

AUTOMAT

A
METRIC
TRAINING
AID!

Metric Breadboarding Systems

for Industry and Education

Automat is the ultimate mechanical breadboarding system. The system can be used for construction of both functional and demonstration models of virtually any working electromechanical machine.

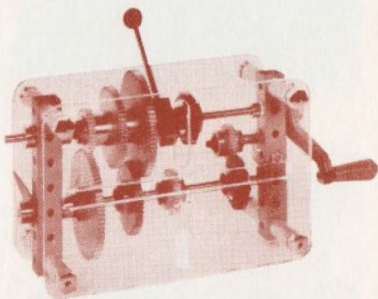
The kits provide everything required to build, alter and demonstrate mechanical models. Special purpose gear and cam drives, link motions, parts for making structural framework, and detailed manuals. No special tools are required. See pages 2-9.



SMP COMPACT™

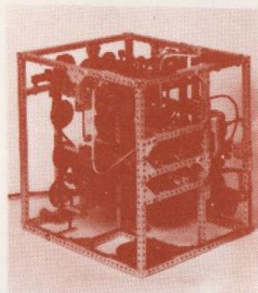
KINEMATIC TEACHING KITS

These 60 different kits enable students to quickly grasp the basic principles of mechanical motion. They are used as demonstrators by high school or college teachers and can be assembled repeatedly by small groups of 2 or 3 students. See pages 10-23.



**STOCK
MODEL
PARTS**

Division of Designatronics, Inc.
54 South Denton Avenue
New Hyde Park, New York 11040
Phone: (516) 328-3300



SMP/Automat consists of a collection of high quality METRIC components. These components are compiled in a logical manner combining different varieties, sizes and quantities of parts, and as a result of this, yield highly versatile construction kits.

Model or prototype building is a task usually undertaken by innovative teachers or engineers for one of the following reasons:

- to develop feel for space relationships of objects
- to develop manual skills
- to stimulate inventiveness and imagination
- to communicate an idea in three dimensions
- to demonstrate a principle
- to train personnel and develop operative skills
- to build a model for preliminary engineering study
- to build a prototype of an actual machine or device
- to establish or optimize assembly procedures
- to enhance a presentation or support a sales effort

Sturdy AUTOMAT parts are made of different metals and finished with bright protective and decorative coatings. All the parts are METRIC which makes these kits and parts exceptionally suitable for teaching and training as U.S. industry converts to the metric system.

The AUTOMAT Frame System presented in this catalog is a unique idea for breadboarding and prototyping purposes. The square cross-sections of the AUTOMAT struts have extremely high torsional and flexural rigidity. Previously available cast breadboard bases had been prohibitively expensive. AUTOMAT Frames provide the ultimate solution; a reasonably priced, true three-dimensional structural support system. AUTOMAT may be used to interface with other components and mounting hardware available off-the-shelf from our affiliated Stock Drive Products Division. To obtain SDP catalogs please see the back cover.

All kits and parts shown in this catalog are available from stock for immediate delivery.

For HANDY ORDER FORM SEE PAGE 23.

AUTOMAT BREADBOARDING KITS

BASIC KIT

See Fig. 1
This model contains 2,600 parts-housed in a wooden case (52 cm long x 42 cm wide x 13 cm high) weighing 57 pounds. A top notch educational tool for larger teams of students or an instructor wishing to build several working models to demonstrate principles of physics, mechanical drawing or kinematics.

Model No. 4Z1M00033 \$763.00

INTERMEDIATE KIT

This is the kit which includes the square tube frame system. It contains 4,100 parts, weighs 68 pounds and is housed in a wooden case (52 cm long x 42 cm wide x 15 cm high). This model will fill most requirements of industry, education, and research.

Model No. 4Z1M01600 \$1,359.00

ADVANCED KIT

See Fig. 2
This is the most advanced of the AUTOMAT kits. It contains 5,300 parts including 2 square tube frame systems. Weighs 79 pounds and is housed in a wooden case (52 cm long x 42 cm wide x 15 cm high). The ideal model for research laboratories and industry, this model consists of more components for the development of larger and more complex mechanical systems.

Model No. 4Z1M02000 \$1,663.00

AUTOMAT MOTOR KITS

The perfect power sources for any Automat-built mechanism.

VARIABLE SPEED MOTOR

See Fig. 3
The Automat variable speed transistorized reversible motor operates at output speeds of between 5 to 50 r.p.m.. It consists of two basic parts: the motor housing, plus the speed control box.

Model No. 4Z1M80600 \$359.00

GEARMOTOR KITS

See Fig. 4
This supplementary gearmotor kit includes: 4 reduction gearmotors; 12 interchangeable gears with 2-4-6-8-10-15-20-30-60-120-200-300-RPM's; flanges; tools; lubricant. The entire kit is housed in a sturdy wooden case. Automat gearmotors operate on a circuit voltage of 220/110 volt AC, 60 cycles.

Model No. 4Z1M00412 \$372.00



Fig. 1

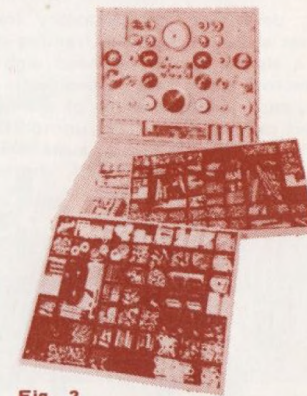


Fig. 2



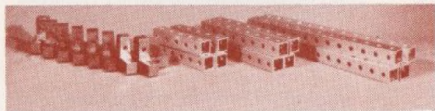
Fig. 3



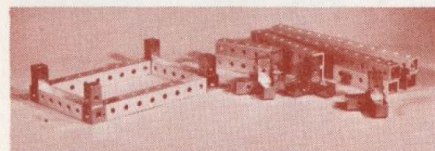
Fig. 4

Putting All the Pieces Together

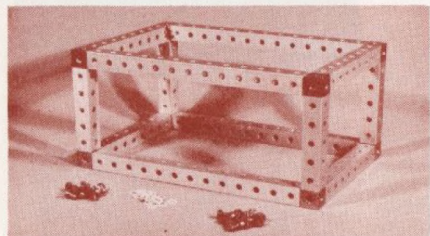
Assembly of a basic model is not fraught with hazard. For one thing, functions of standard kit parts are fairly obvious, so they are misapplied infrequently. And assembly of a flawed model is hardly a tragedy—just tear it down and try again. Nevertheless, it's worthwhile to see how a simple model is assembled, because a step-by-step walk through the assembly process can impart a "feeling" for the capabilities of kit modeling. So here is a cookbook guide to assembling a basic model.



