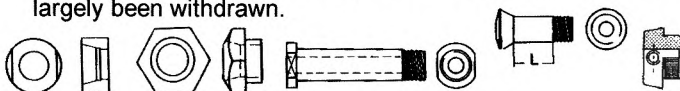
20 to 60mm were listed and the Stepped Pulley had been dropped. In later illustrations the groove is shown rounded* at the bottom. **Flat Belt Pulleys** were 20,30*,40,50mm Ø, and were shown with a curved top* instead of side cheeks from the mid-1960s. Loops and lengths of 3mm Ø and 10*1 mm plastic **Belt**ing were listed from 1970.



Toothed Pulleys, with 12,24*,36,48 teeth, & a DP of 16, were introduced in 1970. The pcd of the 24t was about 35mm. In 1993 the material was given as nylon. Various Toothed Belts of 5mm pitch were listed.

HUBS The main way of fixing all parts to Shafts was by **Collets**. The assembly sequence is shown left with first a **Collet Chuck** slipped on the Shaft and then a **Cone Sleeve** pushed over it, followed by the circular part, a Washer & Nut. Different length Chucks & Sleeves were provided to accommodate the different thicknesses of parts, or to allow 2 or more to be held together. A Cone Sleeve without Shoulder* (below left) was used for parts bored 8mm. Nuts (M8) were circular with 2 flats but later hex, 12mm A/F. The round head on the Cone Sleeve was shown changed to hexagonal* in the mid-1960s List, and 2 new lengths added. In the 1970 List all the Cone Sleeves save the 3 shortest had been withdrawn and **Spacers** were used with the remaining ones as required. The only part for **2.5mm Shafts** was a Collet Chuck which fitted one of the Cone Sleeves above. The Chucks were blackened steel, the other parts brass.

Sleeves for 8 & 12mm bored parts allowed them to rotate freely on 4mm Shafts, and when more than one part was to be free there were **Loose Hubs*** with threaded ends. An alternative part in 1961 through 1970 was an M8 **Threaded Sleeve**, 20,30 & 40mm long - it might be thought to be a bearing except for its length. 2 lengths of **Cone Hub*** were in the mid-1960s List, a part like a Collet Chuck but without the slits, so it simply forms a bush and allows the part bolted to it to rotate freely on a 4mm Shaft. 2 more lengths were added in 1970, when the Loose Hubs had largely been withdrawn.

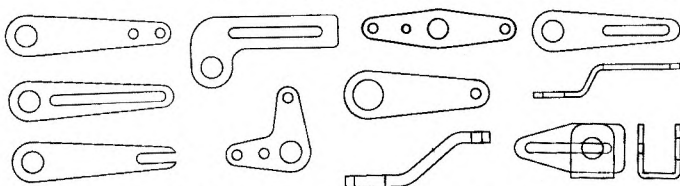


A Cone Sleeve, 2 Cone Chucks, and 2 Cone Hubs were listed from 1978 for use with **6mm Shafts**. The Chucks & Hubs were threaded M10, with a hex Nut 16mm A/F. The 2.5mm parts were no longer listed in 1993.

Another part after 1970 was the alloy **Insert Hub*** with a serrated boss which could be pressed into any 12mm bore part(s). It was available for 4 & 6mm Shafts and in all there were 7 different lengths. It appears to be single-tapped and was apparently only intended for lightly loaded parts.

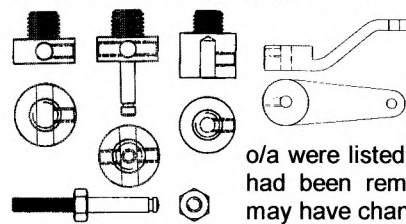
Hubs grooved to allow them to be moved by Stirrups are described later.

LEVERS The 9 different types of **Lever** from 1961 are



shown above, all of 2mm alloy except the thicker Hand Crank, all flat except as shown, and all except the Hand Crank bored 8mm. The Plain, Slotted & Forked Levers were each available in 7 lengths, with from 20 to 75mm throw. No Forked Levers seem to be in the 1978 List and the

75mm wasn't listed in 1993. Also missing in 1993, the Cranked & 'U' Levers (at extreme right). A **Lever Hub*** was listed in 1961-70, and a similar part with Crank Pin* from '61 to m'60s. In 1961 only there was a Special Hub* for the 'U' Lever. In 1970 a Hand Crank with Hub* was introduced. **4 Crank Pins** of from 20 to 35mm* o/a were listed; by 1993 the hexagon had been removed and the lengths may have changed slightly too.

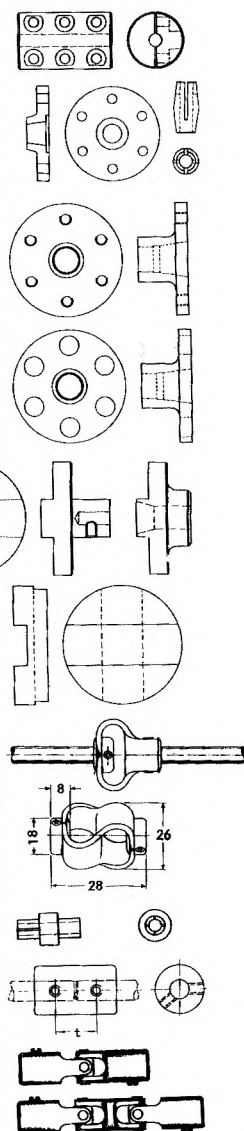


COUPLINGS The following were listed in 1961. A **Split Coupling***, 30mm long, held together by M2.6 Bolts & Special Nuts. A **Flange Coupling***, 30mm Ø, with a split Double Cone* to fit the bore. These parts were no longer listed in 1970. An **Elastic Coupling** - two 36mm Ø Flange Wheels with tapered bores, one* with 6 tapped holes to take Special Pins that enter the oversize holes in the other*. No 'elastic' element is listed. A 36mm Ø **Oldham Coupling*** for 4mm Shafts, with single-tapped bosses. By the mid-60s the bore was tapered* to take a standard Collet Chuck.

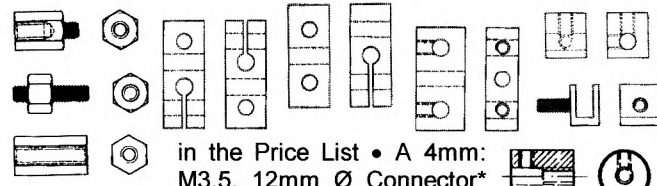
5 new Couplings for 6mm Shafts were listed in 1978, with tapped bosses. One was an Elastic Coupling* which could also be used with an Adaptor on 4mm Shafts; it allowed a deflection of 15° and an extension of 4.7mm. One of the others was an Oldham Coupling and the other 3 look rather similar but no details are available. None of these were extant in 1993.

The first 'cylindrical' **Coupling*** was in 1970, for 4mm Shafts: it had thin split ends and the Shafts were held by the pressure of a Grub Screw in a 6mm bore Collar at each end. It was replaced in the 1993 List by conventional parts to join two 4mm, or two 6mm Shafts*, or a 4 to a 6mm. The first was 11.5mm Ø & 20mm long; the others 15mm Ø by 25mm. All were made of brass and were double tapped at 120° for each Shaft.

Single* & Double* **Universals Joints** were listed throughout & a slightly modified design with 120° double-tapping was shown in 1993.

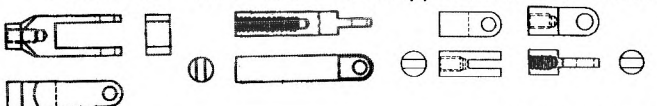


FITTINGS Connectors. • 4*, all hexagonal in section, for M3.5 threaded parts: the 1st was not listed after the m60s, and the 4th not after 1978. • 4* 'supports' similar to the Bearing Blocks already mentioned, the longest 1", variously drilled 4mm or tapped M3.5, and a **Slider***. By 1978 only the 'cube' one was listed and none were in the 1993 Catalogue, though most were still

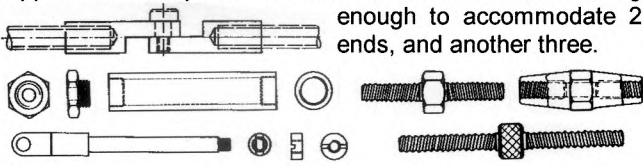


in the Price List • A 4mm: M3.5, 12mm Ø **Connector*** was listed only in 1970 & 1978.

