

# Intro to Light Fixtures

## IN THE BEGINNING

### PRIMITIVE LAMPS - (c 13,000 BC to 3,000 BC)

Prehistoric man, used primitive lamps to illuminate his cave. These lamps, made from naturally occurring materials, such as rocks, shells, horns and stones, were filled with grease and had a fiber wick. Lamps typically used animal or vegetable fats as fuel.

In the ancient civilizations of Babylonian and Egypt, light was a luxury. The Arabian Nights were far from the brilliance of today. The palaces of the wealthy were lighted only by flickering flames of simple oil lamps. These were usually in the form of small open bowls with a lip or spout to hold the wick. Animal fats, fish oils or vegetable oils (palm and olive) furnished the fuels.



## Early Developments

### □ Rush lights:

- Tall, grass-like plant dipped in fat



## Early Developments

### □ Candles:

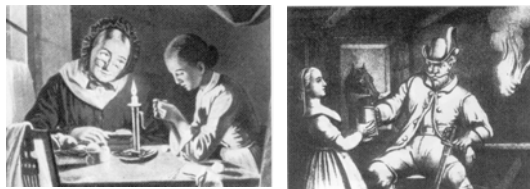
- Most expensive candles made of beeswax
- Most common in churches and homes of nobility
- Snuffers cut the wick while maintaining the flame



## Early Developments



## Early Developments



### New Developments

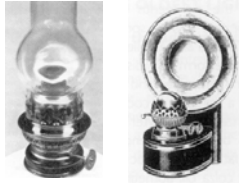
There was a need to improve the light several ways:

1. The need for a constant flame, which could be left unattended for a longer period of time
2. Decrease heat and smoke for interior use
3. To increase the light output
4. An easier way to replenish the source...thus, the development of gas and electricity
5. Produce light with little waste or conserve energy

# Intro to Light Fixtures

## Industrial Revolution - Europe

- Gas lamps developed:
  - London well known for gas lamps
  - Eiffel Tower (1889) originally used gas lamps

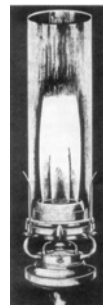


### Argand Lamp

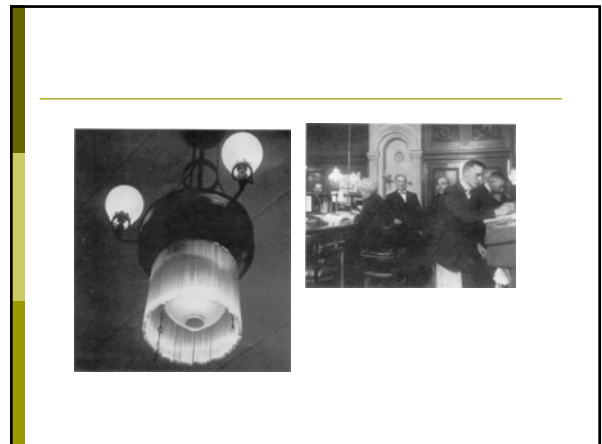
The Argand burner, which was introduced in 1784 by the Swiss inventor Argand, was a major improvement in brightness compared to traditional open-flame oil lamps.

Argand employed scientific knowledge on the role of the newly discovered oxygen in combustion, and by adding a chimney managed to increase the flow of air to the flame thus increasing its light output significantly. The new lamp was as much as tenfold brighter than the most advanced oil lamps of the time.

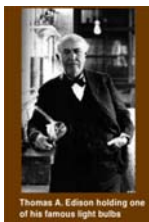
Argand lamps were first introduced in the French theatre in 1784, but due to their high cost did not become a standard fixture in all theatres.



# Intro to Light Fixtures



## Electrical Lighting



Thomas A. Edison holding one of his famous light bulbs



A drawing of an early light bulb design by Edison. Edison tried numerous different materials and designs before he was successful in developing a practical incandescent bulb.



A modern light bulb.

