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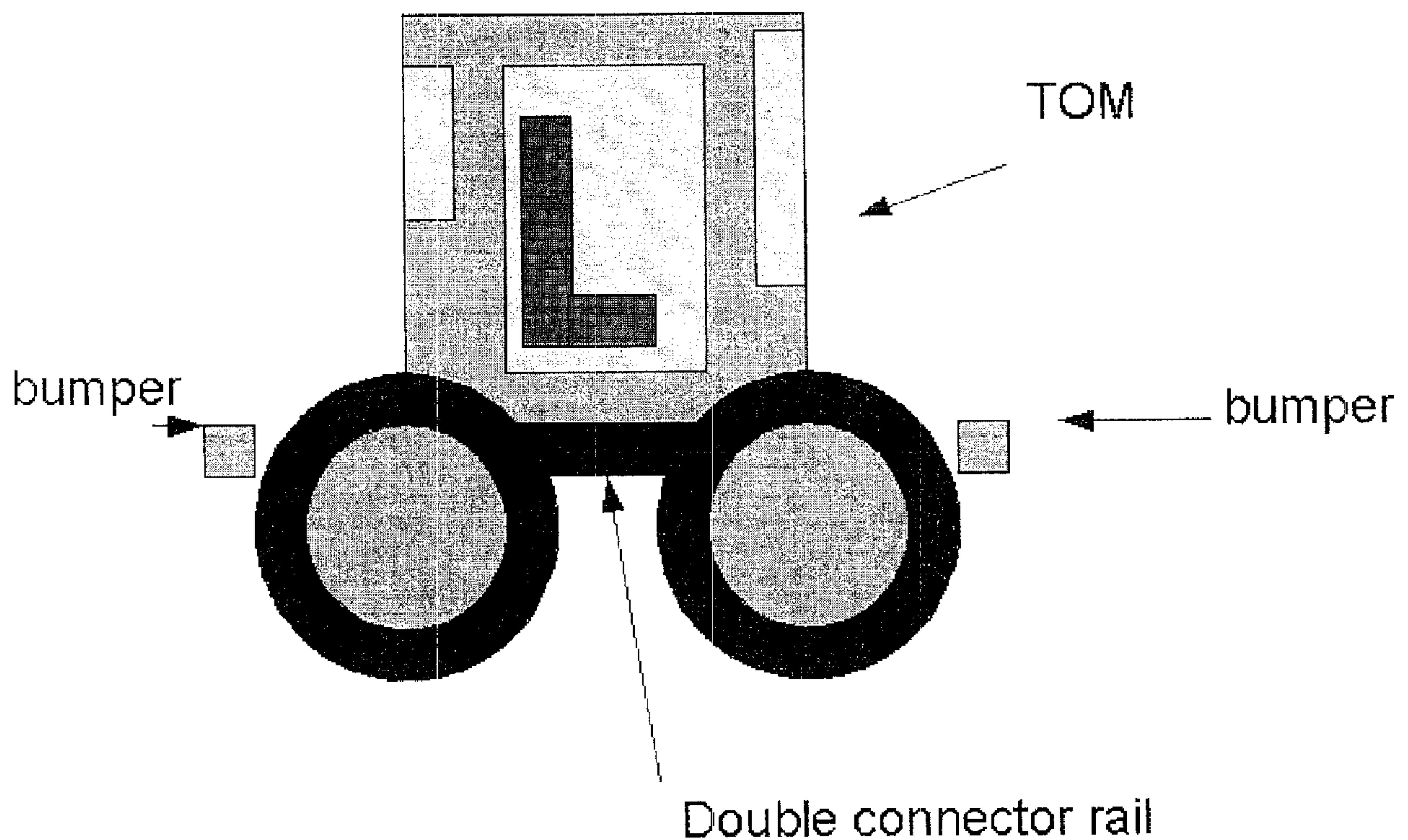
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(54) Titre : SYSTEME DE TRANSPORT  
(54) Title: TRANSPORTATION SYSTEM

Side view



TRANSPORTATION  
SYSTEM

## **Introduction**

### ***Basic Concept***

To evolve the car and the transportation system in tandem to a modular model that can be both flexible and efficient. The system can use existing road infrastructure more effectively. The model is based on the same basic ideas as packet-based systems such as the Internet. The proposal is a system of modules and transporters. The modules (Transport Optimized Module or TOM) would have independent mobility for local transport and dock onto a transporter for speed/distance travel.