Bar Ends. • The 4 below were tapped M3.5 & the holes



in the forks & tongues scale at 3.5mm. Special Pins, grooved for a Circlip, were provided to fit them. The 2 tongued parts were also available tapped LH. All were listed through 1978 except the longer forked one ('61-m60s), and the LH parts in 1978. • In 1978 & 1993 Ends for 6mm Threaded Rod were shown, one drilled 4mm and the other tapped M3.5*. Special Screws went with them, one long enough to accommodate 2 ends, and another three.



Turnbuckles 3 types* were in the 1961 & m60s Lists, also 4 Studs, 30-100mm, threaded RH & LH over 12mm.

Eye Bolts In '61-m60s, 5 lengths from 10-50mm, threaded M3.5.

Collars, s/t: 10mm Ø (later 8) for 2.5mm Shaft ('61-78); 12mm Ø for 4mm ('61-93), & for 6mm ('70-93).

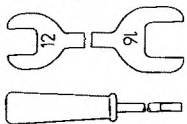
2 M3.5 **Thumb Screws** ('61-m60s), and one in 1993.

Tension and Compression **Springs**, 10-50mm long, ('61-93) and various Hangers for the former ('61-78). Also in '61-m60s, a **Spring Housing***, 10mm Ø by 45mm long, with screw-in Ends (bored 4mm* or tapped M3.5), a tongue-ended Piston Rod*, and Piston*.

FIXINGS The earlier M3.5 CH **Bolts** had slotted hex heads by 1993 (possibly by 1978). Lengths u/h were 5, 8, 12, 15mm in 1961, with 20, 25, 30mm added in the mid-60s, while the 5 & 15 became 6 & 16mm in 1978, and a 10mm was added in 1993. The standard **Nuts** over the years were M3.5, 7mm A/F; M6, 10mm A/F; M8, 12 & 16mm A/F; M10 & M12, 16mm A/F.

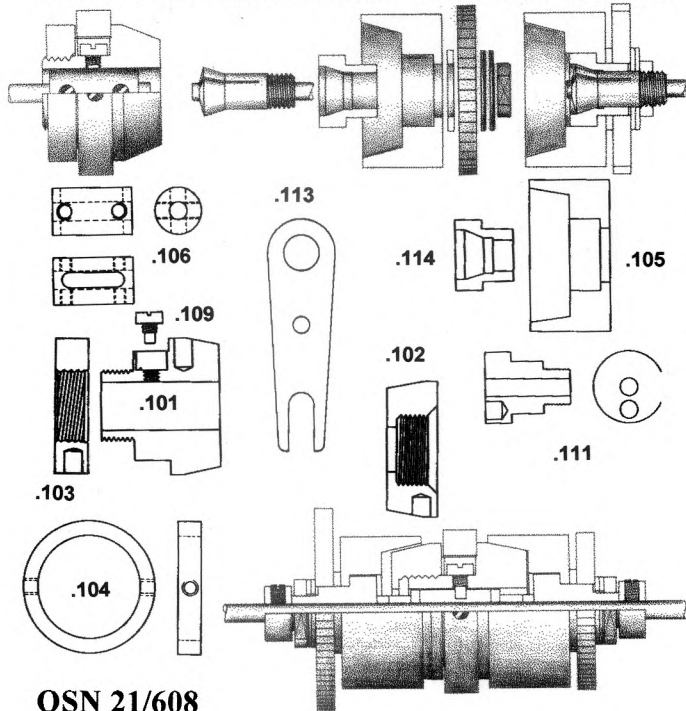
In 1961 7 lengths of M3.5 **Threaded Rod** were available, from 25 to 75mm, and 100mm was added in 1970. M6 Rod, 50, 100 & 200mm long, was listed by 1978. **Grub Screws** were M2.6 x 5, & 8mm; M3.5 x 3, 5, & 8mm; & M5 x 8mm in 1961. All but the M3.5 sizes had been dropped by 1970, and by 1978 the lengths had been changed to 3, 4, 6, & 8 mm.

Tools. The **Spanners**, of 2mm thick blackened steel, had an unusual shape and were stamped with their size(s) & THE AUTOMAT etc. They had 7/10mm, & 12/16mm* openings, plus a single-ended 10mm one in 1961. 7 & 16mm **Socket Wrenches** were in the 1970 & 1993 Lists. Throughout there were two **Screwdrivers**, listed as 3* & 6mm. The 1993 Catalogue included **Circlip Pliers**.



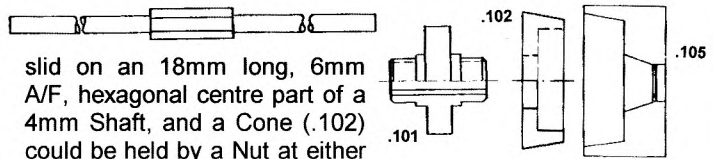
PARTS FOR MECHANISMS

There were 12 special



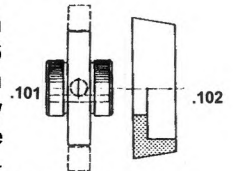
parts used to make a metal-to-metal, Single or Double **Cone Clutch**. The single version is shown first. Starting with the male end (left), a Special Sleeve (40.106) with a longitudinal slot in it was attached to a Shaft by 2 Grubs on each side. The Cone Body (.101) slid on the Sleeve, located by a Pin Screw (.109) engaging the slot. A Slip Ring (.104) rode on the Body, held by the End Fitting (.103) which was tightened against the shoulder of the Body. Operation was by Clutch Levers (.113) acting on Pins screwed into either side of the Slip Ring. To the right the female side (about 34mm o.d.), showing it partly & fully assembled. It had an Outer Body (.105) and Gear (say) held to the Shaft by a standard Collet Chuck in a Special Sleeve (.114). An alternative Idling Hub (.111) was provided if the female side was to be free on the Shaft. In the Double Clutch the (separate) second Cone (.102) screwed onto the Cone Body instead of the End Fitting, and Collars at each end located the assembly on the Shaft.

The Cone Clutch had been redesigned by 1970 and the number of special parts reduced to 8. The Centre (.101)

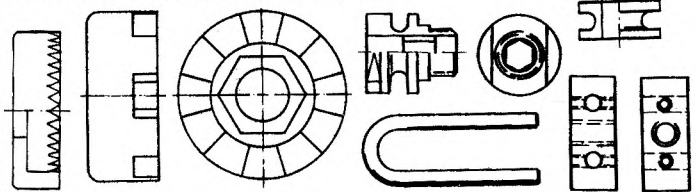


slid on an 18mm long, 6mm A/F, hexagonal centre part of a 4mm Shaft, and a Cone (.102) could be held by a Nut at either end with the Slip Ring between them. The bore of the female Outer Body (.105) was tapered to take a Collet Chuck or Cone Hub.

By 1993 (probably by 1978) the design had again been simplified, with a total of 6 parts. A modified Centre (.101) again slid on the Hex Shaft, and the Cones (.102), now PVC, appear to be pressed onto it, with the Slip Ring between them as before. The female Body was also PVC but otherwise similar to that of 1970. The Clutch Lever was no longer listed, and no doubt it had been found possible to replace it with standard parts.



