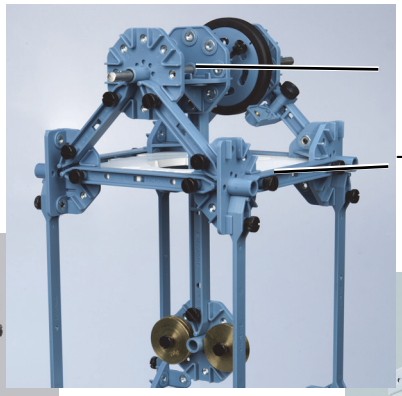
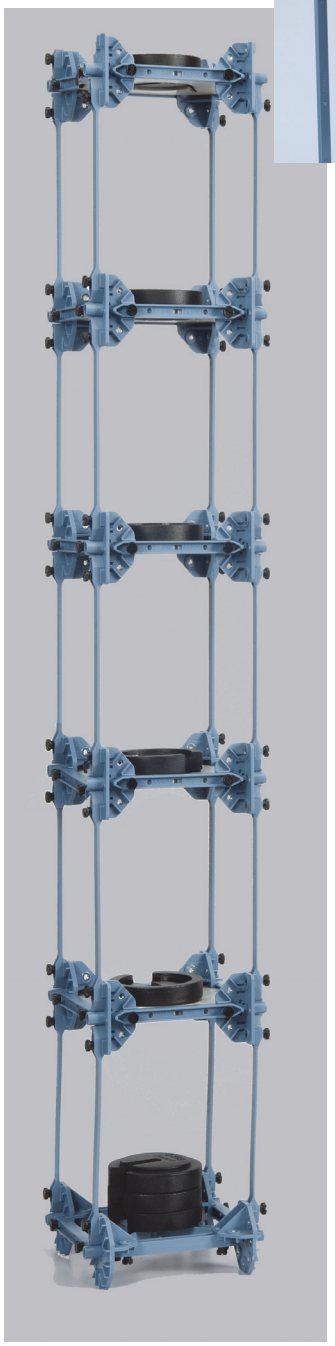
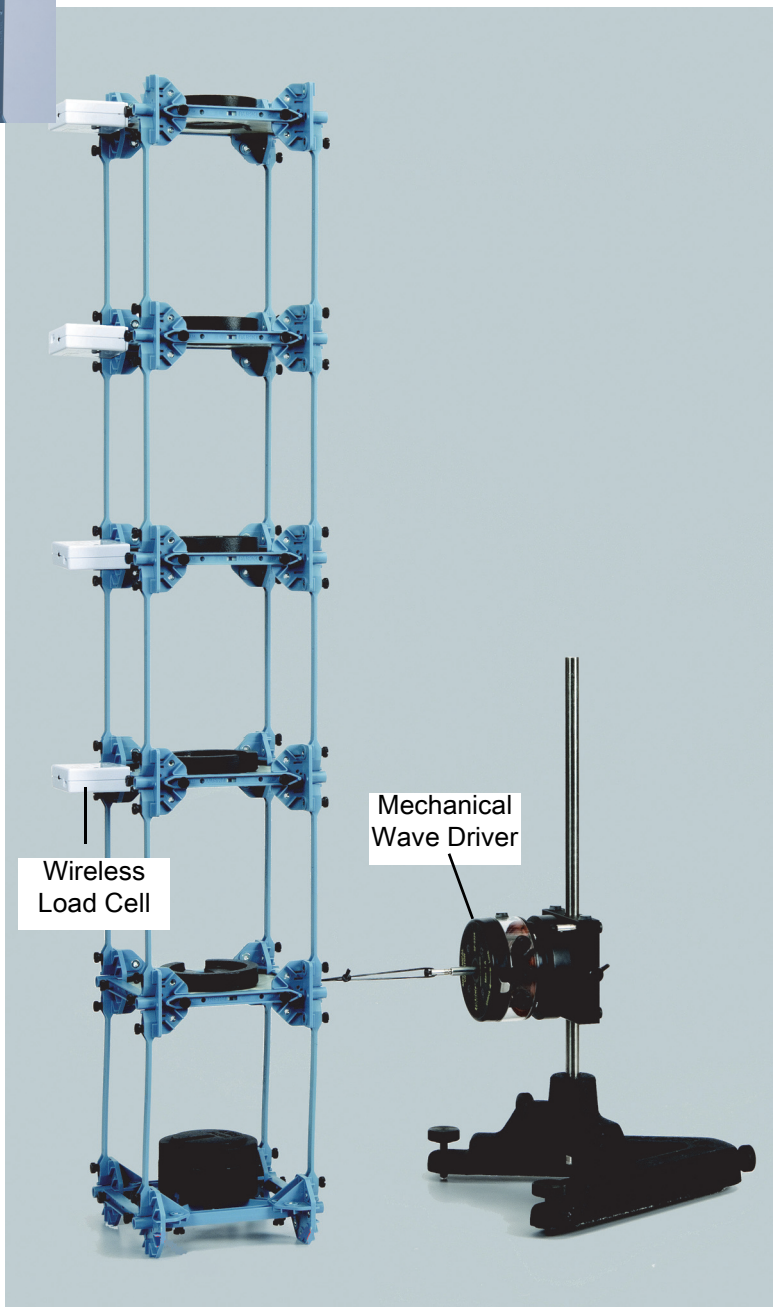
Shaking Tower Kit (ME-7018)
Included in the
Shaking Tower Experiment (EX-5555)