## **Benefits**

### **To individuals**

- is affordable efficient mobility
- offers reduced commuting time and hassle
- has both short and long distance range
- provides comfort and safety in a variety of weather conditions
- can be used without transport infrastructure/ or when temporarily unavailable
- covers multiple applications and situations – commuting and errands
- is less expensive, faster end to end and more versatile than car for commuting
- has flexibility of source and destination and time that can be used
- provides reduced environmental impact
- is modular so only buy/use what you need
- can modify capacity/range/function over time

### **To manufacturing companies**

- is near term
- adds new product that is similar to car
- does not obsolete the car
- uses standard automotive technology
- creates multiple new product opportunities – TOMs, transporters, extension modules
- has simplified engineering for TOM because low speed, short distance requirements for TOMs
- has a modular design allows manufacturing scale cost benefits and common components
- transporter travel frees TOM occupants to engage in entertainment/comfort options/upgrades
- 

### **To Government**

- is near term
- is a green initiative in automotive sector
- creates/keeps consumer product employment
- adds infrastructure employment for loading/unloading and transport
- is a low cost option that can be implemented in the near term at low infrastructure cost
- uses existing roads, rails parking,
- can use high occupancy lanes and bus lanes for transporters
- reduces emissions
- uses existing roads gain greater capacity – reduce traffic congestion
- can increase number of parking spots in same area due to small TOM size
- requires only small social changes
- extends to rail implementation
- extends to intercity and beyond
- TOMs can use new energy sources

## ***Other benefits***

The concept and implementation can extend to longer distance travel with trains that can carry TOMs. TOM passenger could leave TOM to use train facilities during travel. Optionally TOMs could be transported between cities as freight.

## **Key features of proposal**

### ***Key features for transport units***

- 1) Very small transportation units for one or two people, referred to as TOMs. These are four wheeled vehicles that have low power and short range but can be linked to a flexible transport system for higher speed or greater distance. The fundamental principle of this system is the ability to connect small individual transport into an equally flexible higher capacity system. This is similar to packets being routed onto high speed links.
- 2) The TOMs use existing local roads and can originate and terminate at any location served by such. The TOMs can be powered by electric( E-tom), gas/electric/hybrid (H-TOM), gas (G-TOM), diesel (D-TOM) or other fuel source.
- 3) The TOMs would be designed for safety and comfort rather than speed, capacity, and distance.
- 4) Initially storage would be limited by the maximum width and depth of the TOM.
- 5) Storage modules could be connected to TOMs for additional cargo capacity. These would be of lightweight design and intended for short range to minimize TOM performance impact. They would not be intended as a comprehensive cargo and passenger solution. Storage modules would be separate vehicles from TOMs and attached via connectors. TOMs could also accommodate roof storage racks.
- 6) Each TOM would be equipped with a standardized connector system that would enable it to be linked into a larger and higher speed transportation components. The transporters are loaded with TOMs by driving the TOM into a loading slot and lifting the TOM off the ground. This mechanism saves TOM tires, wheels and drive system when being transported.
- 7) The TOMs are four wheeled for safety and consumer familiarity and acceptance and meet national safety standards
- 8) The TOMs would be fully enclosed for all weather transport
- 9) TOMs would have full lighting, steering, signaling capabilities to national transportation standards
- 10) TOMs could have single or dual occupancy models

## ***Key features for transporters***

- 1) These units would be comprised of models that would be compatible with existing road systems and or rail systems.
- 2) They would be capable of loading multiple pods and transferring them between locations.
- 3) The transporters would be equipped with a standardized connector system that would be compatible with single or dual TOM configuraions.
- 4) Loading and unloading would be via a drive into slot and lift to transport model. This model allows for flexible loading and unloading using facilities that have no more requirements than a parking lot.
- 5) The transporter would then carry the TOMs as a single load between departure point and destination.
- 6) The larger transport vehicle will allow for higher speed, safe transport and can be designed to be compatible with bus and rail systems.
- 7) Transporters could be made of differing capacities of pods and trailer systems could be added to extend capacity
- 8) Transporters load TOMs and TOM modules perpendicular to the transporter allowing for parallel loading. The transporter then lifts the TOM off the ground using a mechanism similar to a forklift. By matching the TOM connector to the transport connector and using a locking mechanism designed into the connectors the TOMs are secured for transport. The implementation can be further simplified to lift all TOMs on the transport using one lifter mechanism.

## ***Key features for connector systems***

- 1) Standardized connector for all TOMs and transporters (TOM-Ts)
- 2) Drive-on, drive off convenience
- 3) Fast parallel loading (docking)
- 4) Safe
- 5) Minimal infrastructure requirements
- 6) Can start small and build capacity
- 7) Single TOM takes one slot, dual TOM takes two slots
- 8) Cargo and passenger modules could take one or two slots

### ***Key features for overall system***

- 1) Allows individual flexibility and freedom unparalleled in current public transportation
- 2) Requires no large expenditures on infrastructure to get started
- 3) Avoids bottlenecks because transporters can re-route
- 4) TOMs can be inexpensive
- 5) Removes distance limitations for small efficient transport
- 6) Increases capacity of roads and parking due to smaller vehicles
- 7) Increased parking revenue per area
- 8) Provides off-peak and errand flexibility for commuters and families