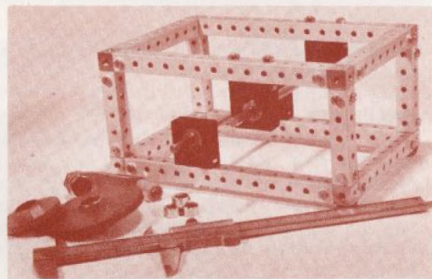
First, determine the necessary frame size and set aside the required framing elements. For a simple box, you need eight corner connectors plus four tubes each for the sides, ends, and elevations of the box. Most frames can be built from unmodified parts in the kit. But if special scale is required, stock tubes can be drilled, shortened, or extended with little effort.



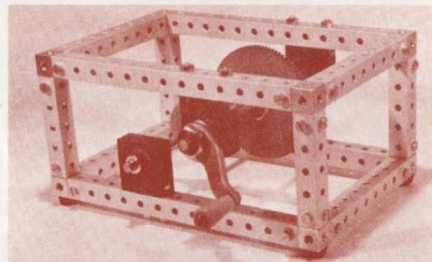
Assemble each end section by slipping the required tubes on the ends of the corner connectors.



When the frame is slipped together, fasteners are selected. The corner sections are tapped for M3.5 metric screws, which are normally used with plastic washers to avoid marring the kit finish. For "permanent" assemblies, or models subjected to vibration, lockwashers are recommended. The basic frame is now ready for bearing mounts.

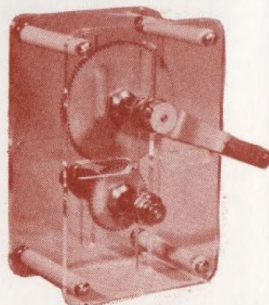


Depending upon the job, sleeve, spherical, or ball bearings may be used. Several types of bearing housings are used to mount and align the bearings. Typically, one bearing is attached and a dummy shaft inserted in it to align the bearing at the other end of the shaft. Then the distance between gear centers is computed, and the second set of bearings is mounted accordingly.



To complete the model, push the working shaft through one bearing, then place a plastic washer, stop collar, and the required gear on the shaft. The gear must be equipped with a sleeve and collet chuck (parts of the kit) for secure holding. When all shafts and gears have been mounted, the gears are positioned for smooth operation and tightened. Operation is tested, then handles and pointers are fitted to the shaft ends, and the model is complete.

For small, simple models used primarily to instruct, clear plastic sideplates can be used for framing elements. The chief advantage of plastic models is improved visibility of working parts.



STACK MODEL PARTS METRIC

FRAME KITS

Kit 4Z2M00300 consists of precision made square tubes and a collection of connecting pieces which allow rapid frame construction.

Slotted connecting pieces and adjustable hinges facilitate diagonal bracing or the fixing of sloping members at any desired angle. Hole pitch and other modules enable these parts to be used in conjunction with all other AUTOMAT sets and components, if required.

Flat plates, supports and also AUTOMAT angle irons complete this static frame building system, which has been extensively tested and proven in actual use.

One of these kits is included in kit 4Z1M01600, and two are included in kit 4Z1M02000.

The extruded tubing is 13 mm x 13 mm with holes spaced 12.7 mm apart.

Kit 4Z2M00300 contains:

SQUARE TUBES

4 pcs.	3 holes No. 4A2M00003
8 pcs.	4 holes No. 4A2M00004
8 pcs.	5 holes No. 4A2M00005
8 pcs.	8 holes No. 4A2M00008
8 pcs.	13 holes No. 4A2M00013
4 pcs.	18 holes No. 4A2M00018
4 pcs.	23 holes No. 4A2M00023
4 pcs.	28 holes No. 4A2M00028
4 pcs.	33 holes No. 4A2M00033

CONNECTORS

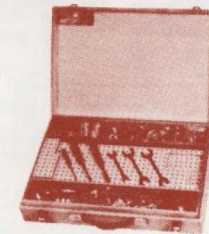
2 pcs. long	No. 4C2M00101
4 pcs.	No. 4C2M00102
4 pcs. L-form	No. 4C2M00103
4 pcs. T-form	No. 4C2M00104
4 pcs. T-corner	No. 4C2M00105
10 pcs. X-corner	No. 4C2M00106
2 pcs. X-form	No. 4C2M00107
2 pcs. X-corner	No. 4C2M00108
4 pcs. short	No. 4B2M00113
4 pcs. XX-form	No. 4C2M00114

MISCELLANEOUS

4 end pcs. for tubes	No. 4C2M00109
1 pair of telescope pcs.	No. 4A2M00110
1 pair of hinged pieces	No. 4C2M00111
1 pair of hinges with stud	No. 4C2M00112
1 pair of slotted hinges	No. 4C2M00115

HARDWARE

100 binding head screws	8 mm long
100 binding head screws	20 mm long
100 binding head screws	30 mm long
200 hexagonal nuts, washers, tools etc.	