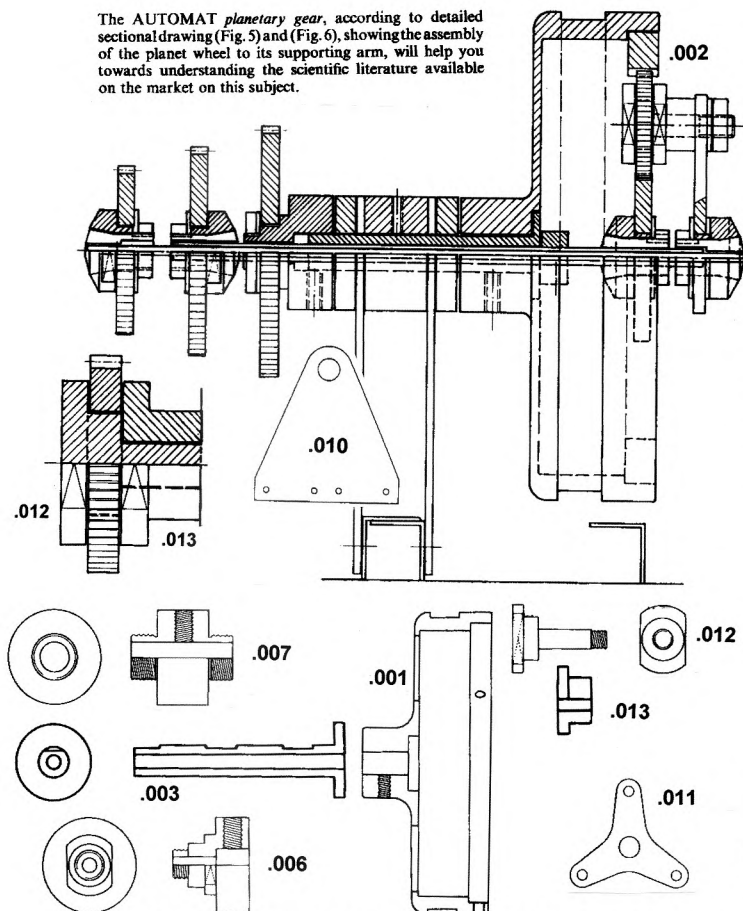
A 35mm Ø **Toothed Coupling*** was listed in 1970; from 1978 on a similar part, but in PVC, was shown, along with a multi-segment **Dog Clutch***, again PVC. Two pairs of these could be used as a 2-way clutch, with a Centre and Slip Ring (on a Hex Shaft) as above to operate them. For a single pair sideways movement of the Slip Ring away from the clutch element could be restrained by any convenient part of suitable diameter fixed to the Shaft.



Other parts were included in 1970 to facilitate sliding movement on Hex Shafts. First the **Grooved Hub***, with a hex bore and a groove to allow a **Stirrup*** to slide it along the Shaft. Alternatively when a Collet Chuck or Cone Hub was being used (on a normal Shaft), a 16mm Ø brass **Stirrup Ring*** could be held against the part(s) to be moved. In those cases the Stirrup could move the whole Shaft with the part(s) on it, or the part(s) relative to the Shaft. The Stirrup was held in a **Stirrup Block*** which was tapped to move along an M6 Threaded Rod. These parts continued in 1993 except that the Grooved Hub was replaced by an (alloy) **Grooved Insert Hub**, again with a hex bore.

13 special parts were used in the 1961 version of the **Planetary Gear** mechanism. The **Body** (21.001, o.d. about 10½cm, with 6 large holes in the face) was fitted with a **Gear Ring** (.002) with internal teeth, but how it was secured isn't clear. A Grub Screw held the Body on the flanged end of the long **Hub** (.003), which ran in the **Bearing**, .007 (supported by a triangular **Support Bracket**, .010, held by

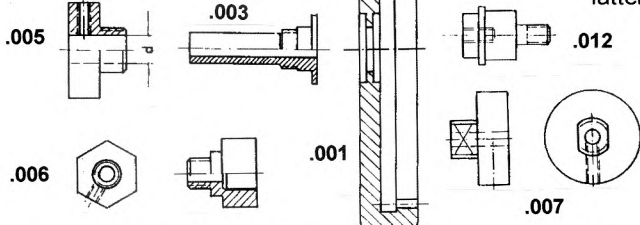
The AUTOMAT planetary gear, according to detailed sectional drawing (Fig. 5) and (Fig. 6), showing the assembly of the planet wheel to its supporting arm, will help you towards understanding the scientific literature available on the market on this subject.



Nuts at each end). The **End Piece**, 006, (with a Gear on it) was held to the other end of the Hub by a Grub Screw. A **Hollow Shaft** ran inside the Hub, with a 2.5mm Shaft inside it. At one end a Gear was fixed to each Shaft, and at the other a Gear was fixed to the Hollow Shaft, and the **Spider** (011) to the 2.5mm Shaft. A planet Gear on each arm of the Spider (also shown in the auxiliary view) was free on a **Planet Hub** (012), held by a Nut against a **Spacer** (013), and engaged the Gear on the Hollow Shaft. The Gears were standard parts.

The only change in the mid-60s was that the depth of the **Body** was reduced a little and it is shown without the lightening holes, and already fitted with a gear ring, probably pressed in, that had both internal & external teeth.

Redesigned parts were shown in 1970 with the **Body**, 001, (with only internal teeth) held on the **Hub** (003) by a Nut, and 3 different **Bearings**, 005 with 8mm bore, and with 4mm bores, 004, otherwise identical to 005, and 007. No doubt the Hub ran in the 8mm, and perhaps the Hollow shaft ran in a 4mm at each end, each supported by a Bracket. If so the Hollow Shaft could be locked, like the Hub, if required. The **End Piece**, 006, & **Planet Hub**, 012, were modified too and a **Spacer** wasn't needed with the latter.



By 1993 (and possibly by 1978) only a **Body**, slightly changed from the 1970 pattern, and the **Spider** were shown as separate parts. A 3rd PN was for the 'Complete planetary model assembled out of the COMPACT Model Series.' Some data were given: the **Body** was 96mm o.d. & 15mm deep, with 108 teeth on the internal gear. The planet Gears had 30t and they meshed with a 48t centre Gear.

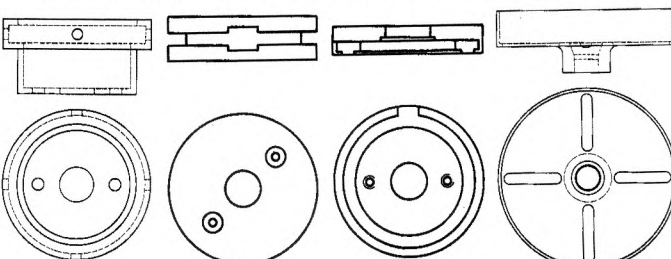
In the 1970 List only, a **Differential Housing*** with a dia-

meter of about 60mm Ø and 15mm deep. Its PN, (25.250), comes immediately after the Bevel Gears.

The 1961 List showed 6 different parts for a **Friction Ratchet**. 3 were 15mm Ø **Drums**, each with a spigot long enough to allow one of 3 types of input device to be attached - a Lever or other 2mm thick part; 4mm thick **Wheels**, etc; & the 18t **Pinion**. The first type* is shown below. The 5-toothed **Rotor*** had a split boss and was held to the Shaft by a 15mm Ø **Collar** with 3 Grub Screws. Said Collar also prevented the 2mm Ø **Rollers*** from coming out. No changes were made to the parts except that from 1970 the Collar was replaced by the standard 6mm version which had been introduced by that time (with 1 Grub Screw initially). A standard 4mm Collar was used at the other end.

3 special parts were listed from 1961 through 1970 for a **Maltese Cross Mechanism**: an **Index Plate*** about 80mm across, a **Driver*** 42mm long, and a **Driving Pin***.

23 parts to make or use with **Cams** were listed in 1961, but



only 8 in 1993. 1961. For face (bell) cams, a 50mm Ø **Face Body***, with metal & Preßspan

Strips, 18*4cm, to shape and wrap round it, held by small Screws; also a ready cut **Metal Profile*** to work an automatic cone clutch, and, in 1970 only, a wedge shaped Profile. From the mid-1960s onwards the **Body** had lost its smaller diameter cylindrical extension. A **Grooved Body*** which probably had a recessed groove around its circumference to house the heads of Bolts used to attach the cam profile.