## Solution Summary

| <b>Problem</b>                                                                                                      | <b>TOM solution</b>                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Consumers are reluctant to use public transportation because it does not go exactly where they want when they want. | Versatile because can start and end anywhere served by roads and still get benefits of commuting solutions via the transporters                                         |
| Current electric cars have range and cargo capacity issues                                                          | Connector technology enables the addition of cargo and passenger capacity. Transporter connection enables distance travel.                                              |
| Traffic congestion and parking issues in cities                                                                     | Reduces vehicle space and allows for dense transport between load and unload locations                                                                                  |
| Small car safety                                                                                                    | TOM use mainly on low speed roads. Higher speed travel is via transporters that can be on safe dedicated transit routes                                                 |
| Automobile industry financial issues                                                                                | Provides opportunities for multiple new products that are based on similar technology as the automobile. Consumers can purchase module upgrades                         |
| Greenhouse gas emissions                                                                                            | TOMs are small and can use less fuel. TOMs modularity enables commuter to travel with less weight but still handle cargo and passengers when required by adding modules |
| Consumer confidence                                                                                                 | Purchase that is green and provides fuel expense savings at lower cost than current alternative fuel vehicles                                                           |
| Transit system adoption                                                                                             | Low infrastructure cost allow cities to provide facilities quickly and cost effectively                                                                                 |
| Transit system shut downs                                                                                           | TOMs can still operate independently                                                                                                                                    |
| Transit system route blockage                                                                                       | Transporters can be routed on alternate routes and roads                                                                                                                |

## Component details

### ***TOM details***

Single TOM would fit one person only and be approximately one meter by one meter and slightly taller than current cars. It would have four wheels and have steering, braking and safety equipment to today's automotive standards. The TOM would have a connector mounted underneath to link to the transporter. It would be limited in speed and range. These limits would reduce expense, emissions and space requirements for the TOM.

TOM dimensions allow for dual side loading of transporters and remain within current road widths. TOM height would provide visibility and therefore additional safety in traffic

TOMs could be designed to a price point enabling them to be purchased as an additional transport option to existing automobile owners and open up the market to those who cannot afford current automobiles.

### **TOM design**

TOM implementation could be based on current vehicle technology. Existing vehicle design that are similar size could potentially be converted to TOMs by adapting the TOM connector to them. TOMs could be build to larger or smaller dimension. Larger TOM design standards would lose the benefit of fitting a larger number of TOMs on a TOM transporter. TOMS can be designed as smaller versions of current small cars as long as connector and size requirements are met.

TOM implementation extends to two or three wheeled vehicles. Such vehicles as motorcycles, scooters and current tricycle-style micro cars could be adapted to the system by equipping them with the connector technology. Adaptation of golf carts or equivalent would be limited as they are large and do not meet transport requirement for pubic roads. Most current mini cars has been designed for multi-passenger with cargo applications and would be heavier and take more space than TOMs.

TOM design differs from today's small electric and gas vehicles in three major ways

- 1) The connector system gives them the ability to easily connect to transporters for distance allow for more efficient design by reducing the range requirements
- 2) The connector system allows for extending the capacity of the TOM for cargo and passengers by adding modules to TOMs. The modules are added to TOM using the same connector technology. The modular nature of TOM allows TOMs to be either single or double width and still attach to transporters and add single of double width modules.
- 3) The standardized small size of TOMs allows for dense common transport connection and allows for TOM transporters to use current road widths

TOM design and efficiency would be enhanced by constructing TOMs with lightweight materials

TOM interiors would be similar to a single seater automobile in design, equipment and layout.

TOM could be provided with one or two doors.

Limited on-TOM storage could be provided behind the seat or seats.

### **TOM fuel sources.**

The TOMs can be powered by electric( E-tom), gas/electric/hybrid (H-TOM), gas (G-TOM), diesel (D-TOM) or other fuel source.

### **TOM versatility**

TOMs would be designed to meet current vehicle transportation standards and therefore could be used to travel to and from any location served by the road system.

### **TOM prototypes**

TOM prototypes could be derived from existing small vehicles. Many existing small electric cars could be adapted to create prototypes of TOMs. Examples could be golf carts, mobile wheelchairs, tricycle micro cars.

## ***TOM connector system***

- 1) Each TOM would have two connector rails for safety and stability
- 2) Each connector rail would be fastened to the TOM and cushioned for comfort
- 3) The connector rails would be hollow and match a connector “tube” on a transporter
- 4) The connector rails would have slots to match to prongs that extend from the connector tube and would mechanically link to secure TOM attachment
- 5) The prongs and slots would prevent the TOM from detaching from the transporter during movement
- 6) The cushioning would enhance transportation comfort
- 7) In addition the connector tube could have a automated guide tab that could pull the TOM from initial engagement to dock position
- 8) TOM connectors on the TOMs would be symmetrical on both ends of the TOM to allow drive-on or back-in loading. It is envisioned that TOM users being transported could read or use entertainment or communication and computing devices while being transported. Commuters would likely load by driving in for fast loading. Distance travelers would likely back in to allow them to view scenery.
- 9) The same connector system would be used on TOM cargo and passenger models.