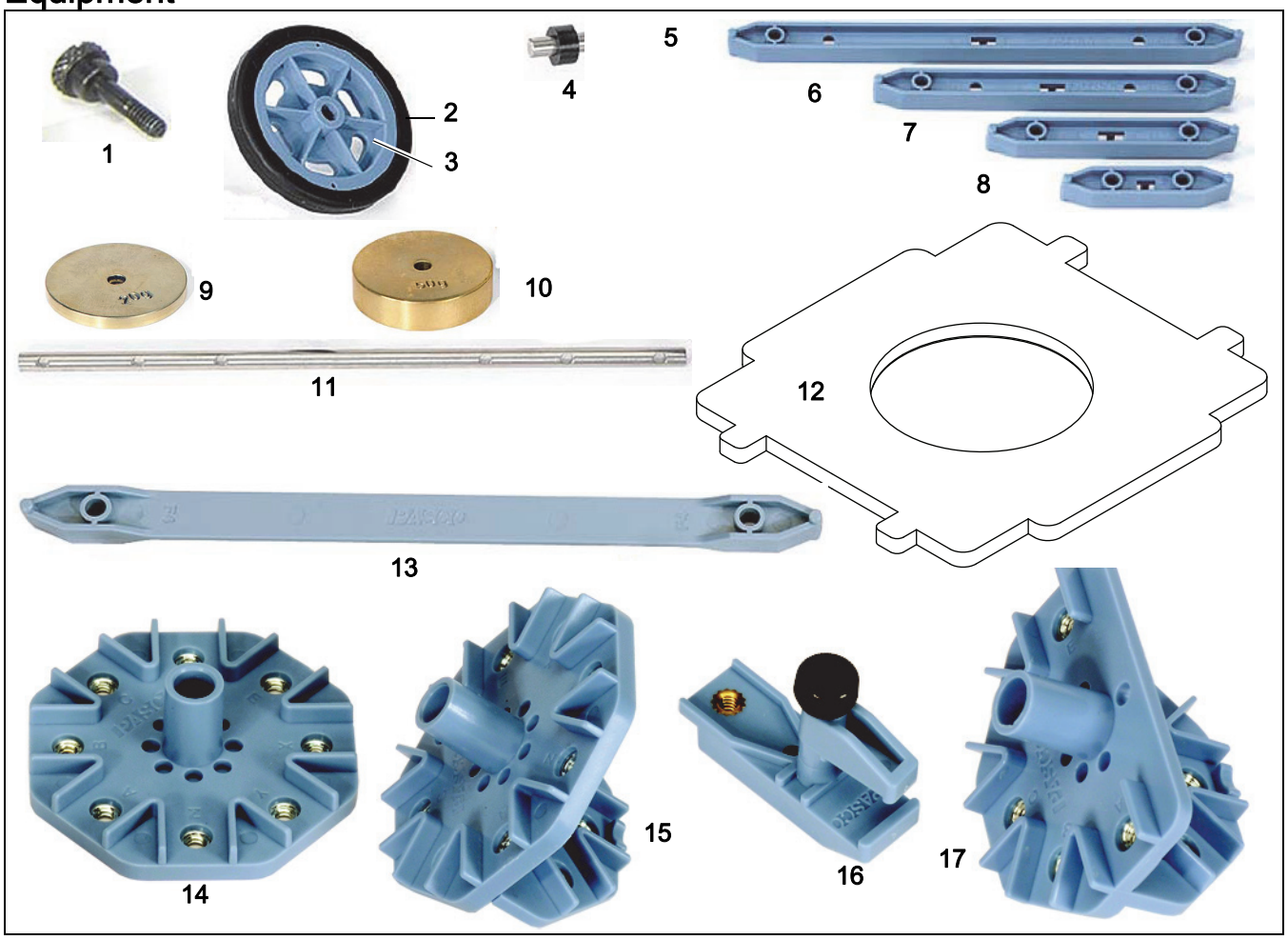






The Cover Page shows the Shaking Tower Kit (ME-7018) on the left side and the Shaking Tower Experiment (EX-5555) on the right side. The inset in the middle shows the Damping Pendulum Structure, which fits on top of the Fifth Floor Structure in both products.

Equipment



Label	Item	Qty	Label	Item	Qty
1	Truss Set Screws (80 pack)	2	10	Mass, 50 gram	2
2	Tire, Structure	1	11	Medium Axle	1
3	Wheel, Structure	1	12	Foam Floor	5
4	Nylon Spacer	2	13	Flat (F4) Beams	20
5	#4 I-Beams	1	14	Flat Round Connector	4
6	#3 I-Beams	24	15	Full Round Connector	5
7	#2 I-Beams	8	16	Sliding Connector	1
8	#1 I-Beams	10	17	Half Round Connector	20
9	Mass, 20 gram	2		Storage Box (not shown)	1
				Rubber Cord (not shown)	

Required but not Included
ME-7566 Large Slotted Mass Set

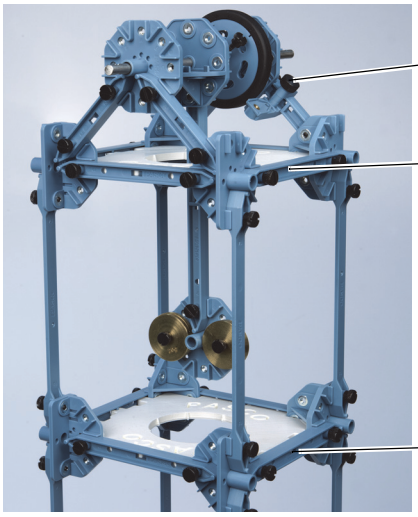
Introduction

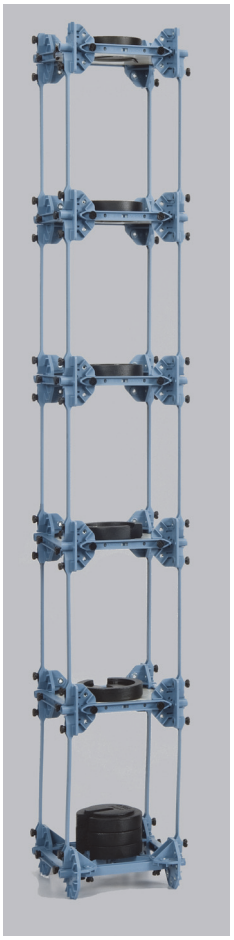
The ME-7018 Shaking Tower Kit contains the parts needed to build a model of a building that is a five story tall tower.

The Kit also includes parts needed to build a Damping Pendulum that fits on the top of the tower. Required Additional Equipment is the ME-7566 Large Slotted Mass Set.