A disc cam could be cut from an 8*8cm Preßspan **Sheet** and attached to a **Disc Body*** with a recessed groove around the face. A **fourth Body***, was said to be for a 'grooved cam'. An **Eccentric Sheave*** of about 50mm Ø, and probably 4mm thick, was introduced in 1970 but not listed in 1993.

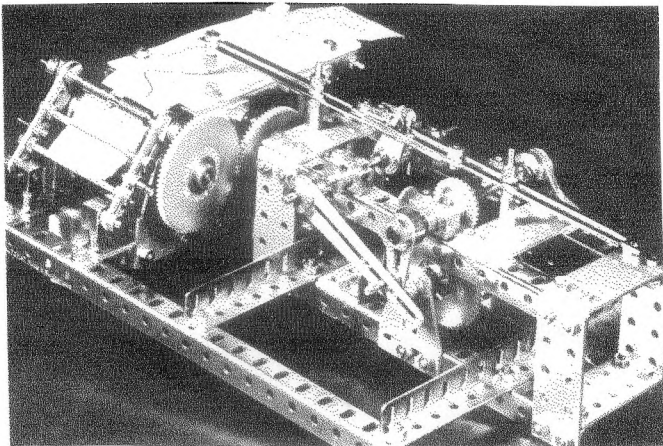
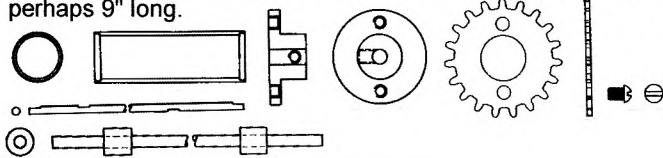
Only the **Face** & **Disc Bodies** were listed in 1978/1993.

Parts were available to make & mount various **Cam Followers**, and they are shown left in the order they were listed. Their names were given as: Flat faced cam follower; Sleeve for knife-edged cam follower; Knife-edged cam follower; Sleeve for knife-edged cam follower; Roller; Roller with radial threaded hole; Cam roller; Screw for cam roller; Bearing for Cam Roller; Cam roller; Shaft for Cam roller. Most of these were dropped after 1970, and by 1993 only the last 5 were listed (with the final 3 ready assem-

bled), but plus, a PVC, 18mm Ø 'Knob cam-follower'.

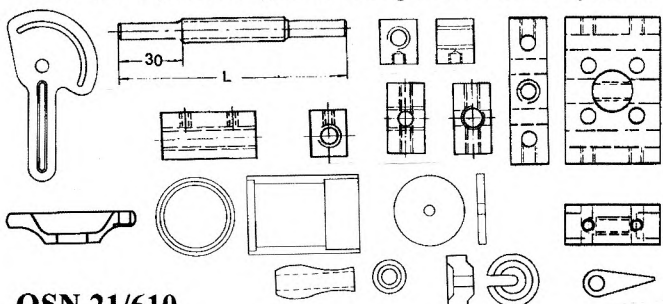
Listed among the Cam parts ('61-70) was a slotted strip called a **Slider***, with no indication of size, and in '70 & '78 only, a 100mm Ø **Face Plate***.

7 special parts were listed in 1961 for a **Chart Recorder**: a **Roller***, 27mm Ø by 80mm long; a single-tapped **Hub*** for it; a 30mm Ø **Driving Sprocket*** with 19 teeth and **Special Screws*** to fasten it to the Hub; a **Special Shaft***; a **Shaft with Rubber Rollers***, and a Roll of **Chart Paper**. The Roller and Shaft weren't in the mid-60s List because other parts in the system could be used instead, and in 1970 the Sprocket had a Hub fixed to it. None of the parts were current in 1993. In the photo of a Recorder below the Pencil Lead Holder (see below) and the Slider (see Cams) appear to be used, and if so the latter look to be about ½" wide and perhaps 9" long.

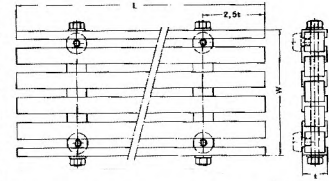


5 special parts for a **Height Gauge** were listed in 1961 & the mid-60s. The main ones were a 25mm Ø **Base***, an **Arm***, 70mm o/a, & a **Sliding Piece***. There was also a **Pencil Lead Holder*** through 1978 (& Leads for it in the m60s).

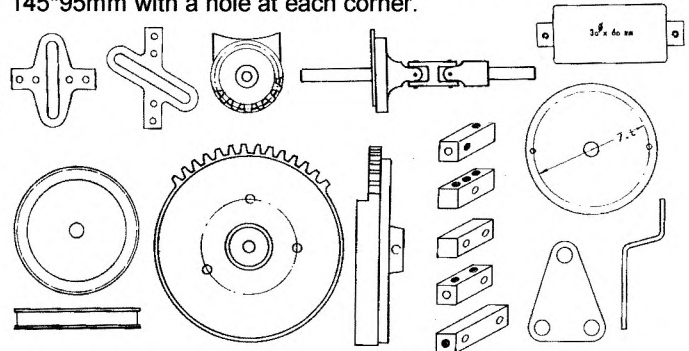
OTHER SPECIAL PURPOSE PARTS • 1961-78. A **Gear Quadrant***, 105mm long o/a, and parts to mount Gear Wheels on it, used for the change wheels on a Lathe. • 1961-93. Steel **Lead Screws** threaded M6, 120*, 176, 239mm long, including 30mm of plain 4mm shaft at each end. A brass, cube-shaped **Lead Nut*** tapped M3.5, ('61-78); a much larger 1*2½*4cm version* with several plain and tapped holes (m60s-78); a 2,5cm long 'double-cube*' with two M3.5 tappings (1970-78); and another*, 19mm long with the M6 bore across, and an M3.5 tapping lengthwise (1993). • A 50mm Ø **Hand Wheel*** (1961). • A **Drum***, 30mm Ø by 45mm long, with 2 **Ends**, one* bored 4mm, & one 12mm for Collet mounting ('61-78). • 2 nicely shaped, alloy **Handle Grips**, 15 & 26*mm long, with Special Bolts to mount them ('61-m60s), then changed to a 26mm parallel



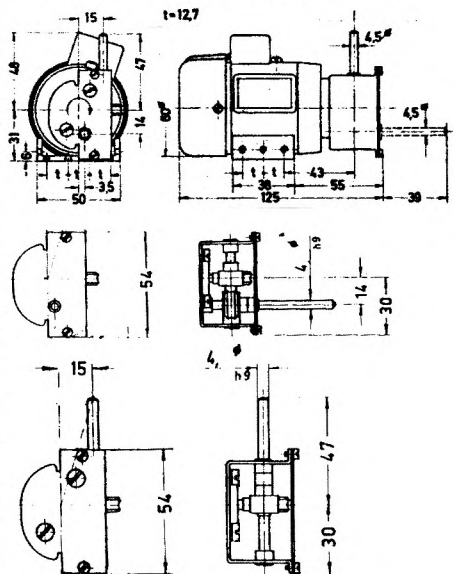
version (1970-78). A **Weight*** ('61-m60s). • **Pointers**, 30*, 60, 165mm long, coloured black, green, & red respectively, with separate 4 & 2.5mm bore, s/t Hubs ('61-m60s). In 1970, 30, 60, 120mm Pointers, with (4mm bore) attached Hub, & without Hub; in 1978 none with hub; in 1993, as 1970 but the only one with Hub was the 30mm, and all were made of PVC. • **Dials**: two 360°, 60 & 125mm Ø, & a 180°, 330mm Ø. A **Scale** marked over 10cm with holes at either end. All these from '61 to 1978. • In 1978 & 1993, 9 **Base Plates**, from 2½*6½" to 5*10½", ½" deep, made from 2 lengths of standard U-section Girders, with special I-section Girders between, spaced apart by small Cubes, all held together by Rods with Threaded Ends. (In 1978 the I-Girders look as if they may have been 2 U-Girders back to back.) • In the 1970 List, 2 **Friction Discs** with Hub (23.350/370), 50 & 70mm Ø - like a Face Plates with no holes in their faces.