4Z2M00300 Single Frame Kit
(696 parts) List Price \$239.00

4Z2M00600 Double Frame Kit
(1392 parts) List Price \$470.00



4C2M00101



4C2M00109



4C2M00114



4C2M00104



4C2M00108



4C2M00103



4C2M00102



4B2M00113



4C2M00106



4C2M00107



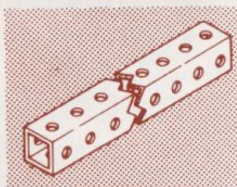
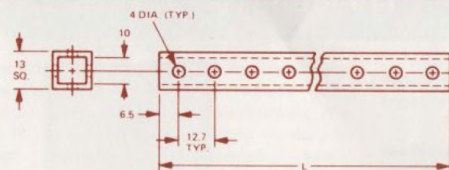
4C2M00105



4A2M00110



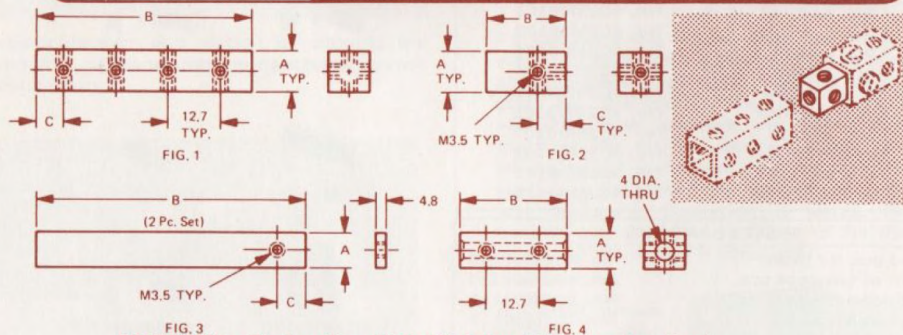
FRAME KIT STRUTS



MATERIAL: Alum. Decorative Anodized

Catalog Number	Holes Per Side	L Length	List Price
4A2M00003	3	38	.46
4A2M00004	4	51	.61
4A2M00005	5	63	.77
4A2M00006	6	76	.99
4A2M00007	7	89	1.10
4A2M00008	8	102	1.23
4A2M00009	9	115	1.58
4A2M00010	10	128	1.78
4A2M00011	11	140	1.90
4A2M00012	12	153	1.95
4A2M00013	13	165	2.00
4A2M00015	15	191	2.38
4A2M00016	16	204	2.68
4A2M00018	18	229	2.77
4A2M00023	23	292	3.54
4A2M00028	28	356	4.30
4A2M00033	33	419	5.07

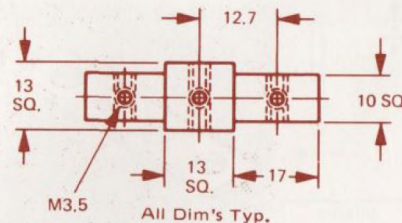
FRAME KIT EXTENDER



MATERIAL: Steel or Brass-Nickel Plated or Aluminum Anodized

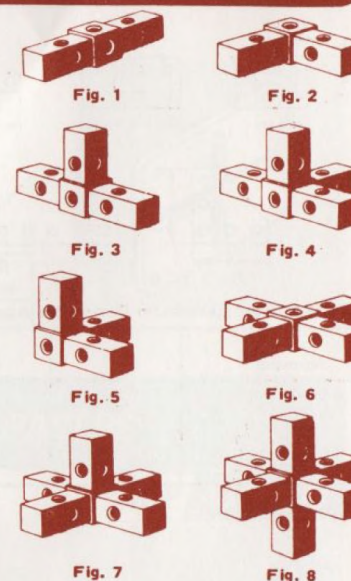
Catalog Number	Fig.	A	B	C	Mat'l	List Price
4A2M00101	1	10	51	6.5	Steel	2.19
4C2M00109	2		17		Alum.	.30
4A2M00110	3		63		Brass	.93
4B2M00113	4		25			.77

FRAME KIT ELBOWS

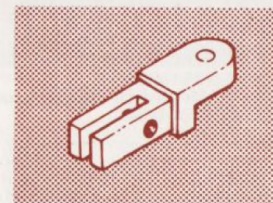
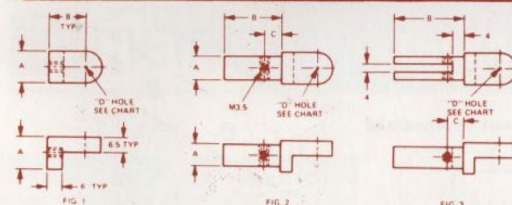


MATERIAL: Zinc diecast

Catalog Number	Fig.	List Price
4C2M00102	1	2.09
4C2M00103	2	2.67
4C2M00104	3	2.81
4C2M00105	4	3.45
4C2M00106	5	3.09
4C2M00107	6	3.03
4C2M00108	7	3.45
4C2M00114	8	3.75



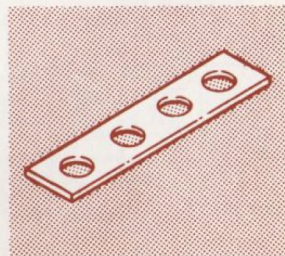
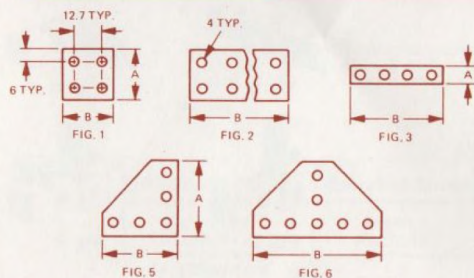
FRAME KIT HINGES



MATERIAL: Steel-Nickel Plated

Catalog Number	Fig.	A	B	C	D Hole	List Price
4C2M00111	1	13	12.7	—	4	1.08
4C2M00111A					M3.5	1.08
4C2M00112	2	10	17	6.5	4	1.37
4C2M00112A					M3.5	1.37
4C2M00115	3	10	25	6.5	4	1.29
4C2M00115A					M3.5	1.29