## ***Transporter connector system***

- 1) The transporter would lower the connector tubes to prepare for TOM docking
- 2) The TOM rails would be matched to the connector tube by driving the TOM into a transporter slot
- 3) Alignment can be simplified by having a guide funnel on the connector tube
- 4) Alignment lighting for aiming could be provided
- 5) Automated guide tabs could be used to further simplify the docking process
- 6) To lock the TOM onto the tube the prongs would be extended from the transporter tube into matching slots on the TOM guide rails
- 7) To unlock the pod the prongs would be retracted
- 8) Trailers could be added to transporters to increase capacity
- 9) Transporter tube height could be made adjustable by transport driver for rougher roads
- 10) Transporters would be wide enough to accommodate pod loading on both sides or single sided for narrow road applications

NOTE : an alternative implementation would be to reverse rail and tube configurations. Rails on transport, tubes on the TOMs. It is important that only one configuration be standardized.

NOTE : TOM rails and transport tubes must be designed to support TOM weight when being transported.

## ***TOM and Transporter attachment mechanism***

The TOM rail fits in transport tube when TOM driven in transporter slot. Multiple locking tabs are engaged to secure transport. A mechanism is extended the locking tab into the TOM rail. The mechanism is controlled by a signal from the transporter. Sensors detect the extended and retracted positions of the locking tabs. A secure, manual lock and unlock mechanism is provided. An implementation is a hydraulic piston mechanisms for the tab movement. Another would be a motorized extension of the tab using a gear or screw type extension and retraction.

The transporter lifts the transporter tube, thereby lifting the TOM rail and TOM using lifting motors or hydraulics. An implementation could be similar to a forklift. Another mechanism could be using a screw driven system.

To unload the TOMs would be lowered and the locking tabs disengaged.

Sensors would detect if a TOM rail was matched with a transport rail.

Sensors could be mechanical or other implementation such as laser. Sensors could be redundant and use more than one type.

Sensors would detect if the transport rail was in lifted or lowered position

An safety interlock could be provided to prevent the transport from moving until locks are engaged and tubes are lifted for all occupied TOM transport slots.

## Operations Scenarios

### *Transport operations*

1. Transporter stops at designated location
2. Transport driver lowers transport tubes and signals ready to load
3. Drivers of TOMs drive into transport tube and dock
4. Transport driver locks prongs from tube into rails on the TOM
5. Transporter and pod sensors and communications confirm operations
6. Transporter lifts TOMs off the ground – saving fuel/electricity
7. TOMs can be driven forward or backed onto t

### *Locking system details*

1. Shock absorber system to ease docking
2. Sensors on transport detect tube occupancy
3. Sensors on transport detect TOM connection status
4. Transport driver activates prongs to lock TOMs onto transport tubes
5. Lock sensors confirm locking to transport driver
6. Lock sensors confirm locking to TOM driver
7. TOM and transport drives could have additional manual confirmation capabilities
8. Wireless communications in TOM and transporter for emergencies

### *TOM docking management*

Lights on transporter above tube signal pod drivers

red – no docking

yellow – dock

green -loaded

Transporter console indicates

tube empty/occupied

TOM loaded

TOM secure

tube up/down

A safety mechanism would ensure the transport could not move with tubes down or TOMs loaded but not secure

Lights on transporter for locking to signal pod driver

red – problem  
 yellow – locked  
 green – unlocked

## ***Transporter details***

Transporters could be in different configurations. The simplest would be a transporter “cab” similar to a transport truck that would haul one or many transport trailers. Variations could include cab plus trailer models and trailers and cabs that are single pod width for narrow road applications.

## ***Loading/Unloading model***

TOM loading requires only the equivalent of a small parking facility. Loading/unloading spots could be painted on a flat area that are only slightly larger than a TOM. The L/U-spots would align to tube positions on a transporter. The TOM drivers would be signaled to drive forward and would drive into a vacant transporter L/U spot. TOM loading and unloading could be added to existing parking, park and ride facilities using low cost infrastructure improvements

TOM loading and unloading facility implementation could use a variety of loading priority models including first come, first served, priority queues, emergency loading.

For public transport system a first come, first served model would provide a viable model that could be changed or enhanced with small changes. This model allows for lower cost, lower footprint facilities for implementation.

Facilities can be low cost as very little infrastructure is required to implement a loading/unloading capability as no buildings are required.

The parallel loading model creates efficiencies in time to load and unload.