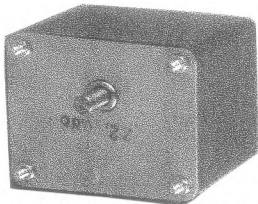


The near-1978 Parts List contained the following parts that were intended for use in the ready built COMPACT models. • The perspex **Gearbox Side Plate** already described but with a central 12.2mm Ø hole. • 2 **Cross Slide Plates*** with slots about 6cm long. • A 112mm long **Hex Shaft** with 5 & 24mm extensions, 4mm Ø. • A **Toothed Body & Gear** with Locking Segment* for an Indexing Drive. • A **Plastic Drum*** 30mm Ø by 60mm long with a tapped boss at each end. • A 95mm Ø x 15mm **Flywheel***. • 5 **Special Connectors** for the Square Girders*, 25mm long except one 43mm. • A 100mm Ø **Face Plate*** with boss and 2x 4mm holes in the face. • A **Triangular Plate***. • A **Wagon Pole*** 140mm long o/a. • A **Cardboard Plate** 145*95mm with a hole at each corner.



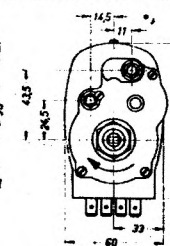
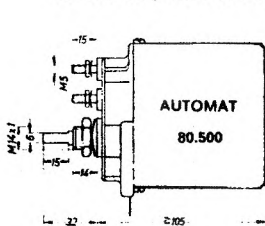
MOTORS Two Motors were shown in the mid-60s List, both for '220/110v'. The first*, with Gearbox, is 125mm long, excluding the (4,5mm Ø) output shaft in its alternative horizontal position. There were 12 gearboxes available giving output speeds of 2, 4, 6, 8, 10, 15, 20, 30, 60, 120, 200 or 300rpm, & the PN's were 80.002 to 80.300. A similar Motor was shown in a mid-1970s List (PN 82.000, 220v, 30W, 2800rpm) with again 12 gearboxes for it (81.002 - 81.300). A Leaflet from perhaps the late '60s, had the same Geared Motor (with 80. PN's), but in one photo the Gearbox was shown without its cover. The 1993 Catalogue showed 2 Geared Motors. The input voltage is again 220/110v, but now whole unit is housed is a





40, 60, 80, 100, 120, 200, 240 or 300rpm.

The second mid-60s Motor was No. 80.500, with a power of '50 W', and its speed could be varied from 1 to 50rpm



'Cooling Surface' (Kühlblech) for this Motor, 80.520, 12*20cm, was also shown and it looks like 2 long coils of wire mounted on a plate, with a printed circuit on part of it. A later Leaflet shows the same 80.500 Motor, but another from soon afterwards, and before 1970, shows a later version, 80.600, with a case similar to the Varimat one described below.

2 variable speed Motors cased like the one above, called Varimat, with an electronic control unit 'of advanced digital design', left, are shown in the 1993 catalogue. The input voltage was again 220/110v, and the output shafts 6mm Ø. The two Motors were called V08 & V16, and they had the same size case measuring 115*115*



75mm. Their speed ranges (forwards or reverse) & torques were 3-150rpm/8cmkp for the V08, & 1-50/16cmkp for the V16. Although shown in the 1993 Catalogue, the Varimat Motors are crossed through in that year's Price List, and in a 1995 List are said to be no longer available.

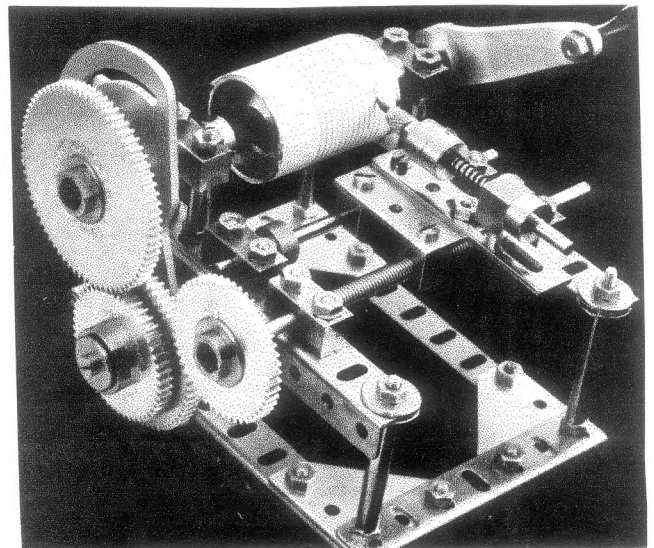
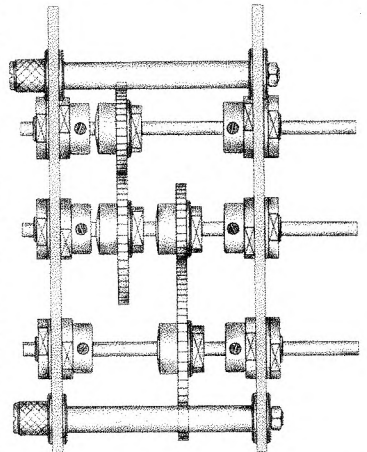
LITERATURE A 32 A4-size landscape page **publicity booklet** in English, entitled 'The AUTOMAT Engineering Sets', has a label on it from the 'Sole Agents': **International Engineering Concessionaires Ltd.**, 39 Parliament Street, Westminster, London S.W.1, and with it is a letter from them dated Feb. 1962. In the Booklet are details of the 6 Instruction Manuals available: #1. Gears & transmissions; the model lathe. #2. Introduction to automatic machines. #3. Cams, cam followers; introductions to crank mechanisms & physics; the Geneva wheel. #4. Motions of cam mechanisms; more on crank mechanisms; machine elements. #5. Cam-operated lever mechanisms; principles of leverage; the Oldham coupling & other forms of connecting shafts; coupler curves. #6. Applications of cam & crank mechanisms; varying the stroke of cam mechanisms; the crank & the oscillating slotted lever; the drag-link mechanism; recording instruments; calculating velocity & acceleration; the eccentric; the cam-operated clutch.

Notes on some of these topics are given, with mention of some other mechanisms using AUTOMAT parts, such as a planetary gear, and friction ratchet, and photos of many of them. The emphasis is on the elements used in automatic machines and the value of AUTOMAT as a teaching/learning aid. The slogan on the back cover is 'the bridge between theory and practice'. Some details are also given of the Sets: Nos. 1, 25, 33, & 1500.

The next item is **6 instructional sections**, home-bound together with an introduction and summary of the system by a firm called **Irwin-Desman Ltd.**, of 294 Purley Way, Croydon CR9 4QL. Their words were written after AUTOMAT had moved to Germany and after 6mm Shafts had been introduced, but the 6 sections all relate to an earlier period and bear the Zürich address. Each section has its own

pagination but in all there are 88 portrait A4 pages. Sets 1 to 6 are mentioned (though struck through in pencil) and 4 of the sections apply to Sets 1, 3, 5 & 6, and have titles similar to those of the corresponding Manuals mentioned in the Booklet above. The other two are 'Applications of gear trains in lathes', & 'Introduction to Planetary Gears'.

Each Section has a number of photos, diagrams & drawings of relevant models, with notes on particular features but no detailed instructions. The exception is the Planetary Gear where only a cross-sectional drawing (the one shown here earlier) is provided. Some experiments are described and some fairly elementary theory provided. The tone is quite serious and the work was probably aimed at apprentices. Two typical models are shown below, a simple Gearbox with the bearings located in the slots of the Gearbox Side Plates, and a Demonstration Lathe. An interesting promotional feature was that most of the sections contained some 'Prize Problems', and anyone sending a right answer to Zürich was to be rewarded by a gift of some supplementary parts. An example: What is the module of a gear wheel with 108 teeth and a pitch circle diameter of 81mm?