The Damping Pendulum is modeled after the passive damping mechanisms installed in modern buildings to dampen oscillations during earthquakes.

The Shaking Tower Kit is also included in the EX-5555 Shaking Tower Experiment. The Shaking Tower Experiment package (EX-6666) includes the additional equipment needed to shake the tower at various frequencies and to measure the force of the shaking at each floor.





Shaking Tower
Note: Slotted Masses are not included

Shaking Tower Kit Construction

There are four parts to the Shaking Tower Kit Construction.

- The first part is the Ground Floor Structure.
- The second part is for the five floors above the ground floor which are all constructed in the same way.
- The third part is the completion of the tower using the Ground Floor Structure and the five floors.
- The fourth part is the Damping Pendulum which is attached to the top of the fifth floor.

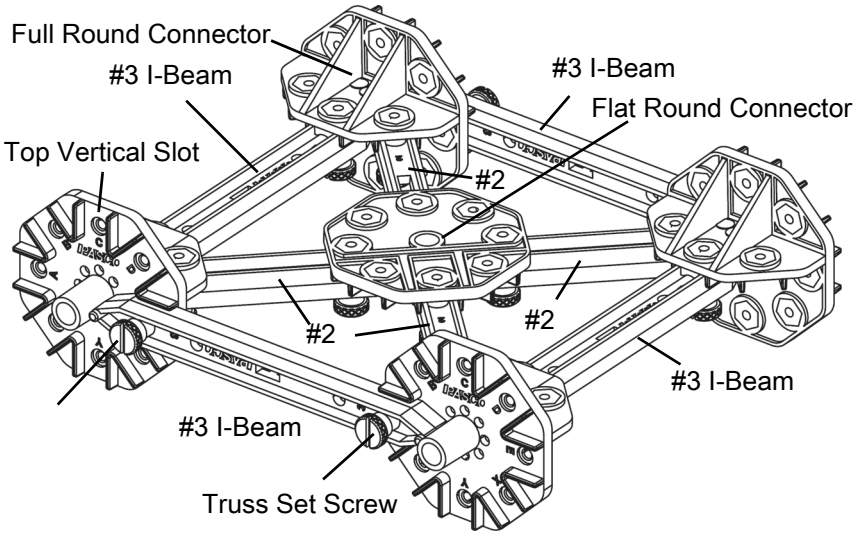
The following instructions show how to build the ground floor, first floor through the fifth floor, and the Damping Pendulum on top of the fifth floor.

Ground Floor Construction

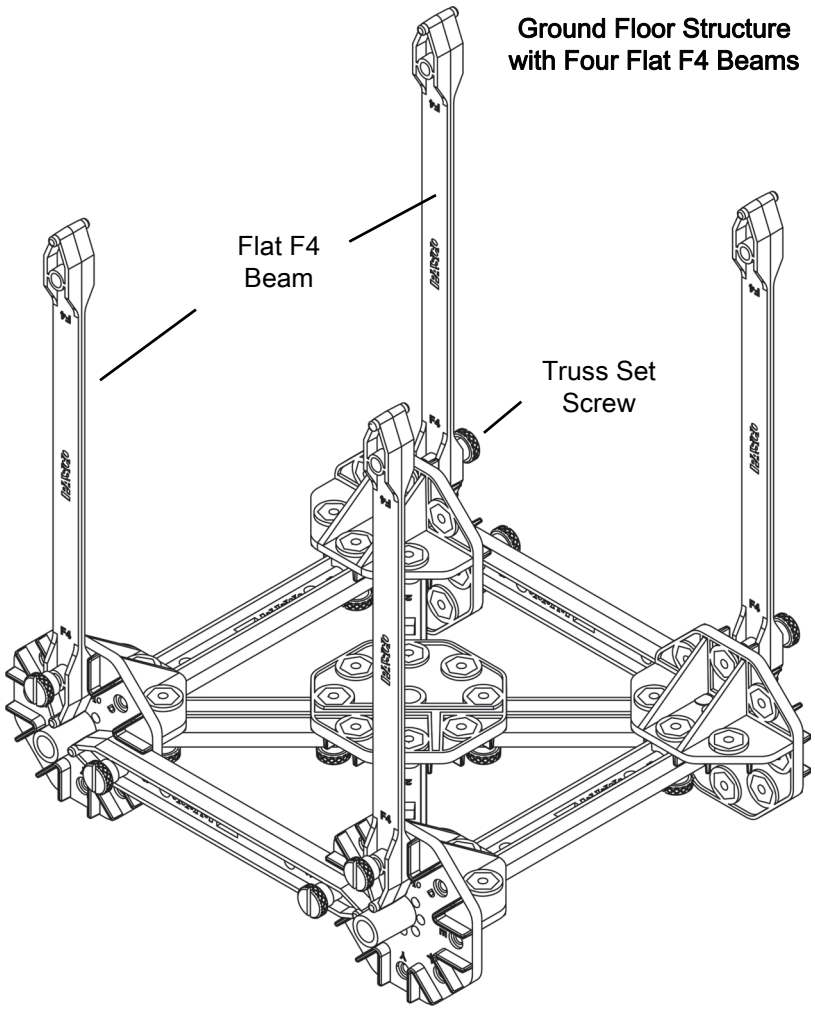
Items Needed for the Ground Floor

#3 I-Beams (4)
#2 I-Beams (4)
Flat Round Connector (1)
Full Round Connectors (4)
Flat F4 Beams (4)
Truss Set Screws (20)

1. Attach the four #2 I-Beams to the Flat Round Connector using Truss Set Screws.
2. Attach the four Full Round Connectors to the four #2 I-Beams as shown.
3. Attach the four #3 I-Beams to the Full Round Connectors as shown.
4. Align a Flat F4 Beam and a Truss Set Screw with the top vertical slot on a Full Round Connector. Attach the beam using the Truss Set Screw.
5. Repeat the process to attach the other Flat F4 Beams to the other Full Round Connectors using Truss Set Screws.



