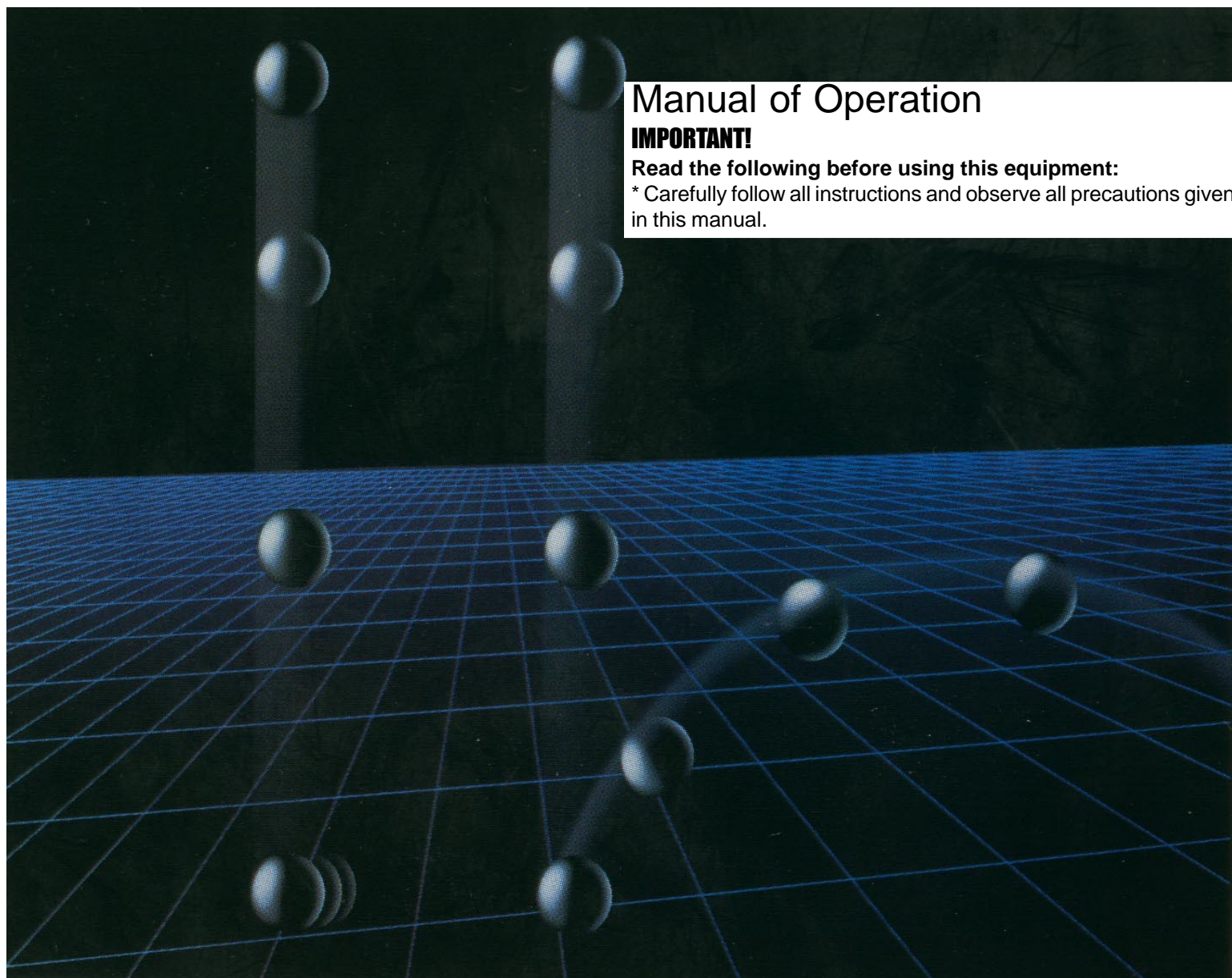


Actual Size



N99-P70-3840

**HAPPY & UNHAPPY BALLS**



## Manual of Operation

### **IMPORTANT!**

**Read the following before using this equipment:**

\* Carefully follow all instructions and observe all precautions given in this manual.

The “Unhappy Ball” is made of rubber called Norbornene polymer (brand name: Norsorex) which possesses excellent impact absorption properties. The rubber has great internal absorption of inputted energy and is able to dampen impact from a colliding object without giving the object a reaction force. It has the advantage whereby little resonance can be caused to occur by external vibrations. It can be processed in a similar manner to that of ordinary rubber, and sheets made of this material are utilized in a lot of applications. The “Happy Ball” is made of common neoprene.

## Characteristics

1. Low restitution elasticity (less than 10%)
2. It has especially good energy absorption under normal temperature ranges (10 ~ 30 degrees Celsius)
3. Its absorption and insulation of high frequency vibrations are especially good.

### Range of use

1. As damping material  
... for protection of conveyor mechanism, stoppers for precise location of articles conveyed, and shock absorbers (in place of pneumatic and hydraulic types).
2. Padding materials  
... for the prevention of things dropped from being scattered and for the reduction of fatigue on legs and loins.
3. Material for minimizing resonance on audio equipment  
... Prevention of speaker howl. Insulation of external vibration to player units.
4. Low hardness rubber roll material  
... Rolls for printing.
5. Footwear sole material  
... for the reduction of heelstrike.
6. Industrial use  
... gaskets and packing.
7. Sports goods  
... Gloves, mits, and supporters.

## Comparison of mechanical properties

Item	Neoprene (Happy Ball)	Norsorex (Unhappy Ball)
Tensile strength (kg f/cm squared)	205	124
Stretch (%)	370	550
Hardness (JIS A)	63	32
Restitution elasticity (%)	53	3
Compression permanent set (70 degrees Celsius x 22H%)	15	478
Specific Gravity	1.39	1.25

## Manufacturing method for Norsorex

As shown in the diagram, Norsorex is obtained through the synthesis of Norbornene from Ethylene cyclopentadiene by the Diels-Alder’s reaction, then through ring opening polymerisation of the Norbornene monomer. Norsorex is a polymer which has a construction whereby double bonding and the five membered ring have been bonded alternately, which means that vulcanization can be done by utilizing this double bonding.