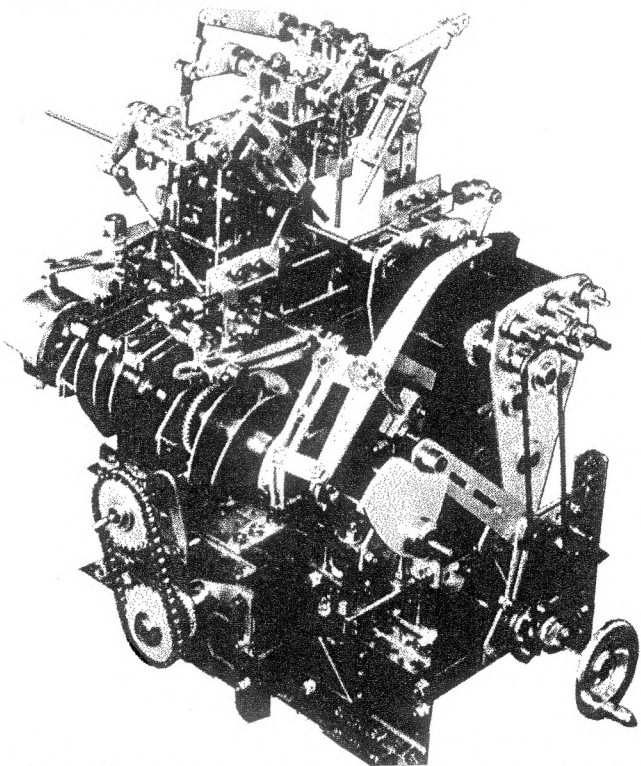
The Irwin-Desman notes mentioned earlier contain some comments on the uses of AUTOMAT, and some emphasis is placed on its suitability for automotive engineering applications, including working models of complete vehicles to study problems of steering, handling, towing, etc.

Next a **manual in French** entitled 'Instructions', and again from the Swiss period. It has 163 portrait A4 pages in all, but in sections as before, and headed Groupe 1 to 7, plus an 'Introduction to Planetary Gear Mechanisms'. All the ground in the English manual is covered but with more theory, and in addition there's a long section on analysing crank/link motion graphically, a section on kinematics, and much more on cams. It's looks to me to be quite advanced material within the topics covered.

The **1993 Catalogue** has drawings of all the parts and also photos of most of them in use in various fairly elementary applications. For example the ways that frame-works and bearings can be constructed, and how Gears and Levers can be mounted. Beyond that are photos of Dovetail Slides and subassemblies sliding on Ball Bearings,

or along Shafts, and some straightforward gear assemblies are shown. There are a few words of advice on getting to know the parts and the general steps needed in planning and building a piece of equipment, but that is all. There is no mention of any other literature.

The literature to hand contains photos of 2 or 3 complex models but not much detail can be seen in them. To give an idea however, one, widely used in early publications, is shown below. The text with it reads, 'This fascinating model of an automatic screw machine was built by us at the request of the Watchmakers' School in Solothurn, Switzerland, for training their young engineers. It took some time and patience to design the machine, but thereafter the various precision AUTOMAT components made the construction a simple exercise.'



THE SETS As already noted **Sets 1 to 6** are mentioned in the earliest material to hand, but no details are available. The contents of each set seems to have been linked to the construction of a particular class of mechanisms.

The IEC letter of 1962 gives prices for **Sets 1, 25, 33 & 1500**, and some details of them are given in the Booklet.

- **Set 1** had parts to make a simple demonstration Lathe, complete with gear quadrant, leadscrew, & change wheels.
- **No.25** weighed 8kg and had 1300 parts, all it is said, needed to make the 50 basic models explained in the 6 manuals included in it.
- **No.33** had 2400 parts in 3 trays; it weighed 14kg and was in a box 45*36*10½cm. A summary of the parts is given and they included 42 Gears/Sprockets, 28 Bearings, 40 A/Gs, 142 Spacers, & about 600 NBW.
- The **No.1500** was packed in a wooden box measuring 50*308*14cm and weighed 23kg. The parts were in 5 trays in 4 layers. An 8 page Brochure with the above Booklet (or an annex to it) gives a summary of the parts in the Set: 64 Gears/Sprockets, 42 Bearings, 60 A/Gs, 112 Spacers, & about 1400 NBW. The No.1 cost £19, the No.25 £125, and the No.1500 £158; at the time the price of a MECCANO No.10 was about £50.

Also mentioned are **Mechanism Kits** to build specific mechanisms, which would be available 'in the near future'. A list of 15 is given, with more to follow, and they go from M 1.0, Crank & rocker mechanism, to M 4.1 The Maltese Cross (coupled to a dial indicator). The idea was that once built these mechanisms would serve as permanent teaching aids. It was said that some parts would be coloured by painting onto the metal or onto strips stuck on the parts,

with green for base parts and red for driven members.

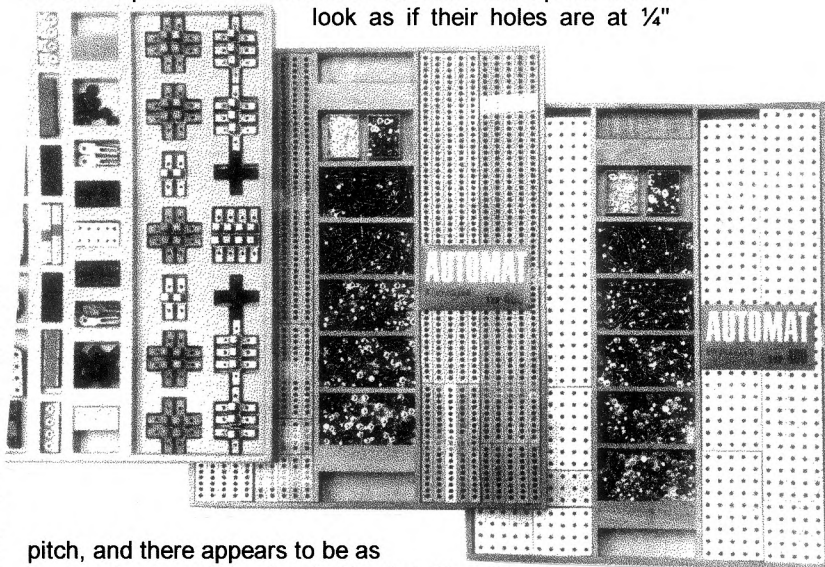
An Automat Leaflet from before the 6mm Shafts were introduced lists **Sets 25,33,1500,1600 & 2000** with their box sizes, weights, etc. The numbers of parts in them are given as 1300,2600,3800,4100 & 5300. A Motor Set '4=12', and the 80.600 Motor are also listed.

A later Leaflet and the Irwin-Desman notes, both after the advent of the 6mm Shafts, say that 4 sets are available, **Nos.25,33,1600 & 2000** with 1260, 2600, 4100 & 5300 parts. An **00.300 Set** containing solely parts to make Square Girder frameworks is also mentioned; elsewhere the contents are given as 52 Girders, 48 Connectors (plus some of 3 other types, if requested), and 100 each of 8, 20 & 30mm N&B, plus Washers, Tools, etc. The **1600** contained Square Girder parts equivalent to those in the 00.300, and the 2000 had a double quantity. All sets were supplied in polished wood carrying cases, and each contained a set of illustrated manuals.

To give an idea of dates, the 1970 Parts List includes wooden cases for all those sets, plus one suitable for 'Set 00.300 and 00.600 and Motors'. Perhaps the 00.600 was a double sized No.00.300.

At this time, and no doubt throughout its life, the Motor Set "4=12" contained 4 Motors and all 12 Gearboxes. Individual Geared Motors were of course also supplied, with whatever gear ratio was specified.