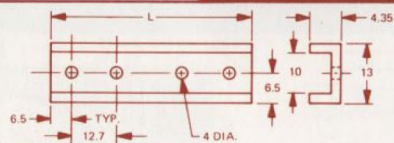
METRIC CORNER AND MOUNTING PLATES



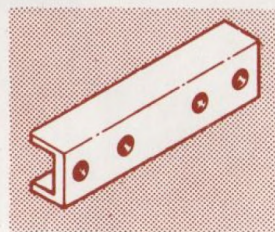
MATERIAL: Aluminum Decorative Anodized

Catalog Number	Fig.	A	B	Thickness	List Price
4A2M01201	1	25	25	2	.30
4A2M01202	1	25	38	2	.35
4A2M01203	2	63	63	2	.40
4C2M01211	3	10	50	1.3	.16
4A2M01215	5	38	38	2.5	.54
4A2M01216	6	63	63	2.5	.61

METRIC FRAME KITS HALF-STRUTS



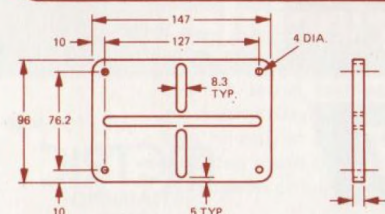
MATERIAL: Aluminum, Decorative Anodized



Catalog Number	L Length	No. of Holes	List Price
4A2M00402	26	2	.30
4Z2M00403	39	3	.32
4A2M00404	51	4	.37
4A2M00405	63	5	.38
4A2M00406	74	6	.42
4A2M00408	101	8	.48
4A2M00409	114	9	.56
4A2M00410	127	10	.63
4A2M00413	164	13	.74
4A2M00415	190	15	.80
4A2M00417	216	17	.88
4A2M00421	266	21	1.34

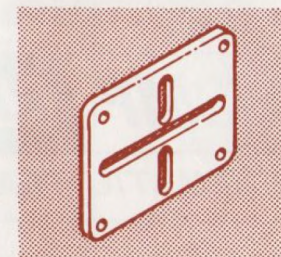
METRIC

SIDE PLATE



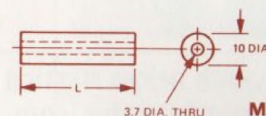
MATERIAL: Plexiglass
(Clear Acrylic)

Catalog Number	List Price
4M2M01001	2.16



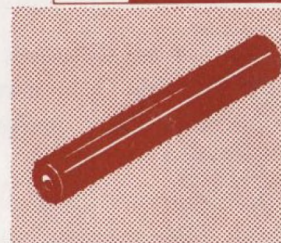
METRIC

SPACERS



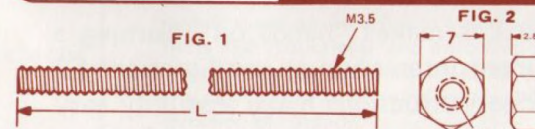
MATERIAL: PVC-Light Gray

Catalog Number	Length	List Price
4P2M01002	55	.38
4P2M01003	32	.30
4P2M01004	23	.22
4P2M01005	10	.16
4P2M01006	35	.22



METRIC

THREADED TIE RODS



Catalog Number	Fig.	Length	List Price
4C2M12425	1	25	.06
4C2M12430	1	30	.08
4C2M12440	1	40	.11
4C2M12450	1	50	.11
4C2M12460	1	60	.13
4C2M12475	1	75	.16
4C2M12500	1	100	.18
4C2M18402	2	—	.46*

*Per 10 pieces



For rod extenders see page 12.
For rod ends see page 20.

The exciting new way to teach Mechanical Principles:

SMP COMPACT™
KINEMATIC TEACHING KITS

A
METRIC
TRAINING
AID!

Add instant comprehension to textbook instruction with this unique series of mechanical drive training aids from Stock Model Parts.



There are 60 different kits to choose from, with prices starting at just \$17.56. The kits consist of rugged, colorful drive components and clear lucite side plates, which measure $3\frac{3}{4}$ inches (15 x 10 cm).

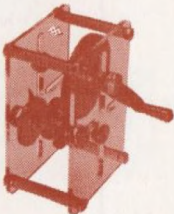
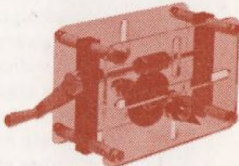
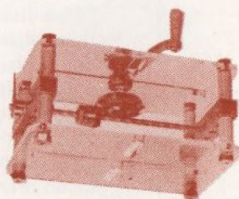
Each demonstrates an important mechanical drive principle, such as angular-speed variation (model illustrated), motion transmission using helical gears or centrifugal-clutch drives. Your students can actually see the relationship between gears, belts and clutches; recognize direction changes and visualize how actual machines work.

And the low cost of these kits makes "hands on" learning a practical reality. Essential student interaction in small groups of 2 or 3 can be encouraged. Precise instructions make assembly easy and interesting. Each kit comes in its own sturdy plastic box.