1907

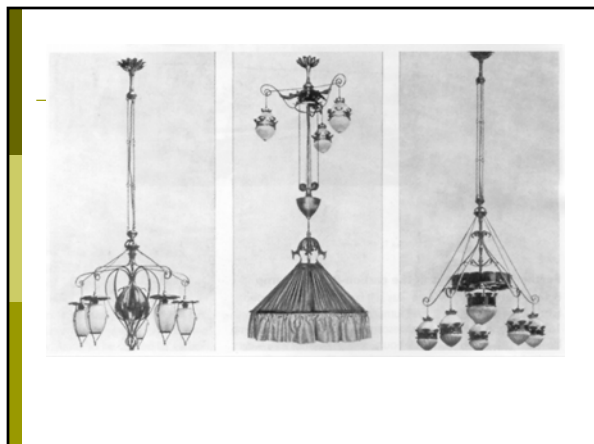
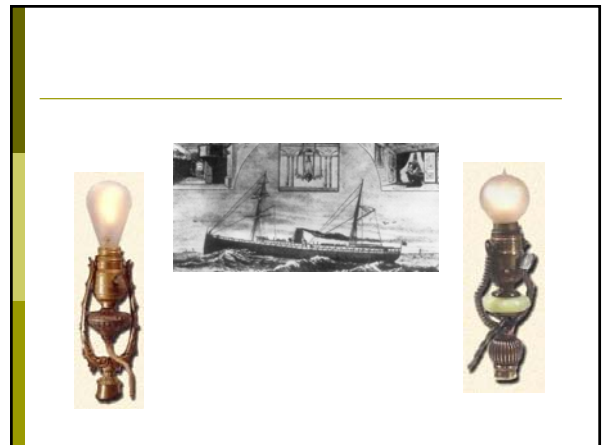
The first commercial tungsten filament for incandescent lamps became available in the United States. Tungsten wire manufacturing was still costly and difficult, but the problem was to soon be overcome.



A modern tungsten light bulb filament.



Thomas Edison's first incandescent lamp filament, made of carbonized bamboo.



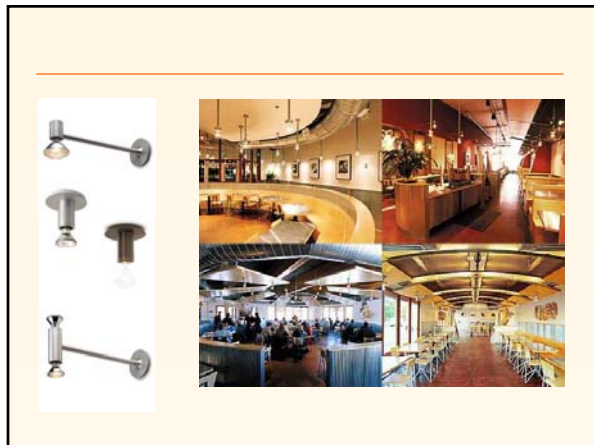
# Intro to Light Fixtures



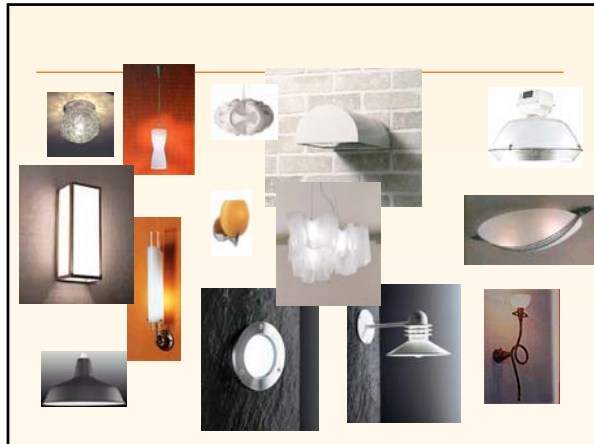
## Light Fixture

### Specifications:

- Method of Mounting
- Method to make Electrical Connection
- Housing
  - Lamp
  - Lamp Socket

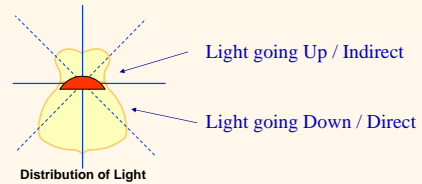


# Intro to Light Fixtures

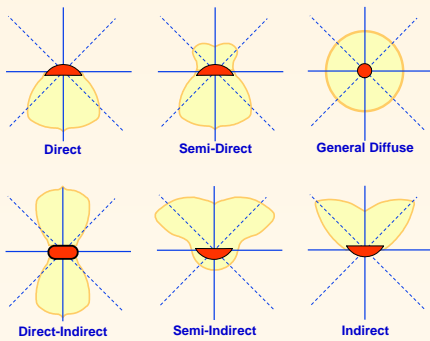


## Direction of Light

- Goal of a luminaire is to put light where the user needs it
- Convenient way to classify luminaires is by the *direction* of light emitted from the luminaire