Ground Floor Structure with Four Flat F4 Beams



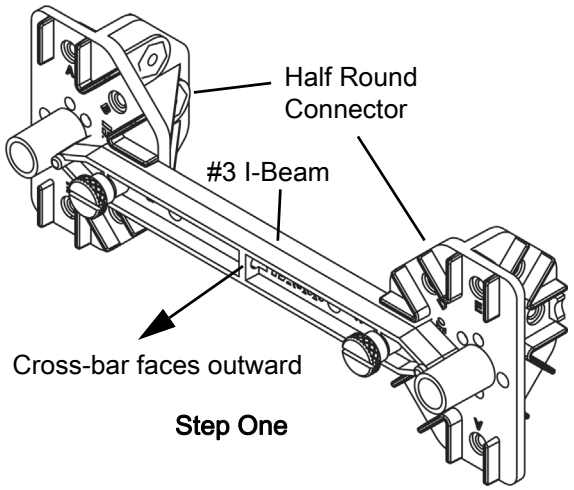
Floor Construction

Items Needed Per Floor

#3 I-Beams (4)	Truss Set Screws (8)
Foam Floor (1)	Half Round Connectors (4)

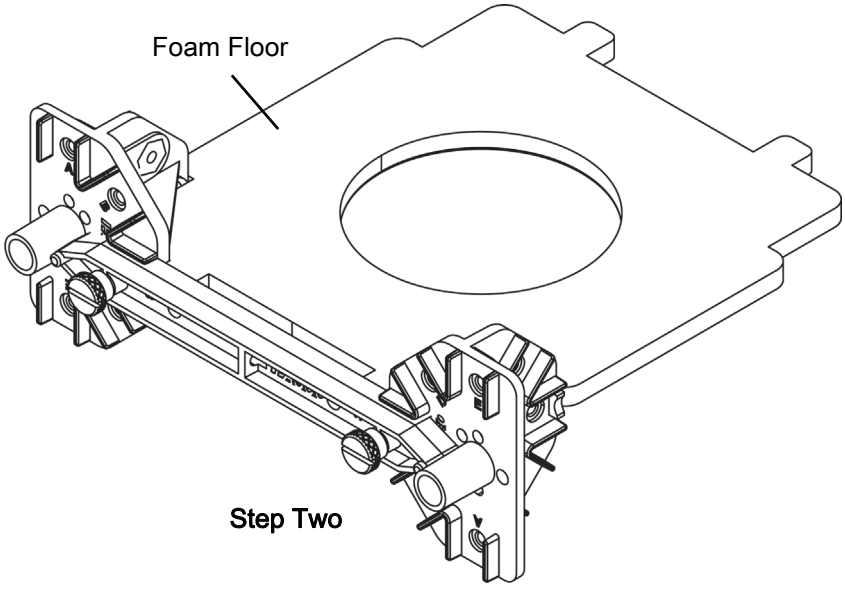
Step One: Attach one #3 I-Beam between two Full Round Connectors.

Make sure that the “cross-bar” on the #3 I-Beam faces outward.



Step One

Step Two: Place the Foam Floor between the Half Round Connectors with one edge of the floor in the back of the #3 I-Beam.

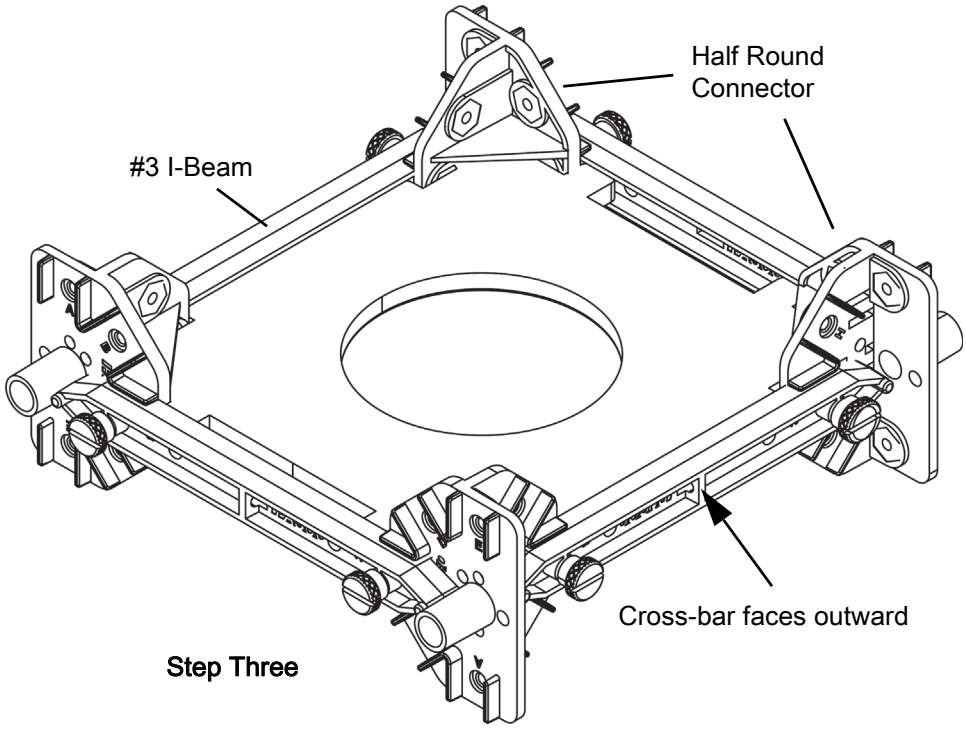


Step Two

Step Three: Add three #3 I-Beams and two Half Round Connectors around the Foam Floor using Truss Set Screws as shown. Notice that the “cross-bar” on each #3 I-Beam faces outward

Build More Floors

Use the same process to build four more floors (for a total of five floors).