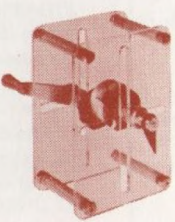
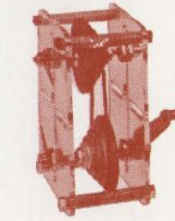
**STOCK
MODEL
PARTS**

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New Hyde Park, New York 11040
Phone: (516) 328-3300

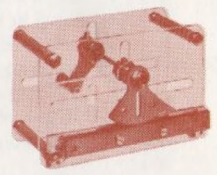
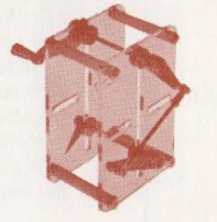
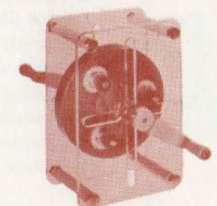
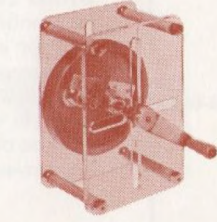
SMP COMPACT™ KINEMATIC TEACHING KITS

Cat. No.	Description	Completed Kit
424-001	SINGLE-MESH GEAR DRIVE Drive illustrates speed relationships in a single-mesh, external, spur-gear drive. 48-tooth gear on crank-operated input shaft drives 96-tooth gear on output shaft with indicator. Useful in studying speed ratios and control of direction of rotation obtainable with gearing. Price: \$17.56	
424-002	GEAR DRIVE WITH IDLER Drive illustrates speed relationships in a gear train with idler. 48-tooth gear on input shaft drives 36-tooth gear (idler) on intermediate shaft, which meshes with 96-tooth gear on output shaft. Illustrates function of idler in changing direction of rotation without affecting output-shaft speed. Price: \$20.75	
424-003	DOUBLE-STAGE GEAR DRIVE Drive indicates speed- and directional relationships in a compound gear train: dependence of speed ratio between input and output shafts on tooth ratios of both meshes (96/36x54/48), while number of meshes determines direction of rotation (in this case both shafts rotate in same direction).. Price: \$23.14	
424-004	WORM-GEAR DRIVE Drive illustrates motion transmission between two non-parallel, non-intersecting shafts at right angles; speed-relationships in a worm-gear drive (note high reductions); and introduction to irreversible drives; crank and indicator on the two shafts assist in studying speeds and direction of rotation. Price: \$20.75	
424-005	BEVEL-GEAR DRIVE Drive illustrates motion transmission between non-parallel, intersecting shafts (in this case at right angles), and speed relationships in a bevel-gear train. Crank and indicator on the two shafts assist in studying speeds and directions of rotation. Price: \$23.94	

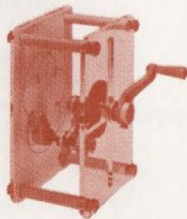
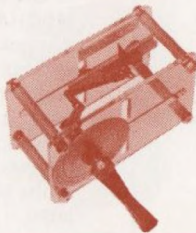
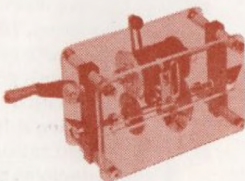
SMP COMPACT™ KINEMATIC TEACHING KITS

Cat. No.	Description	Completed Kit
4Z4-006	GENEVA DRIVE Drive illustrates principles of an indexing motion. Crank-operated drive shaft engages six-station, external geneva wheel, motion of which is intermittent (1/6 turn advance followed by dwell). Illustrates speed variation and constructional characteristics of an intermittent-motion drive. Price: \$17.56	
4Z4-007	CHAIN DRIVE Drive illustrates principle of positive-motion transmission between parallel shafts using chains. Sprocket on crank-operated drive shaft actuates roller chain passing over intermediate (idler) sprocket and engaging sprocket on driven shaft (with indicator). Useful in showing speeds and directional relationships in chain drives. Price: \$27.93	
4Z4-008	FLAT-BELT DRIVE Drive illustrates principles of motion transmission over belts. Introduction to friction drives. Crank-operated drive shaft with pulley drives belt running over intermediate (idler) pulley and pulley on driven shaft with indicator. Useful in illustrating speed- and directional relationships in belt drives. Price: \$22.34	
4Z4-009	OLDHAM COUPLING DRIVE Drive illustrates motion transmission requiring coupling of two, offset, parallel shafts running at the same speed. In the Oldham coupling, perpendicular projections or keys on the two shafts engage correspondingly shaped perpendicular slots or keyways on floating, intermediate member. Motion of intermediate member adjusts to accommodate shaft offsets. Price: \$26.33	
4Z4-010	STEPPED-BELT DRIVE Drive illustrates principle of variable-speed transmissions using belt drives. Drive shaft and driven shaft contain five pulleys each; center distance is adjustable. Different reduction ratios obtainable by running belt over different pulley combinations. Unit useful in studying speeds and constructional requirements in variable-speed drives. Price: \$17.56	

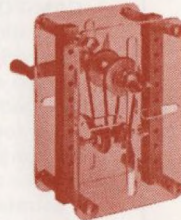
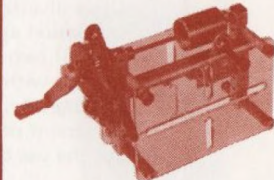
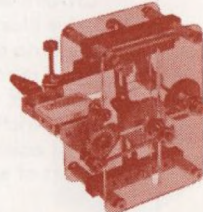
SMP COMPACT™ KINEMATIC TEACHING KITS

Cat. No.	Description	Completed Kit
4Z4-011	RACK-AND-GEAR DRIVE Drive illustrates conversion of a rotation into a proportional translation with limited travel. Gear sector on crank-operated drive shaft engages rack mounted on dovetail slide. Drive shows dependence of speed relationships on geometry of drive. Price: \$19.15	
4Z4-012	CRANK-AND-ROCKER DRIVE Drive illustrates conversion of rotation into oscillation using a four-bar linkage. Crank-operated driving shaft and driven shaft (with indicator) coupled by floating link, length of which is adjustable. Center distance between shafts also adjustable. Useful in studying speed relationships and effect of dimensional changes on motion characteristics of a non-uniform motion drive. Price: \$19.15	
4Z4-013	SPUR GEAR FORWARD AND REVERSE MECHANISM A quick action change of direction gear change assembly is utilized in this model. In effect, an additional idler gear is inserted in the gear train when it is desired to change the direction of rotation of the output shaft. This is controlled by the operating lever in much the same manner as the lead-screw reversing lever of the engine lathe. Price: \$31.12	
4Z4-014	PLANETARY GEAR DRIVE Drive illustrates principles of planetary gear systems. 108-tooth internal gear engages 30-tooth planetary gears, which mesh with 48-tooth gear on shaft concentric with input; arm holds planetary gears. Arrangements for holding different members fixed. Illustrates speed ratios, directional relationships and principles of construction in drives involving gears on moving centers. Price: \$39.90	
4Z4-015	CYCLOIDAL CRANK Drive illustrates conversion of a uniform rotation into a unidirectional, variable-speed rotation. Arm drives planetary pinion riding inside stationary, internal (sun) gear. Pin on planet pinion engages slotted link on output member, imparting variable speed. Center distance between shafts variable. Useful in studying speed variation and motion characteristics of a non-uniform motion drive. Price: \$30.32	