The sets in the 1993 Catalogue are the **401,500,1400, 1600 & 2000**, and all are packed in wooden cases with trays, as before. It is said that the sets contain room to house extra parts. • The **401** contains structural parts, with 3 layers of Square Girders, Connectors (which look ready assembled), Brackets, etc. Standard Square Girders can be seen in a photo of the Set below but also some parts which look as if their holes are at ¼"



pitch, and there appears to be as many of one as the other in the Set. Possibly the ¼" parts are simply printed card packaging but it doesn't look like it in the original. • The **500** is called the Profile Kit and contains, in 2 layers, a selection of the U & T-slot Girders, N&B, and various small Plates and Corner Brackets. • The **1400** is the basic structural set and cost twice as much as a 400. The parts are in 4 layers, one with 12 ready assembled Base Plates; one with (blue) Cover Plates, U-Girders, & I-Girders; one with 2 sets of Square Girders and N&B; & the fourth with all the Connectors, Small Plates, and Brackets. No T-slot Girders are included. The I-Girders are not mentioned elsewhere as separate parts. • The **1600** is the basic gear kit with 5 layers of Gears, Sprockets, Pulleys, Bearings, Shafts, Collets, Levers, Couplings, fittings, and special parts. • The **2000** has structural and mechanical parts, this time with 2426 packed in 5 layers. It contains a wide selection of parts including some Square and T-slot Girders, but no Bases or Cover Plates, and probably none of the parts for the particular mechanisms described earlier. It cost about the same as the 1400 or 1600 - DM4400 in

1995, £1500 say, and is said to be intended for technical schools, apprentice shops, inventors and hobbyists. • A 3000 Kit is also mentioned and seems to be just a 1400 & a 1600 in their own boxes. It isn't listed in the 1993 Price List but it is in a 1995 one and costs some 10% less than buying its component sets individually.

Motor Kits 8310 & 8410 are also shown and are simply 10 of the small Geared Motors, or 10 of the large ones, one for each output speed, packed in a plastic carrying case.

The **1995 Price List** has all the 1993 sets plus various others which are, like the 3000, just a combination of the standard sets at a slightly reduced price. The new ones are the 901 (500 + 401), 1900 (1400 + 500), 2001 (1600 + 401), 2100 (1600 + 500), 2500 (2000 + 500), 3500 (1600 + 1400 + 500), & 3901 (1600 + 1400 + 500 + 401).

Mechanism Kits were mentioned earlier and these presumably led to the ready built **COMPACT Gear Models** which were intended to demonstrate all manner of mechanical movements. The simplest is a belt running over a pair of pulleys with a jockey pulley, and pointers on the shafts to show what is happening. At the other extreme a planetary gear, again with pointers. A pair of the transparent Gearbox Side Plates, spaced apart, form the main structure of the models and many of the components look to be standard parts. 60 of the Kits are listed in MCS under COMPACT SMP, with some small illustrations. They would date from about 1970 when Stock Model Parts (SMP) sold AUTOMAT material in the U.S.A. In 1993 there were 75 Models in all, called the C 62 Series, and all but a few of the 1970 ones have been carried forward with the same PNs.

USING THE PARTS David Hobson owns the early parts mentioned in the Introduction and he kindly lent them to me to play with. The main ones were A/Gs, Brackets, Levers, Gears, Threaded Bearings, 4mm Shafts, & Lead Screws with Lead Nuts.

I made a framework and had a 96:18 gear step-up driving a Lead Screw; a pair of Lead Nuts on the latter were bolted to a Rack which meshed with a Gear Wheel. I'd then used up all of the 6 Bearings. The framework was easy to make and perfectly rigid, but the geometry of the A/Gs didn't allow two to be joined at right angles through their round holes, and it was not possible to join three at a corner with 3 N&B. The Bearings were surprisingly easy to line up, partly due to the slightly greater clearance in them compared to the FAC parts, and they were also not quite as long. It would have been easier to mount the Rack if there had been a longer Lead Nut with 2 mounting holes in it, and such a part was introduced later on. As would be expected from such accurate parts, my little mechanism worked smoothly first time.

What to say more generally about AUTOMAT? Comparisons with FAC come to mind but I really haven't adequate experience of either system, particularly in building complex mechanical movements or the heavier types of machinery. This is especially true of AUTOMAT's later parts, which I've not even seen, let alone used.

Nevertheless my overall conclusion about FAC must apply equally to AUTOMAT: any good-sized range of reasonably well designed, accurately made parts would be more than welcome to anyone who needs to make up the types of machinery envisaged by the designer of the system. The literature and the early range of parts seem to indicate that with AUTOMAT the original emphasis was on demonstration models, particularly those relating to automatic machine tools, and other small pieces of machinery. But later on the addition of 6mm Shafts would have allowed more power to be used, and the heavy Girders would have made strong frameworks possible. Comments from anyone who has used the parts would be very welcome.

THANK YOU to all who have contributed material, including Josep Bernal, Jeannot Buteux, John Hanby, David Hobson, Thomas Keel, Thomas Morzinck, & Geoff Wright.

MERKUR News David Hobson was recently able to take photos of some sets belonging to Bill Foote, and he kindly gave me copies. They include No.340, the largest set in the previous range (see 9/213), and two new sets that have been introduced since the notes in 17/484. So MERKUR seems to be alive and well, though I've not heard of it being on sale in the UK. (Is TECC (20/569) still marketed I wonder.) The 'CROSS' name is still prominent on all items.

One of the new outfits is a larger **Motor/Gears Set, No.2.2**. Its box is somewhat larger than that of the No.2.1, but is in the same style, and all the 2.1 parts can be seen, plus more gears and some other parts. The former include another Contrate, another 50t Gear, and 2 more Bevels. The other parts that can be seen are some Axles, a 7h Strip, a few DAS, more than one 5h wide Flat Plates, a 5*5h & one, perhaps two, 5*10h Flanged Plates, 2 Trunnions & 2 Plastic Flat Trunnions, 2 Large Trunnions #2039 (red) & 2 Large Flat Trunnions #3038 (green), and (probably) a 10h A/G and a second Coupling. The front of the Model Leaflet (or Manual perhaps) is similar to that of the 2.1 in layout but shows the Motor driving an output shaft with a 38mm Pulley on it, through a Pinion/Gear reduction, followed by a Worm stage. Apart from Pulleys the 2.2 Outfit appears to contain most but not quite all the parts needed for the Mechanisms in the 2.1 Leaflet.

Before going on to the second new set, a word about the **No.340**. The parts are in 4 trays and sit in the usual MERKUR clear, moulded plastic inserts. The style of the lid and the manual cover is similar to that of the 330 manual in OSN 9, with side views of a more elaborate Windmill driven by a gear train, and a tracked Chassis under it. The 85 & 119t Gears shown are the early 6-spoke design but the ones in the Set are the current type with no cutouts.

The other new set is the **No.8** with 1405 parts and weighing 6.6kg. So it's appreciably larger than the No.7 and it includes the Motor that is in the Gear Sets, the only regular set to do so. The parts are in 5 trays with inserts, and fit into a box which is probably the same size in plan as the No.6 & 7. It's no doubt deeper to allow a stack of 3 trays on one side with 2, deeper and edged in red, alongside. The models on the lid are those shown in OSN 17 for the No.6, but inset top right is the Mechanism from the 2.2 lid and there's another inset top left but I can't make out what it is. The text is in 12 languages and down the lefthand side are some 20 small flags. All the main parts can be seen including the 5h Braced Girder not in the 340. In addition to the Pulleys/Tyres in the 340 there are 4 new Tyres that scale at 7cm o.d. This part is black plastic and looks to be a disc with the tyre shape moulded around it (left). The only hole in the disc is at the centre and although a 38mm Pulley would fit into the recess above the disc I can't see how it would be attached. Perhaps the Tyre has a boss behind the disc



and it is a push-fit on the Axle, with the Pulley fastened to the Axle by its Set Screw as decor. Colours are as usual except that both parts of the battery Box are black. The 'M3 - M8' on the Manual cover (below) presumably indicates the sets covered though the M prefix isn't used elsewhere. No



details are available as to what's inside. The Tractor is the one shown in 20/569, but now it's pulling a Trailer.

& the benefit of this in allowing use anywhere, without fear of damage, was pointed out in both the FOR & NGN instructions.

On the end dates, nothing is known of NGN after WW2 but David found FOR listed in a 1954 & 1955 dealer's catalogue, but not in the 1959 edition. He also mentioned that catalogue pages showing FOR, from 1931 to 1951, are in a book called *Le Jouet de Paris JEP 1902-1968*.