Step Three

Tower Construction

Items Needed: Flat F4 Beams (24), Truss Set Screws (28), Floors (5), Ground Floor Structure (1)

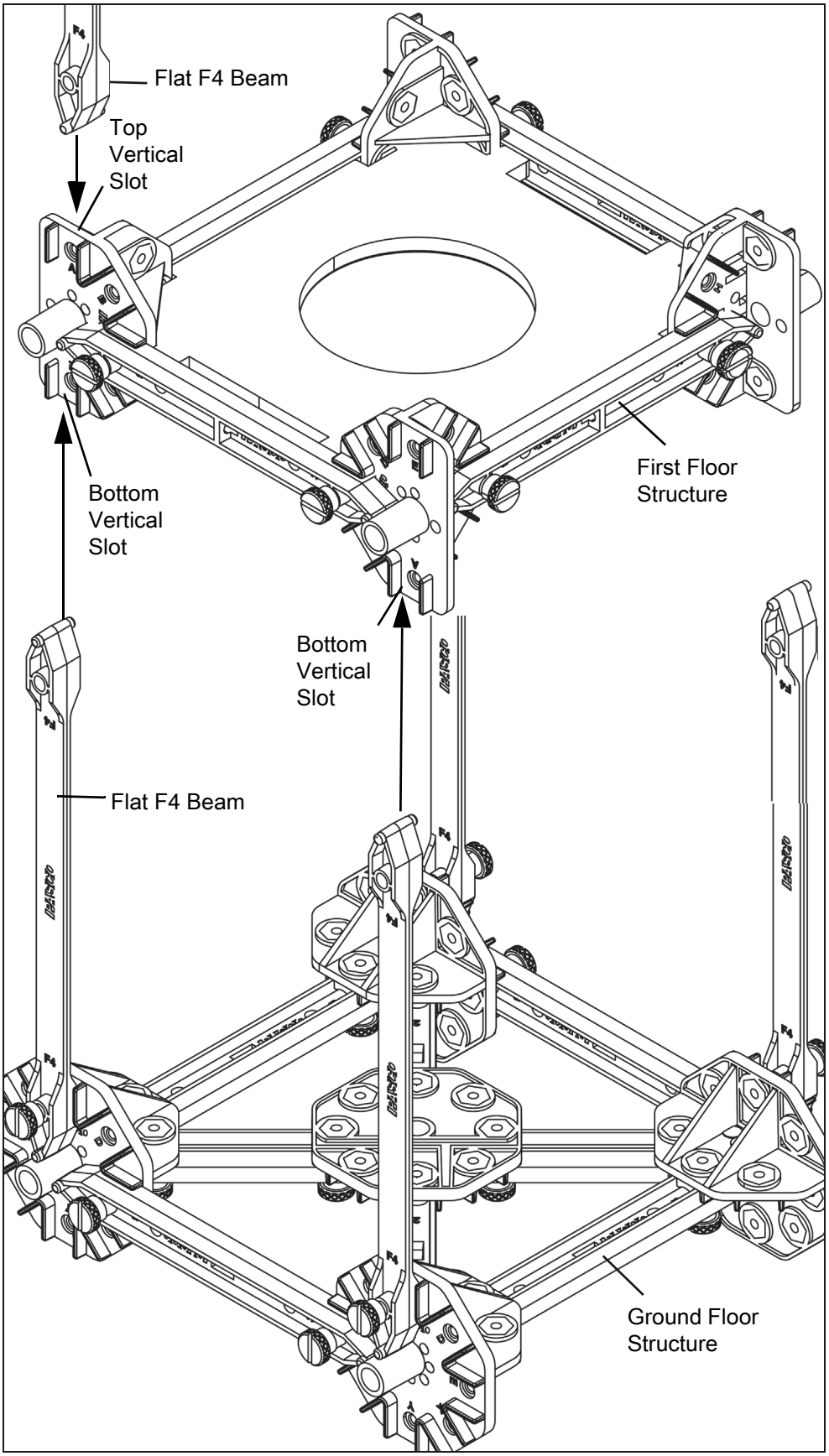
Step One: Align the Flat F4 Beams of the Ground Floor Structure with the bottom vertical slots of the Half Round Connectors on the First Floor

Step Two: Use Truss Set Screws to attach the First Floor to the Flat F4 Beams.

Step Three: Use four Truss Set Screws to attach four Flat F4 Beams to the top vertical slots of the Half Round Connectors on the First Floor.

Step Four: Add the Second Floor to the top of the Flat F4 Beams of the First Floor. Attach four Flat 4 Beams to the Second Floor.

Use the same process to add the Third Floor to the Fourth Floor and the Fifth Floor to the Fourth Floor. NOTE, do not add any Flat F4 Beams to the Fifth Floor.



ME-7566: Required Additional Item

Notice on page 1 that the illustration of the Shaking Tower shows slotted masses on the Ground Floor and each of the Tower Floors.

The PASCO ME-7566 Large Slotted Mass Set consists of nine iron disks of 0.5 kg each and a hanger of 1.5 kg.

Stack three disks on the center of the Ground Floor Structure. Put one disk on each of the Floors. The circular step on the top of the disk fits in the hole in the Foam Floor.

Damping Pendulum Structure Construction

Items Needed

#2 I-Beams (4)	Truss Set Screws (8)	Sliding Connector (1)
Flat Round Connector (1)	Full Round Connectors (3)	Medium Axle (1)
Wheel (1)	Tire (1)	Nylon Spacer (2)