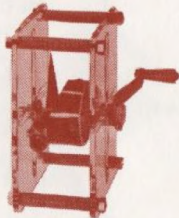
SMP COMPACT™ KINEMATIC TEACHING KITS

Cat. No.	Description	Completed Kit
4Z4-016	INTERNAL-GEAR DRIVE Drive illustrates speeds and directional relationships in a gear train consisting of a crank-operated drive shaft with an internal gear meshing with two gears on two output shafts running at different speeds. Indicators on output shafts useful in studying speeds and directions of rotation involved. Price: \$36.71	
4Z4-017	EPICYCLIC GEAR DRIVE Drive illustrates motion of a gear train consisting of a 54-tooth sun gear and arm (input) carrying a 24-tooth planet gear riding externally on the sun gear. Planetary (epicyclic) motion shown by following the path traced on a fixed end plate by a scribing point attached to the planet gear. Useful in illustrating characteristics of an important class of compound motions. Price: \$30.32	
4Z4-018	SLIDER-CRANK MECHANISM Drive illustrates basic method of converting rotation into reciprocation. Crank-operated drive shaft pin-connected to connecting rod, which drives slider. Study of displacements in mechanism facilitated by angular and linear scales mounted on unit. Price: \$18.35	
4Z4-019	DOUBLE-ACTING TAPERED CLUTCH Device illustrates principle of clutching and declutching in machine drives. Cone-type friction clutch with two-cone construction couples driving and driven shafts in either of two positions, thus varying speed ratio. Indicators on shafts useful in studying speeds and basic motion relationships in clutch drives. Price: \$43.89	
4Z4-020	DRAG LINKAGE Mechanism illustrates conversion of continuous rotation into continuous, non-uniform rotation by means of a four-bar linkage. Center distance and length of coupler link adjustable. Unit useful in studying speed relationships and method of construction permitting unobstructed movement of linkage. Price: \$17.56	

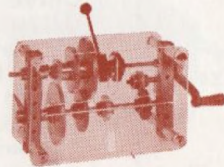
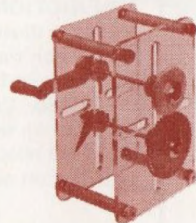
SMP COMPACT™ KINEMATIC TEACHING KITS

Cat. No.	Description	Completed Kit
4Z4-021	OSCILLATING TURNING-BLOCK LINKAGE Drive illustrates conversion of rotation into oscillation by means of a crank driving an eccentric, slotted link. Eccentricity is adjustable. Device useful in studying speed variation and effect of eccentricity on motion characteristics of drive. Price: \$16.76	
4Z4-022	RIGHT-ANGLE BELT DRIVE Drive illustrates motion transmission with a belt drive running over non-parallel shafts. Unit consists of four independent pulleys, the axes of adjacent pulleys being at right angles. Device useful in studying speeds and directional relationships in an angled belt drive. Price: \$26.33	
4Z4-023	MECHANICAL DIFFERENTIAL Device illustrates action of a bevel-gear differential. Input crank drives arm on intermediate member (spider) engaging two output members, the average of the speeds of which is controlled. Useful in demonstrating principles of differential action, such as occurs in automobile differentials. Price: \$55.86	
4Z4-024	LATHE DRIVE WITH LEAD SCREW Drive illustrates principle of the drive of a metal-cutting lathe. Included are change gears, lead screw, cylindrical work piece and pointer on compound rest simulating cutting tool. Useful in studying relative motions and mechanical arrangements of a basic metal-cutting machine. Price: \$43.89	
4Z4-025	SHAPER MECHANISM Drive illustrates quick-return motion and work-feed arrangement used in shapers. Crank drives eccentric, slotted link connected to reciprocating output motion (of shaping tool). Second drive involves crank-and-rocker, ratchet clutch and lead screw in controlling advance of work piece. Useful in studying basic arrangements and speed-relationships in shaper drives. Price: \$50.27	

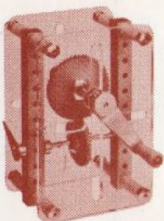
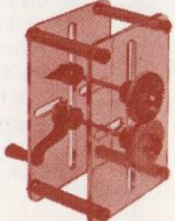
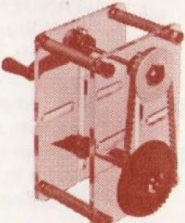
SMP COMPACT™ KINEMATIC TEACHING KITS