FORGEACIER: S1; N-G-NEERO: S1 [31/908-9]

5. Don Redmond commented that the number of **KONSTRUKTOR** systems, 18 at present, makes it difficult to identify any particular one, and that wherever possible the 'official' name should include any qualifying name on the box, transliterated of course. I'd rather given up doing this because sometimes the name on the set isn't the same as the one on the manual, sometimes the names on sets in the same range differ, and sometimes the names have stylised or cursive letters which makes transliteration difficult or even impossible. However I can see that for anyone prepared to do the necessary transliteration, the extra name would help in the critical case of having a set or manual and wanting to identify which **KONSTRUKTOR** it is in the OSN Index or Database. The transliteration table that I use for normal characters was given in 4/75, and below (thanks to Michael Denny) one for

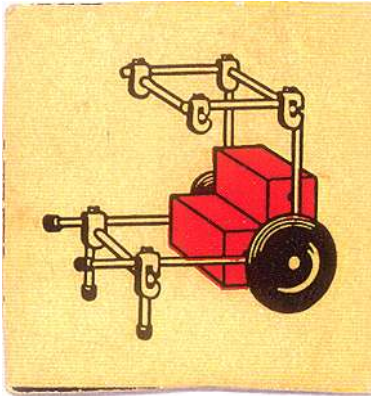
Printed form	Cursive form	П	п	Π	π
А	а	Р	р	Р	р
Б	б	С	с	С	с
В	в	Т	т	Π	т
Г	г	У	у	У	у
Д	д	Ф	ф	Ф	ф
Е	е	Х	х	Х	х
Ё	ё	Ц	ц	Ц	ц
Ж	ж	Ч	ч	Ч	ч
З	з	Ш	ш	Ш	ш
И	и	Щ	щ	Щ	щ
Й	й	Ъ	ъ	Ъ	ъ
К	к	Ы	ы	Ы	ы
Л	л	Ь	ь	Ь	ь
М	м	Э	э	Э	э
Н	н	Ю	ю	Ю	ю
О	о	Я	я	Я	я

their cursive form. In the end though I suspect that the real answer would be an illustrated index with small photos of the logo, lid(s), manual cover(s), etc for each system. Comments on all this would be welcome.

Cyrillic Names [31/909]

6. Don also sent some details of John Wapshott's **LIL'N-GINEER** set (see 27/782), or rather a set of parts in a chocolate box, with the name from the original lid pasted on to its lid.

The form of this name, left, differs from the one in OSN 27 (even though there may originally been another word after **CONSTRUCTION**). There was no model sheet with the set but 6 cards, 5*5cm, with a model on each. The model on the one left isn't included in the OSN 27 model sheet; the others are but the drawings differ a little in each case. Some of the parts are not quite the same either, notably the dimensions of the wheels: Don gave the o.d. of their Tires as 27, 30, & 33mm, but it isn't sure which of them are original.



LIL'N-GINEER: S1 [31/909]

7. News from Paul Goodman that deliveries of the **MÄRKLIN METALL Excavator Set** were stopped until a mistake in the instructions was corrected – they were due to resume around August/September. Paul also sent a better photo and some notes on the model. All the movements are hand operated by Cranks on one side of the cab but there is probably enough room inside to house Motors, etc. The tracks are based on the MetallusTrack Set with nearly 1600 parts. Looking at the photo there are probably special Plates used in the cab & bucket.

MÄRKLIN: S2 [31/909]

8. Paul also recently visited the **AUTOMAT** factory and kindly sent me a current catalogue. It is identical to the 1993 one described in OSN 21 but there may have been some small changes in the contents of the current sets. With it a leaflet showing 5 Junior Gear Kits not known before. They are #1-5, called Gear Drives; Traction Drives - synchronous; Traction Drives - asynchronous; Gear Drives with crossed Shafts; & Friction Wheel Drives. Each is packed in a plastic box & has a selection of Gears & parts to make frameworks for them, including a clear Plastic Plate unique to the Junior sets. The ready-built **COMPACT** Gear Models are also mentioned, 50 of them though the firm's web site, www.compact-technik.de, lists 76. This site also has some details of the sets, & illustrations of the parts. A price list for the parts can be downloaded & it shows a few changes from the Catalogue, with some additions and some deletions.

AUTOMAT:S1 [31/909]

SMALL AD [31/909]

Wanted STOKYS sets, parts, manuals. Please list & price in first letter. Richard Symonds, Suite 101, 1675 Martin Dr., Surrey, B.C. V4A 6E2, Canada. Tel: 1-604-536-6538.

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EDITORIAL I'm pleased that OSN has survived 25 years to reach No.50 and that it is still in good heart. Much ground has been covered and much remains to be explored, but for me at least it has been a fascinating journey, and I look forward to producing more Issues. None of this would have been possible without the support of both contributors & subscribers, and I would like to thank them all, not least for their patience now that it takes so much longer to produce each Issue.

Shorter NOTES, with thanks to all contributors.

1. **Snippet. TRONICO Dinosaurier Sets.** There are 3 of these outfits, all in the same vein. They are Tyrannosaurus



FIG.1

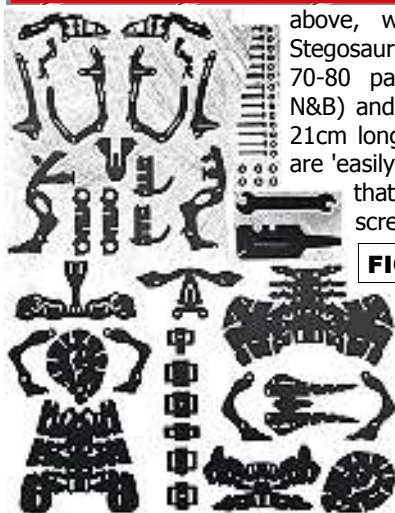


FIG.2

above, with its parts below it; Stegosaurus; & Triceratops. All have 70-80 parts (including 30 or so N&B) and all the models are about 21cm long. It is said that the parts are 'easily bendable' aluminium' and that 'the kits are only bent not screwed together'. So presumably the parts interlock after having been suitably bent, with the N&B at critical points. I wondered if the parts were ready formed but in an Ebay set they look flat, and the diagonal slot in the corner of the Screwdriver's handle

is probably an aid to bending.

These sets are sold (at €9 each) only by the shop attached to the TRONICO website, but sets to make identical models called METAL DINO, as below, have been seen on American Ebay. As can be seen the lids have OWIKIT in small letters in the bottom left corner. A Parts List sheet with one set is headed ROBOTIKITS & below it is 'This aluminum kit includes soft and hard aluminum plates. To give this kit your own



FIG.3

shape, bend the soft plates to a different position and/or angle according to your own ideas.' And the undersides of all the boxes, OWIKIT and TRONICO show the animal in several different postures.

TRONICO: S4

[50/1516]

2. **AUTOMAT.** Paul Goodman wrote (some time ago I'm sorry to say) that AUTOMAT had changed hands, and since June 2012 its new owner has been Knotech GmbH, Selitstraße 10, D-55234 Erbes-Büdesheim, a town about 50km away from the previous address.

The website [//www.compact-technik.de](http://www.compact-technik.de) gives details of the current range of sets & parts and I hope one day to update the review of AUTOMAT in 21/604 (that was in 1999) to include an outline of all the changes since then.

AUTOMAT: S2

[50/1516]

3. **METALLUS.** Paul Goodman also mentioned that this German system might be 'running down', and when I checked its website the only sets I could find were 3 of the earlier 7 basic sets, and one theme set, the Ploughing Engine. It was only practical to check on a few parts: all of the 3 categories of common parts I looked at were as before, but in more specialized areas no parts were listed in 2 of 3 of them.

METALLUS: S6

[50/1516]

4. **The TECO Manual.** Jürgen Kahlfeldt wrote that the 8 model pages in the TECO manual described in 34/1027 are identical to 8 of the 13 model pages in the 31st Edition of the STABIL manual for Set 48, although said pages are not in the same order.

TECO: S4

[50/1516]

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