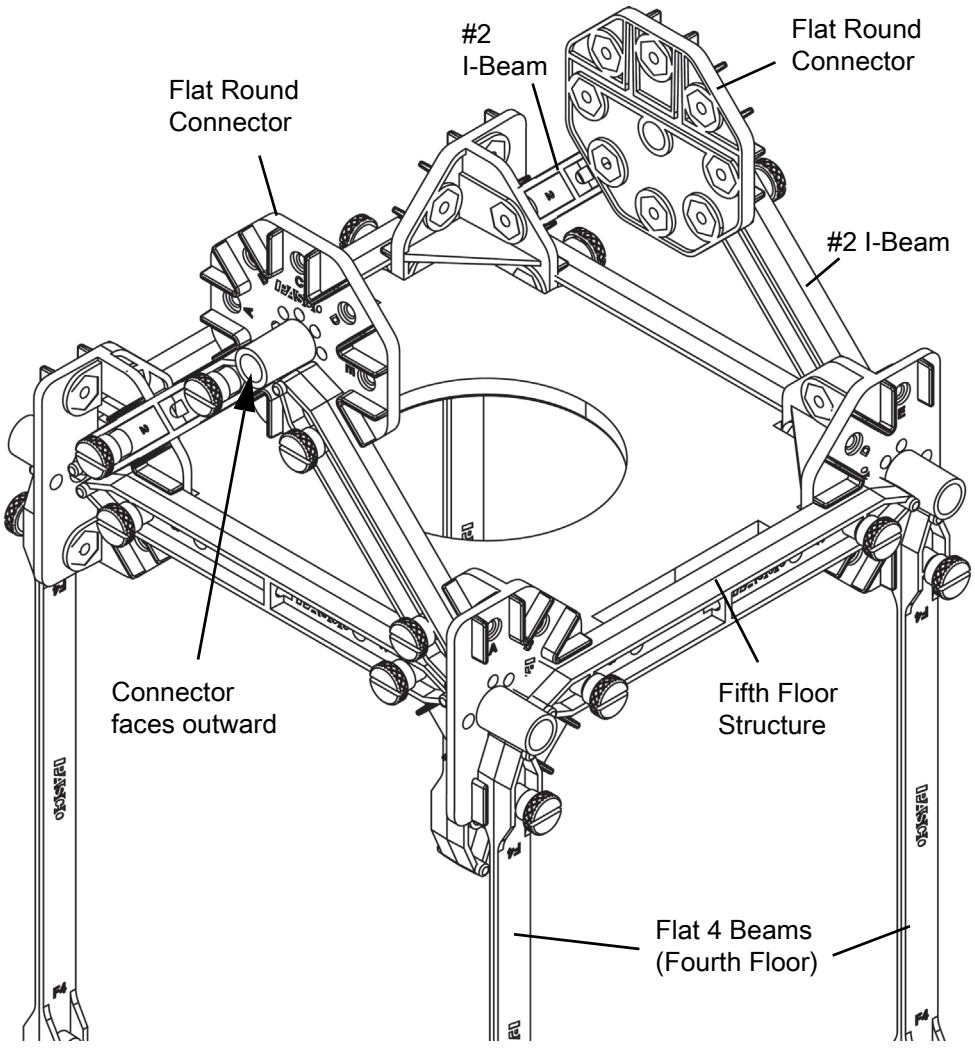
The Damping Pendulum Structure is above the Fifth Floor of the Shaking Tower. The pendulum part of the Structure extends downward through the hole in the Foam Floor. Remove the circular mass from the Fifth Floor.

Part One of the construction is to build the supports for the axle that carries the pendulum. Part Two of the construction is to put the pendulum and other components on the axle as the axle is put into the supports.

Part One: Supports for Axle

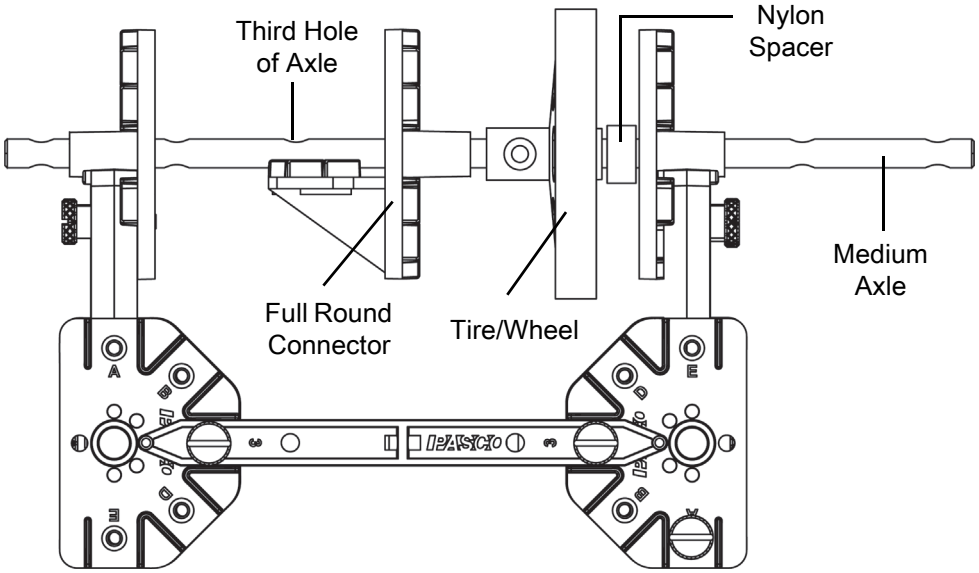
Step One: Attach a #2 I-Beam to the forty-five degree angle slot on each of the Half Round Connectors on the Fifth Floor as shown. Note the orientation of the supports relative to the Flat F4 Beams.

Step Two: Attach a Flat Round Connector to each of the two 45° angled supports as shown. Make sure that the Flat Round Connectors face outwards.