Cat. No.	Description	Completed Kit
424-026	INCLINED-PLANE DRIVE Drive illustrates conversion of translatory motion into perpendicular translatory motion by means of an inclined plane or wedge. Geared, crank-operated drive shaft actuated wedge mounted on horizontal dovetail slide. Wedge engages rollers on output member moving on vertical dovetail slide at reduced speed depending on wedge angle. Linear scale on output motion useful in studying speed relationships involved. Price: \$35.11	
424-027	CAM-FOLLOWER MECHANISM Drive illustrates conversion of rotary motion into reciprocating motion and into oscillation by cam action. Crank-operated drive shaft attached to plate cam engages (a) translating, roller follower traveling on dovetail slide (b) swinging follower. Return springs ensure continuous contact. Basic principles of cam action illustrated in this unit. Price: \$19.95	
424-028	CYLINDRICAL CAM MECHANISM Drive illustrates conversion of rotation into oscillation at right angles. Crank-operated drive shaft carries cylindrical cam bearing against roller follower on oscillating output member. Return spring ensures contact. Drive illustrates kinematics of a basic three-dimensional cam drive. Price: \$23.14	
424-029	BARREL-CAM DRIVE Drive illustrates conversion of rotation into oscillation at right angles. Unit has cylindrical (barrel) cam with groove providing double contact with roller on swinging follower member. Arrangement illustrates positive constraint of forward and return motion without the use of a return spring. Price: \$26.33	
424-030	CRANK-AND-SLOT DRIVE Drive illustrates conversion of continuous rotation into continuous rotation with a varying speed ratio. Pin on driving crank engaged eccentric, slotted link, imparting variable speed. Eccentricity is adjustable. Indicator on output shaft assists in studying speed variation and effect of eccentricity on motion of drive. Price: \$16.76	

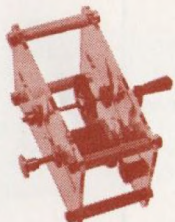
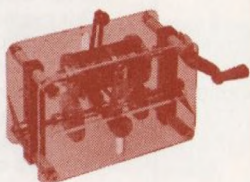
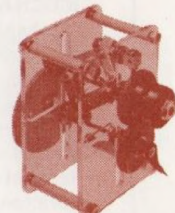
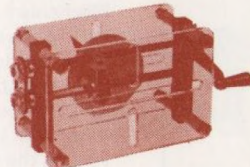
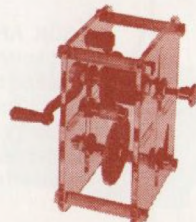
SMP COMPACT™ KINEMATIC TEACHING KITS

Cat. No.	Description	Completed Kit
424-031	TRIPLE-STAGE GEAR TRAIN Drive illustrates motion transmission in a three-mesh, four-axis gear train (96/24x72/36x90/30). Indicators on the four shafts illustrate speeds, phasing and directions of rotation in gear transmissions. Price: \$28.73	
424-032	FOUR-STAGE CHANGE-GEAR ASSEMBLY Drive illustrates principle of angular-speed variation using change gears. Drive shaft connected by a sliding clutch to any one of a set of change gears connected to output shaft, thus providing a choice of speed ratios. Useful in understanding design principles and kinematics of transmissions, such as are found in machine tools and vehicle drives. Price: \$35.91	
424-033	OPEN-BELT DRIVE Drive illustrates principle of belt drives used for uniform motion transmission between parallel shafts. Crank-operated drive shaft has pulley driving belt passing over pulley on output shaft. Indicator on output shaft useful in studying speeds and directions of rotation in a basic friction drive. Price: \$17.56	
424-034	TANDEM-BELT DRIVE Unit illustrates design of open belt drives in tandem. Crank-operated drive shaft with driving pulley engages belt running over pulley on intermediate shaft. Second pulley on intermediate shaft drives output shaft through another belt. Indicators on the three shafts useful in studying speeds, phasing and directions of rotations involved. Price: \$31.12	
424-035	HELICAL-GEAR DRIVE Drive illustrates principle of single helical gear mesh (36/48) for coupling two parallel shafts with a constant speed ratio. Indicator on output shaft assists in studying speeds and directions of rotation involved. Price: \$18.35	

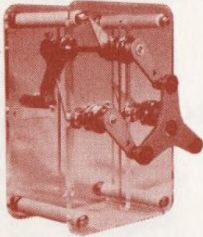
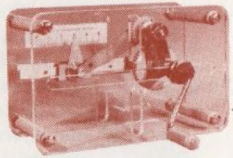
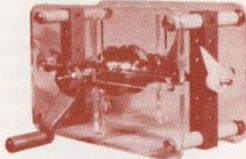
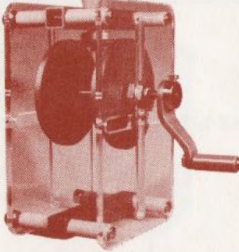
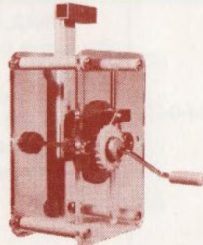
SMP COMPACT™ KINEMATIC TEACHING KITS

Cat. No.	Description	Completed Kit
4Z4-036	CROSSED HELICAL-GEAR DRIVE Drive illustrates principle of motion transmission at constant speed ratio between two non-intersecting shafts at right angles, using helical gears (48/36). Indicator on output shaft useful in studying speeds and directions of rotation in a commonly used instrument drive. Price: \$20.75	
4Z4-037	DOUBLE-STAGE CROSSED HELICAL-GEAR DRIVE Drive illustrates motion transmission at constant speed ratios involving more than two shafts using crossed helical gears. Crank-operated drive shaft coupled to parallel output shaft by intermediate gear mounted on a shaft at right angles. Indicators on intermediate and output shaft useful in studying speeds, phase, and directional relationships involved. Price: \$25.54	
4Z4-038	HERRINGBONE-GEAR DRIVE Drive illustrates principle of motion transmission at constant speed ratio between two parallel shafts using herringbone gears. Indicator on output shaft assists in studying speeds and directions of rotation in a type of gearing used to minimize axial thrust in power drives. Price: \$19.15	
4Z4-039	TIMING-BELT DRIVE Drive illustrates principle of positive motion transmission between parallel shafts using a toothed belt. Crank-operated drive shaft with grooved pulley drives grooved (timing) belt, which in turn drives grooved pulley on output shaft. Indicator on output shaft useful in studying timing, speeds and directions of rotation involved. Price: \$24.74	
4Z4-040	FRICTION-WHEEL DRIVE Drive illustrates principle of constant-ratio motion transmission between parallel shafts by means of frictional contact between two wheels or discs. Crank-operated drive shaft with disc bears on second disc on output shaft. Basic speed relationships clarified with aid of indicator on output shaft. Price: \$17.56	