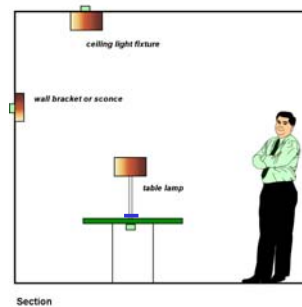


## Distribution Types



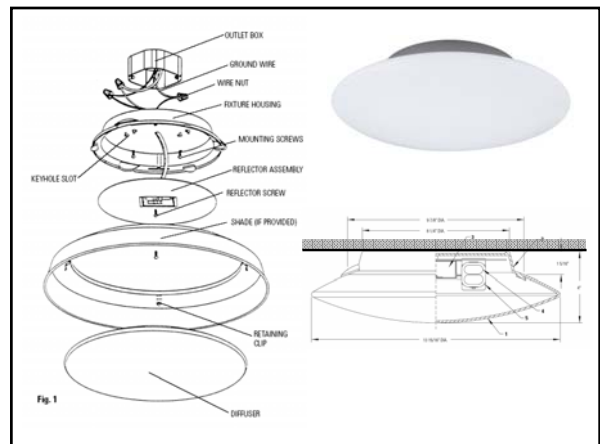
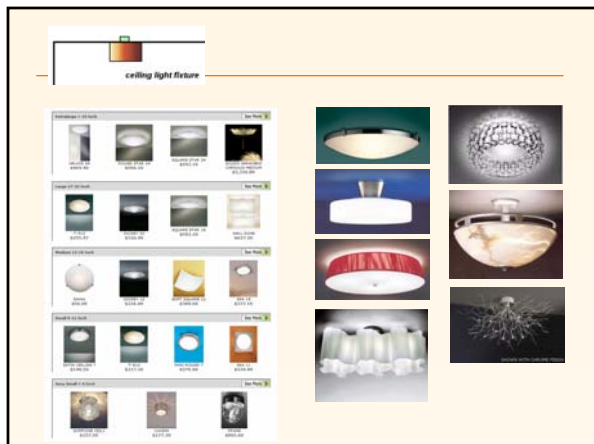
## Mounting

### Surface



#### Typical Components:

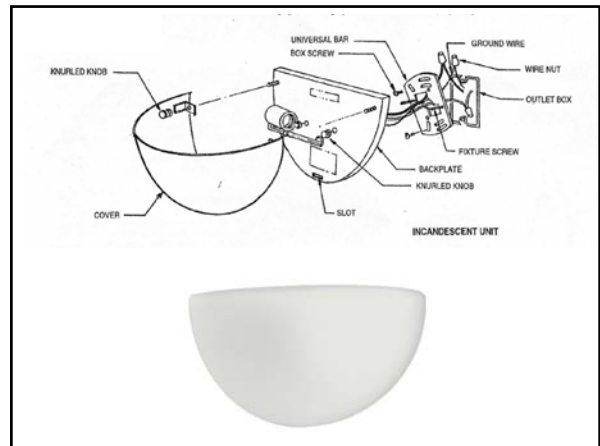
- Recessed Junction Box
- Housing
  - Back Plate
  - Lamp and Lamp Socket
  - Diffuser or Shielding
  - Base or Leg for Table Lamp



# Intro to Light Fixtures

**wall bracket or sconce**

Grid of light fixture options for wall brackets and sconces, including prices and 'See Photo' links for each item.



**table lamp**

Grid of light fixture options for table lamps, including prices and 'See Photo' links for each item.

## Mounting

- Pendant**

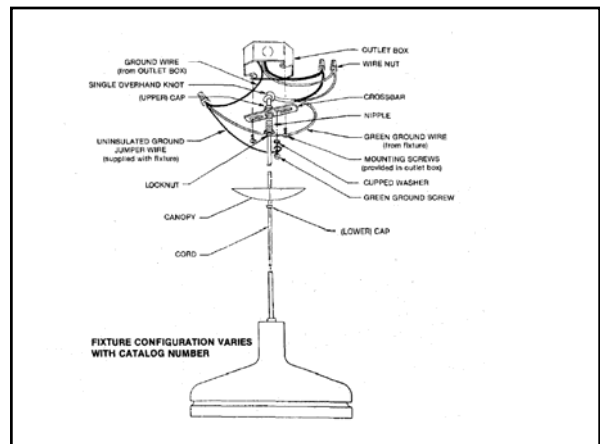
Section

**Typical Components:**

- Recessed Junction Box
- Housing
  - Canopy
  - Stem
  - Lamp and Lamp Socket
  - Diffuser or Shielding

**pendant**

Grid of light fixture options for pendant lights, including prices and 'See Photo' links for each item.