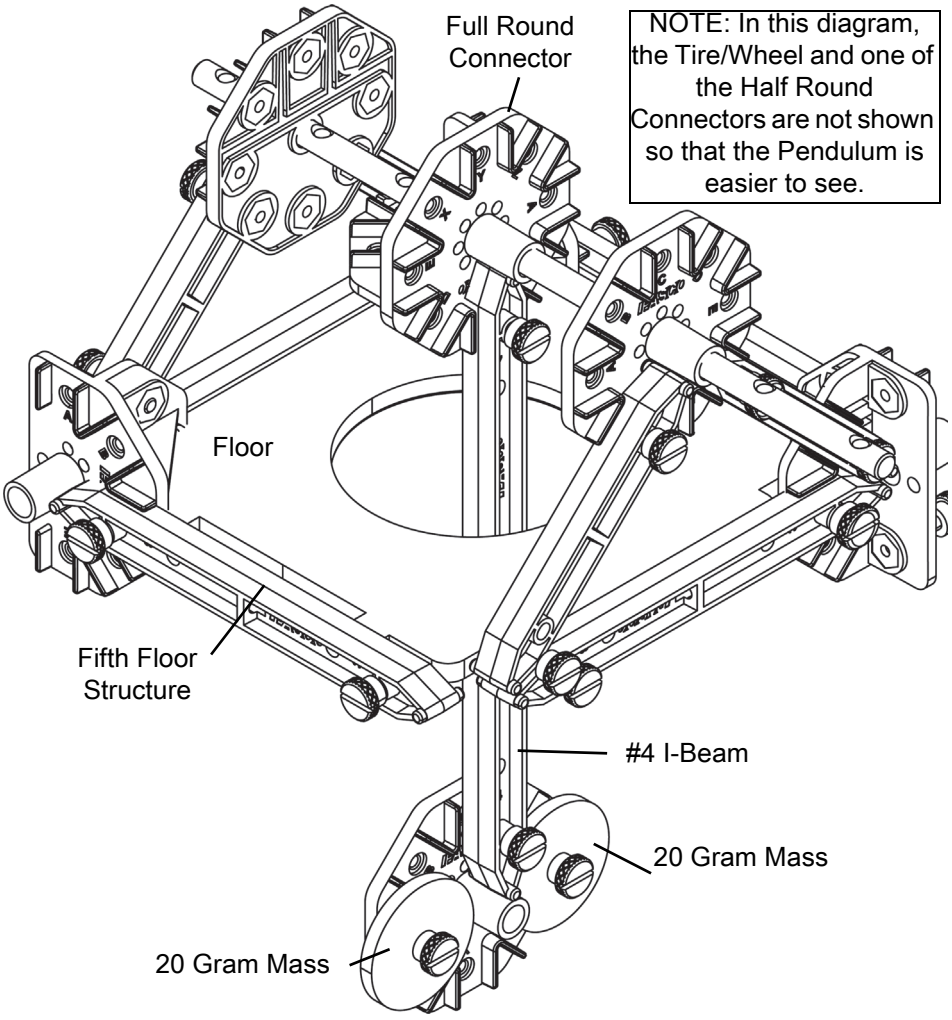
Part Two: Assemble the Damping Pendulum

Step One: Put the end of the Medium Axle through the center hole of a Flat Round Connector. Put the following components onto the Medium Axle in the following order. Note the orientation of the Tire/Wheel and the Full Round Connector as shown. Push the Axle so that the other end goes through the center hole of the other Flat Round Connect.

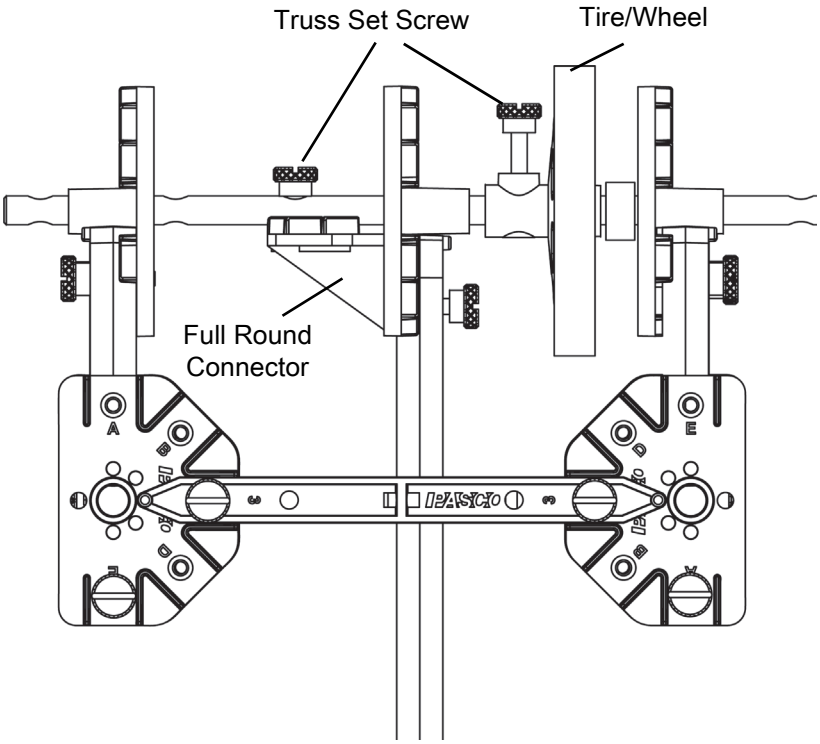


- First, put the Nylon Spacer onto the Axle.
- Second, put the Tire/Wheel on the Axle with the Wheel “hub” pointing as shown in the diagram.
- Third, put the Full Round Connector on the Axle with the “right angle” part pointing as shown in the diagram.

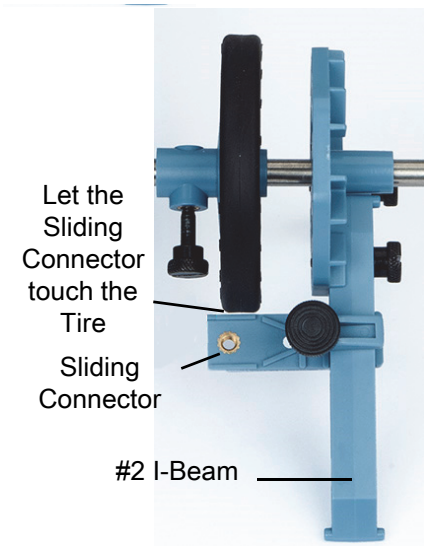
Step Two: Assemble the Pendulum and attach it to the Axle. Attach a Flat Round Connector to one end of a #4 I-Beam. Add a 20 Gram Mass to the Flat Round Connector on both sides of the #4 I-Beam as shown. Position the pendulum through the hole in the middle of the Fifth Floor. Attach the upper end of the #4 I-Beam to a bottom vertical slot on the Full Round Connector.



Step Three: Attach the Full Round Connector and the Tire/Wheel "hub" to the Medium Axle. Adjust the position of the Full Round Connector on the Axle so that the third hole in the Axle is below a threaded hole on the Connector as shown. Use a Truss Set Screw to mount the Full Round Connector in place. Put a Truss Set Screw into the threaded hole on the Tire/Wheel "hub" and tighten the screw until it makes good contact with the Axle.