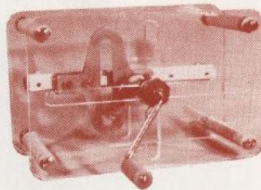
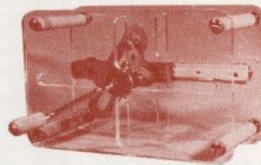
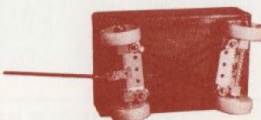
SMP COMPACT™ KINEMATIC TEACHING KITS

Cat. No.	Description	Completed Kit
4Z4-041	JAW-CLUTCH DRIVE Drive illustrates principle of a serrated (jaw) type clutch, which serves to couple or uncouple crank-operated input member to gear-mesh actuating output shaft. Basic clutch construction and motion characteristics of drive illustrated by model. Price: \$25.54	
4Z4-042	DOUBLE-JAW CLUTCH DRIVE Drive illustrates use of double-clutch and gear arrangement using jaw clutches to obtain different speed ratios between input and output shafts. Indicators serve to illustrate speed and motion relationships involved in clutching operations, such as are found in a variety of industrial drives and automatic machinery. Price: \$47.08	
4Z4-043	CENTRIFUGAL-CLUTCH DRIVE Drive illustrates principle of a centrifugal clutch. Geared input and output shafts connected through a double clutch arrangement including a centrifugal clutch. Unit illustrates principle of transmission control using a shifting action governed by speed. Price: \$36.71	
4Z4-044	VARIABLE-SPEED FRICTION DRIVE Drive illustrates principle of an infinitely-variable speed transmission. Crank-operated input shaft with keyed roller, slideably mounted on shaft, drives disc on perpendicular output shaft through frictional contact. Control of roller position obtained by screw moving roller along keyway, thereby adjusting speed ratio. Price: \$19.95	
4Z4-045	SINGLE-ACTING TAPERED-CLUTCH DRIVE Drive illustrates principle of cone-type friction clutch, coupling driving member (crank-operated input shaft) through a gear train to output shaft. Indicator on output shaft serves to illustrate motion characteristics in a combination gear-and-clutch drive. Price: \$26.33	

SMP COMPACT™ KINEMATIC TEACHING KITS

Cat. No.	Description	Completed Kit
424-046	PARALLEL CRANK DRIVE Drive illustrates the simultaneous drive of three cranks to keep the rotation of the driven shafts in step with the driving shaft. Indicators on all shafts are useful in studying the velocity and directions of rotation. Price: \$23.50	
424-047	EPICYCLIC GEAR-SLIDER MECHANISM This mechanism, frequently called "Watt's Epicyclic Gear Drive", consists of a 30 tooth planet gear riding externally on a 54 tooth sun gear. The motion of the planet is coupled by connecting rod to the slider. Study of the displacement of the slider is aided by a linear scale mounted on the unit. Price: \$23.50	
424-048	BEVEL GEAR FORWARD & REVERSE MECHANISM Mechanism consists of a 48 tooth bevel gear which drives either of two 24 tooth bevel gears mounted on the cross shaft. When the shift button is depressed, the drive is shifted from one 24 tooth gear to the other, reversing the direction of rotation of the output shaft. Indicators on the shafts facilitate the study of speeds and directions of rotation involved. Price: \$33.95	
424-049	FRICTION WHEEL FORWARD AND REVERSE MECHANISM Mechanism consists of two friction disks mounted on the drive shaft so arranged that, dependent upon the position of the shaft, only one disk makes contact with the friction wheel. When the handle is pushed in, the shift is moved bringing the other disk into contact with the wheel, thus reversing the rotation of the output indicator. Slight speed variation of the output indicator is possible by positioning the friction wheel. Price: \$21.95	
424-050	RACK AND GEAR JACK MECHANISM Mechanism illustrates the mechanical advantage obtained by the gear ratio involved. Moderate loads placed on the top of the jack platform can easily be lifted by the mechanism. A ratchet and pawl on the input shaft prevents the jack from descending under load. Price: \$35.95	

SMP COMPACT™ KINEMATIC TEACHING KITS

Cat. No.	Description	Completed Kit
424-051	SCOTCH YOKE DRIVE Drive illustrates one of a class of drives which convert rotary motion into reciprocating motion. The output motion of the slider is harmonic and therefore this drive is frequently employed when it is necessary to generate the sine function of the angle of the crank in mechanical systems. Price: \$24.95	
424-052	SLANTED SCOTCH YOKE DRIVE Drive when used in conjunction with #51 illustrates the increased displacement of the slide when the slot of the scotch yoke is at an angle with the axis of the slider. As in #51, the motion of the slider describes the function of the sine of the driving crank angle. Price: \$24.95	
424-053	FRICTION RATCHET DRIVE Drive illustrates the action of the friction ratchet coupled with the crank-and-rocker drive. The output indicator will rotate only when the rocker arm is moving in one direction due to the action of the friction ratchet. Center distance between the shafts and the length of the floating link are adjustable to facilitate the analysis of this drive. Price: \$27.95	
424-054	ANTI-PARALLEL CRANK STEERING MECHANISM Mechanism illustrates a form of steering used in carts when it is necessary to employ maximum maneuverability. As one set of wheels is turned on its axis, the other set will turn in the opposite direction due to the action of the anti-parallel crank. Price: \$38.50	
424-055	PARALLEL DRIVE MECHANISM Mechanism utilizes a Crank and Rocker Drive to convert the rotation of the input crank into an oscillating motion of the rocker arm. A parallel linkage between the two rocker arms causes the two indicators to remain parallel in all positions. Provision for adjustment of all lengths and shaft positions permits a comprehensive study. Price: \$24.92	