TOM small size allows for smaller area loading and unloading.

## ***Point to Point operations***

- 1) Transporters with occupied TOM slots would arrive and unload
- 2) Transporters would then be completely empty simplifying loading
- 3) The transporter could load in position once unloaded TOMs had departed or move forward to load from a different set of L/U spots to speed operations
- 4) Drivers drive into L/U spots as they would a parking spot and load when transporter arrives and loading is signaled
- 5) Transporter trailers could also be loaded prior to transporter arrival for higher density/speed operations

## ***Hub/transfer operations***

- 1) Transporters with no transferring TOMs could proceed with a brief stop
- 2) Optionally all TOMs could be made to unload to wait queues to implement a pure routing model
- 3) TOMs that would be transferring would unload into empty L/U spots and depart as they would a parking spot
- 4) Empty transporter slots could be filled from a wait queue of TOMS

## ***Additional safety measures***

To further increase loading and unloading safety a dual gate system could be implemented per TOM loading slot. The “outside” gates would have sensors that required the TOM to enter the L/U slot only when it is empty and stop. The “outside” gate would then close. The “inside” gate would open only when a transporter is in position for loading. Gate design should allow for single and dual TOMs.

## **Key features of the transport model**

- 1) Works like the Internet by supporting independent arrival and departure from unlimited destinations into hubs
- 2) Hubs are independent of each other for operations
- 3) Capacity and routing between hubs is variable and flexible
- 4) Transfer assignment and queuing can be managed based on traffic arrival and wait times
- 5) Traffic can be prioritized
- 6) Shaping measures by time of day or other criteria can be implemented

## **Hub and transport fare collection**

TOM users could pay for hub and transport in a variety of ways. Any current model of fare collection could be applied. Cash could be collected from TOM users at entry to transport loading and unloading locations. Passes, swipe cards and electronic fare mechanisms can be applied.

## **TOM transport economics**

TOM design allows for lightweight, small footprint transportation. Transporters can efficiently carry multiple TOMS. Locations of TOM load and unload facilities and hubs is flexible and can be implemented so that TOM transport is economically viable for both the TOM user and the transport provider. TOM transporters should cost in the same range as buses or equivalent cargo transport. Cost of operations should be similar to other public transport.

## **TOM module extensions**

### ***Potential extensions***

TOM modules can be extended. The fundamental concept is mix and match modules with the common TOM connector.. Examples that follow are a sample and not intended to limit the options.

All modules can attach using a rail to rail connector. Additional connections for powering lights, heat, etc.. would be provided.

Single TOM cargo module – attaches to TOM, fills additional transporter slot, TOM backs it into slot the occupies another slot, Could be disallowed during peak periods. Allows for short trip cargo haul, for example groceries or mall. TOMs could tow multiple cargo modules

Dual cargo module – as above but dual

Single TOM passenger module – similar to cargo module but has passenger amenities. Could be another TOM.

Dual TOM passenger module – as above but dual

Connector adapters for dual to single and single to dual matching would be available

Multiple modules could be connected together in short haul applications

Power modules could be provided to increase range of E-TOMs

### ***Engineering Options***

Single vs dual rail/tube – dual design for safety/redundancy but low cost model could have single connector (in same position as one of dual connectors for compatibility)