Step Four: Mount the Sliding Connector at the middle of one of the #2 I-Beams as shown.



When the Shaking Tower Kit is shaking, the Damping Pendulum is damped by adjusting how hard the Sliding Connector rubs against the Tire.

Further Study: Damping Pendulum

Try changing the amount of mass on the pendulum or the length of the pendulum to see it your can get it to dampen out the motion of the shaking tower more quickly.

See the next page for information about the EX-5555 Shaking Tower Experiment.

Shaking Tower Kit Equipment (EX-5555)

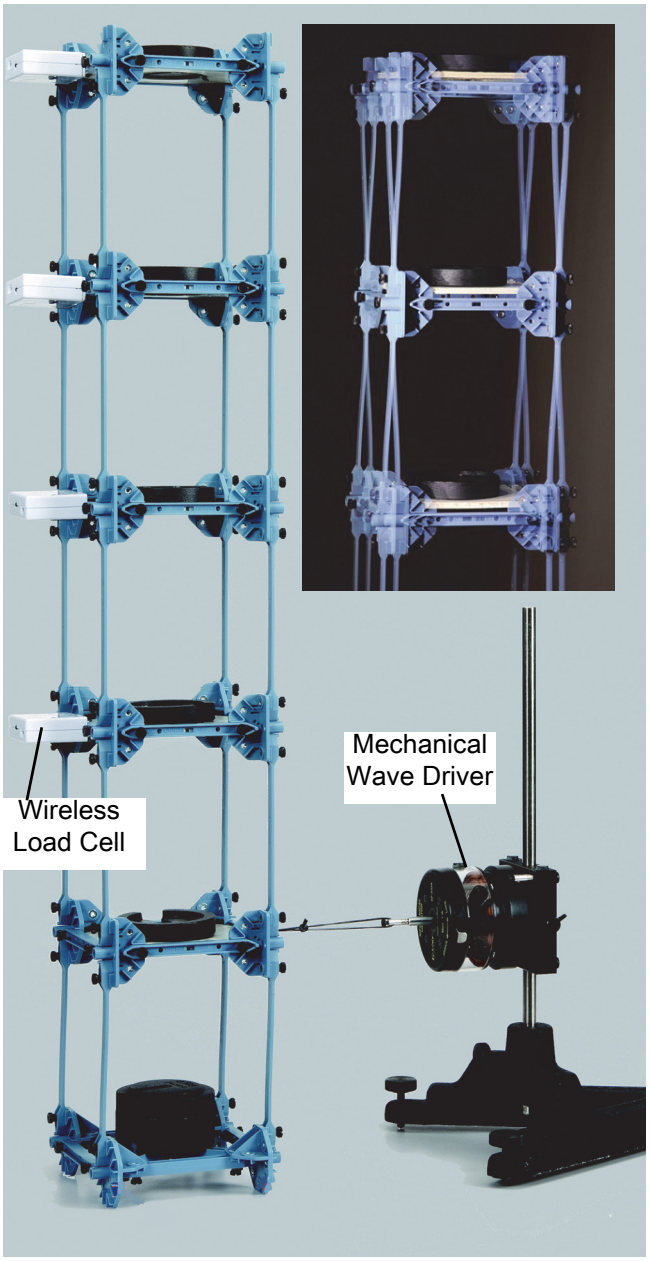
Note: The Shaking Tower Experiment, product number EX-5555, includes all the equipment needed for the “Shaking Tower” experiments. For more information, download the “ZIP” file from the EX-5555 web page at **www.pasco.com**. The ZIP file contains the Microsoft Word experiment writeup, Capstone configuration files, and graphics files.The Shaking Tower Experiment (EX-5555) includes the Shaking Tower Kit (ME-7018) and the following additional items.

Item	Product Number	Qty
Mechanical Wave Driver	SF-9324	1
2-Meter Patch Cord Set	SE-9415A	1
Large Rod Base	ME-8735	1
Threaded Rod 25 cm	ME-8988	1
Large Slotted Mass Set	ME-7566	1
Wireless Load Cells	PS-3216	4

Required but not included:

- 850 Universal Interface (UI-5000)
- PASCO Capstone Software

The inset photograph to the right shows the Shaking Tower oscillating in its various resonance modes.



In the Shaking Tower Experiment, the tower is shaken by the Mechanical Wave Driver which is powered by an 850 Universal Interface (not shown).

Technical Support

For assistance with any PASCO product, contact PASCO at:

Address: PASCO scientific
10101 Foothills Blvd.
Roseville, CA 95747-7100

Web: www.pasco.com

Phone: +1 916-462-8384 (worldwide)
877-373-0300 (U.S.)

Email support@pasco.com

Check the PASCO website for the latest version of the instruction manual.

www.pasco.com/manuals

Replacement Parts

None of the equipment items in ME-7018 Shaking Tower Kit are available separately. However, the items are included in other PASCO products. Check the PASCO catalog or the web site at www.pasco.com to find out what is included in each of the PASCO products.

Item	In Model #	Description of Model Number
Truss Set Screws (80 pack)	ME-6994	Truss Set Screws (pack of 80)
Tire, Structure	ME-6998A	Axle Spares
Wheel, Structure	ME-6998A	Axle Spares
Medium Axle	ME-6988A	Axle Spares
Nylon Spacer	ME-6988A	Axle Spares
#4 I-Beams	ME-6993	Truss Set Members
#3 I-Beams	ME-6993	Truss Set Members
#2 I-Beams	ME-6993	Truss Set Members
#1 I-Beams	ME-6993	Truss Set Members
Half Round Connector	ME-6993	Truss Set Members
Mass, 20 gram	ME-8983	20 g Replacement Mass Set (set pf 6)
Mass, 50 gram	ME-8984	50 g Replacement Mass Set (set of 6)
Flat (F4) Beams	ME-6987	Structures Flat Members
Flat Round Connector	ME-6997	Full Round (XYZ) Connector Spares
Full Round Connector	ME-6997	Full Round (XYZ) Connector Spares
Sliding Connector	ME-6999A	Angle Connectors Spares
Rubber Cord	ME-8986	Rubber Cord 30 m Spool