# Intro to Light Fixtures



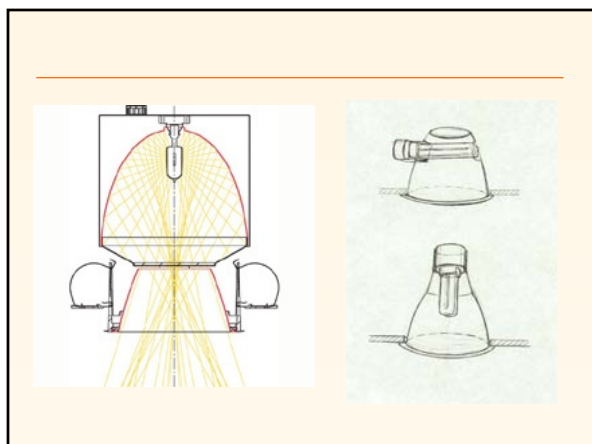
## Mounting

### Recessed

**Typical Components:**

- Splice Box
- Housing
- Lamp and Lamp Socket
- Aperture Cone
- Diffuse or Shielding

Typical components of a recessed downlight.



## Glare

**GLARE PREVENTION TIPS**

- Distribute light to walls and ceilings. Bi-directional fixtures such as A, D, and E (see p. 7) work well.
- Use daylight to light walls and ceilings.
- Use adjustable blinds or shades that control window glare while retaining view.
- Choose higher reflectance room surfaces.
- Select only semi-specular or white painted lenses and reflectors. Avoid mirrored or specular (shiny) reflectors or lenses that can be seen from any angle.
- Shield the lamp from view with baffles, louvers, lenses or diffusing overlays.

# Intro to Light Fixtures

## Shielding

## Reflector

**Reflectors** around or above the lamp used to increase performance of the fixture

## Shielding

Lamp placed above ceiling aperture or louver to provide **shielding** from normal viewing angles

## Glare Control

**Contour** of ceiling aperture or louver to provide **Glare Control** from normal viewing angles

## semi-recessed

# Intro to Light Fixtures

Diagram illustrating the components of a light fixture: Reflector, Lamp, Ballast, Housing, Louver, Mounting Frame, Lens or Diffuser, and Trim. A photograph shows a 2 ft X 4 ft Louvered Troffer installed in a ceiling. Below the diagram are three perspective views of different troffer styles.

## Reflector

Diagram illustrating the use of a reflector. The reflector is positioned around or above the lamp to increase the performance of the fixture by reflecting light downwards. A 3D perspective view shows a troffer with a reflector behind the lamp.

## Shielding

Diagram illustrating shielding. The lamp is placed above the ceiling aperture or louver to provide shielding from normal viewing angles. Dashed lines represent sight lines being blocked by the louver.

## Glare Control

Diagram illustrating glare control. The contour of the ceiling aperture or louver is designed to provide glare control from normal viewing angles. Red dashed lines show light rays being directed away from the viewer's eyes.

## General or Ambient : Troffer

Two photographs showing the installation of a troffer light fixture in an office. The left photo is labeled "Before" and shows a desk with a lamp. The right photo is labeled "After" and shows the same desk with a recessed troffer light fixture.

Diagram illustrating glare control. The sharp cut-off provides good glare control, but creates dark voids and ceilings, leading to darker cave-like environments. The circular diagram shows the glare zone and indicates that people and objects have a direct view of the lamp.

# Intro to Light Fixtures




A small amount of controlled brightness is introduced to the walls and ceiling, creating a brighter, more pleasant environment without causing unwanted glare.

Blurring lighting distribution creates less brightness directly below the fixture, minimizing wall reflections.



recessed in the wall




recessed in the floor



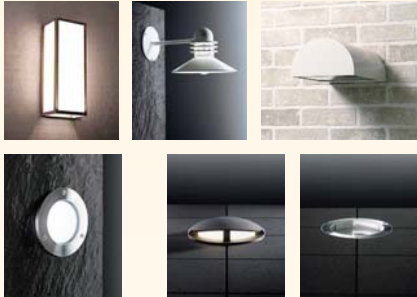
## Exterior

- Pole or Post Mounted



## Exterior

- Building or Ground Mounted



## Exterior

- Ground Mounted for Object Lighting



# Intro to Light Fixtures

## Fixtures Inside and Out

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- **Underwriters Laboratory Testing**
  - Dry Applications
  - Damp Applications
  - Wet Applications
  - Wet/Dry Applications
  - Underwater Applications
  - Corrosive Applications
  - Hazardous Applications

## Finding Fixtures

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- **General Lighting Mnfrs Websites**
  - [www.Lightolier.com](http://www.Lightolier.com)
  - [www.Erco.com](http://www.Erco.com)
- **Light Fixture Search Sites**
  - [www.LightSearch.com](http://www.LightSearch.com)
  - [www.eLumit.com](http://www.eLumit.com)
- **Retail Sites**
  - [www.Lightology.com](http://www.Lightology.com)
  - [www.unicahome.com](http://www.unicahome.com)
  - [www.lumens.com](http://www.lumens.com)
  - [www.100watt.net](http://www.100watt.net)