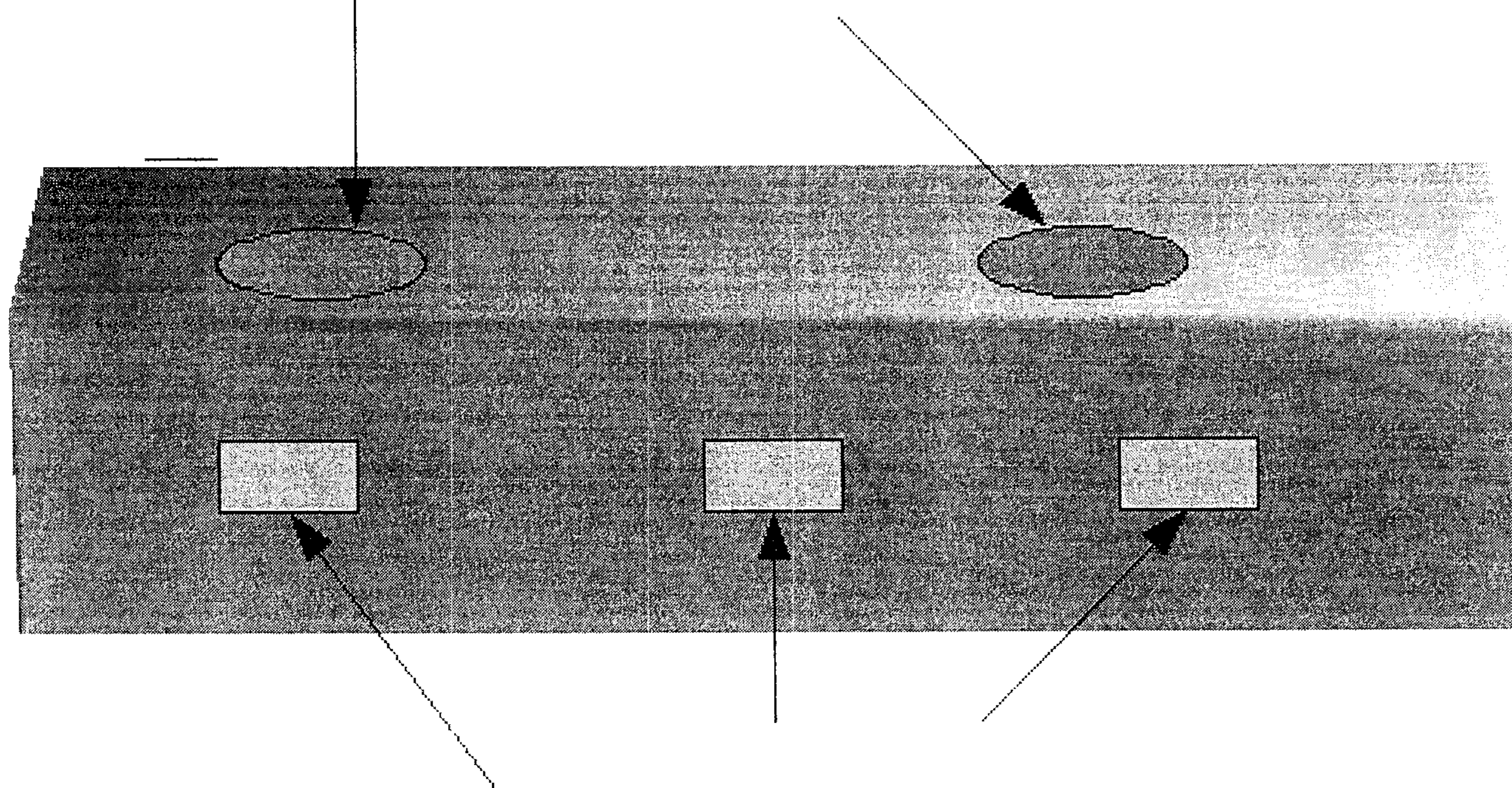
Dual TOMs have system that combines inputs/controls for two slots

Additional controls for loading/unloading cargo/passenger modules

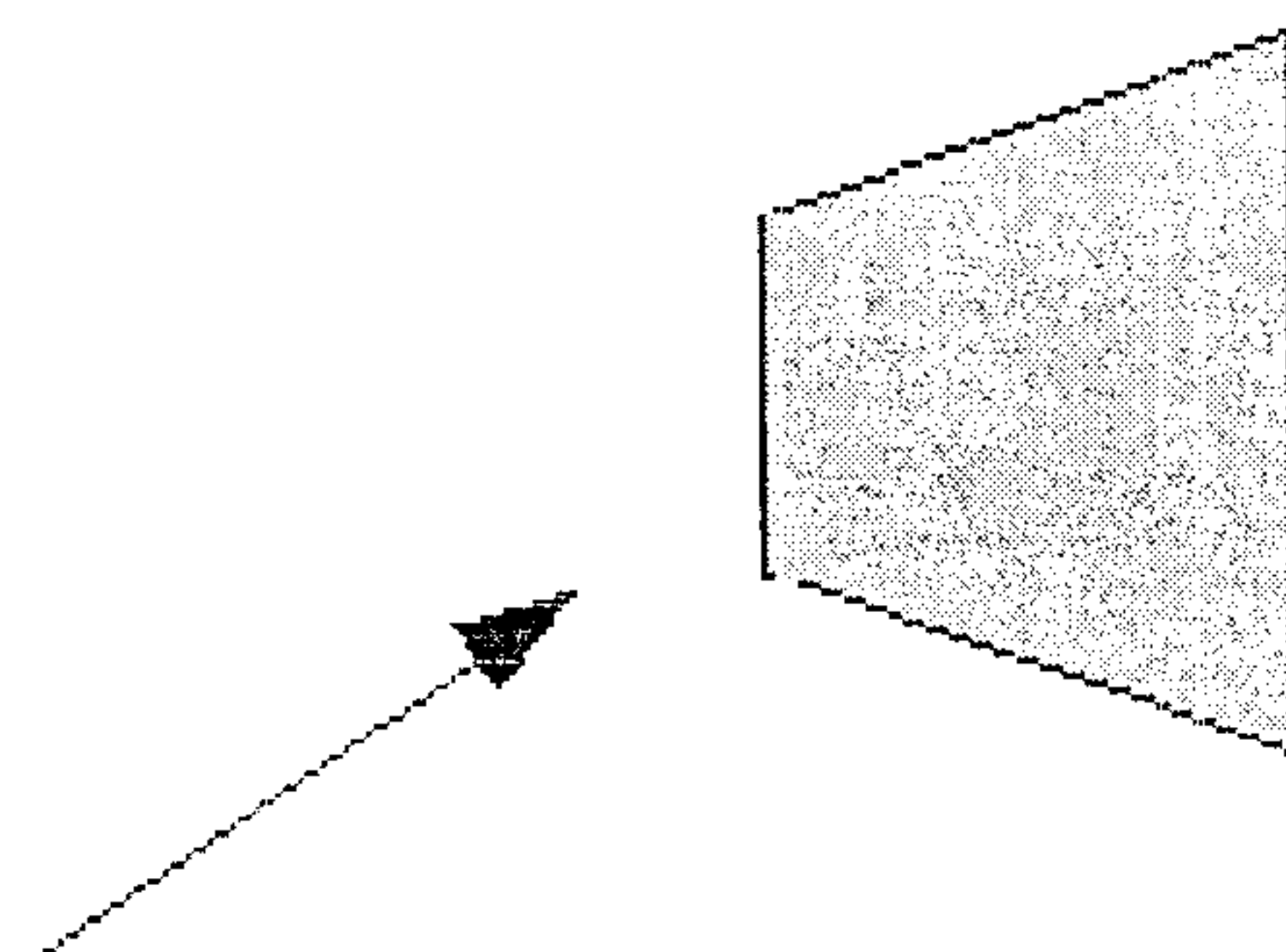
Pivoting connector for longer cargo loads

Transfer tube system could be automated at hubs to guide and route TOMs to load and unload using same connectors

Cushioning mechanism



Connector attachment slots



Collar at connector end or ends for simple alignment

Figure 1

Side view

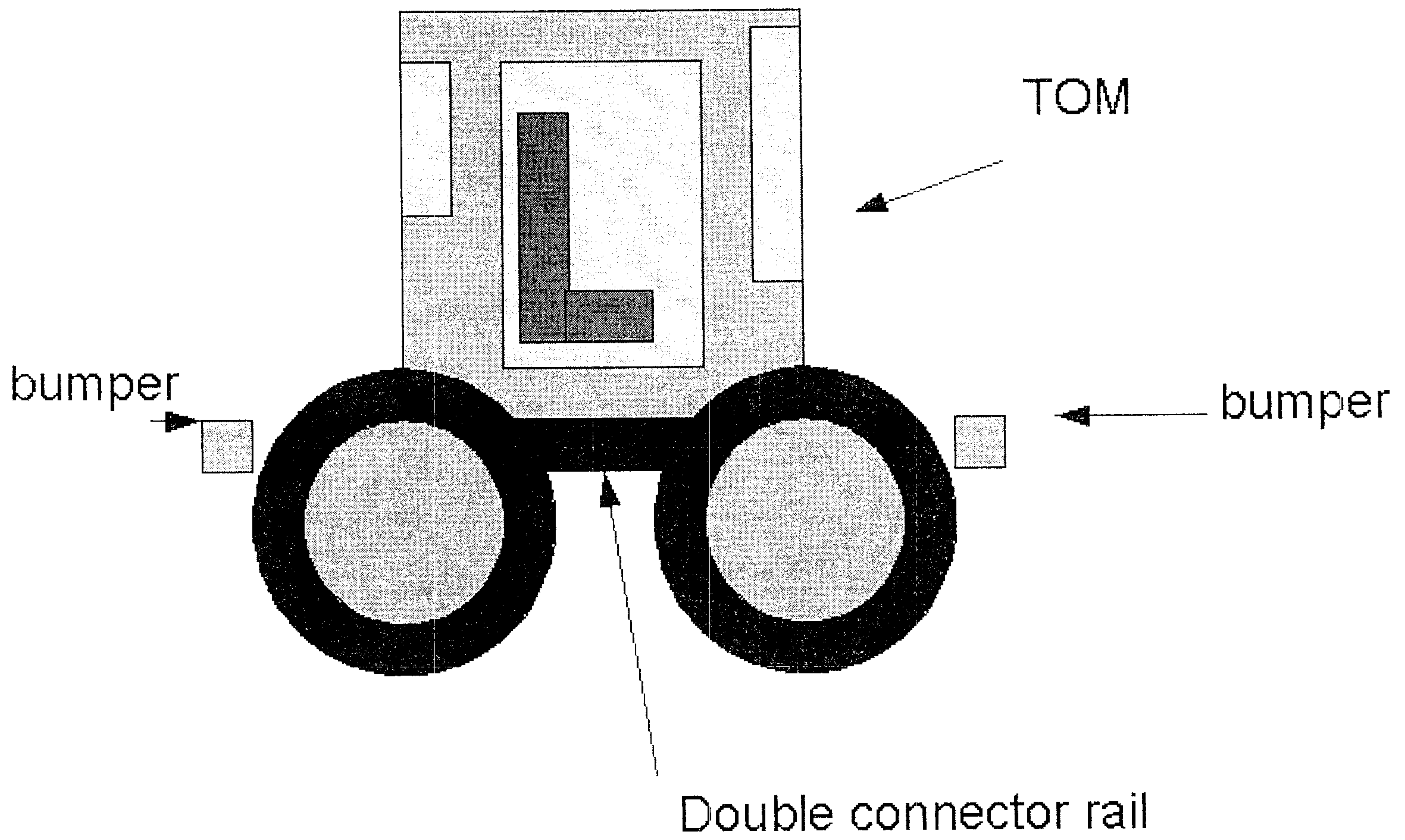


Figure 2

# Connector rails

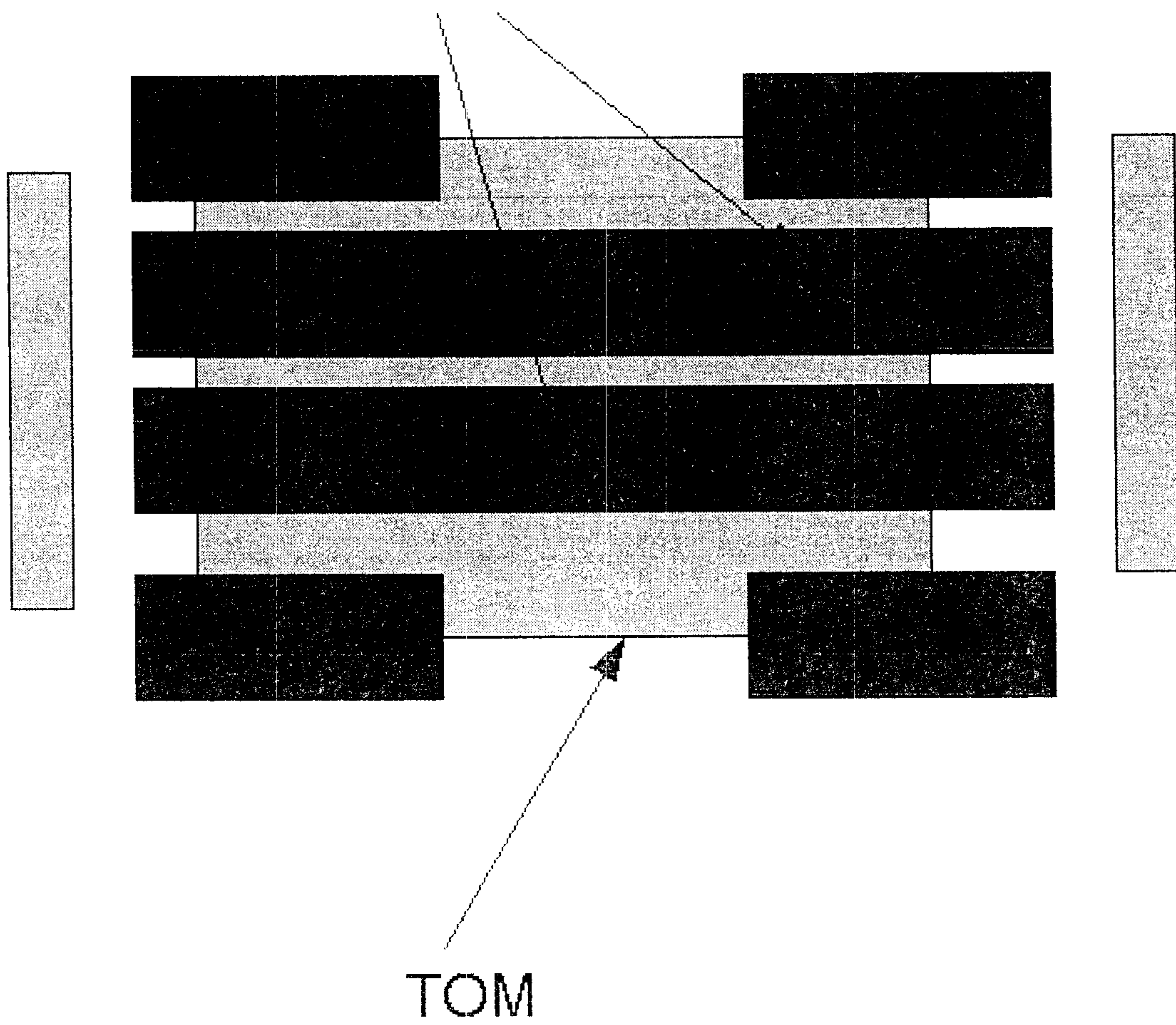
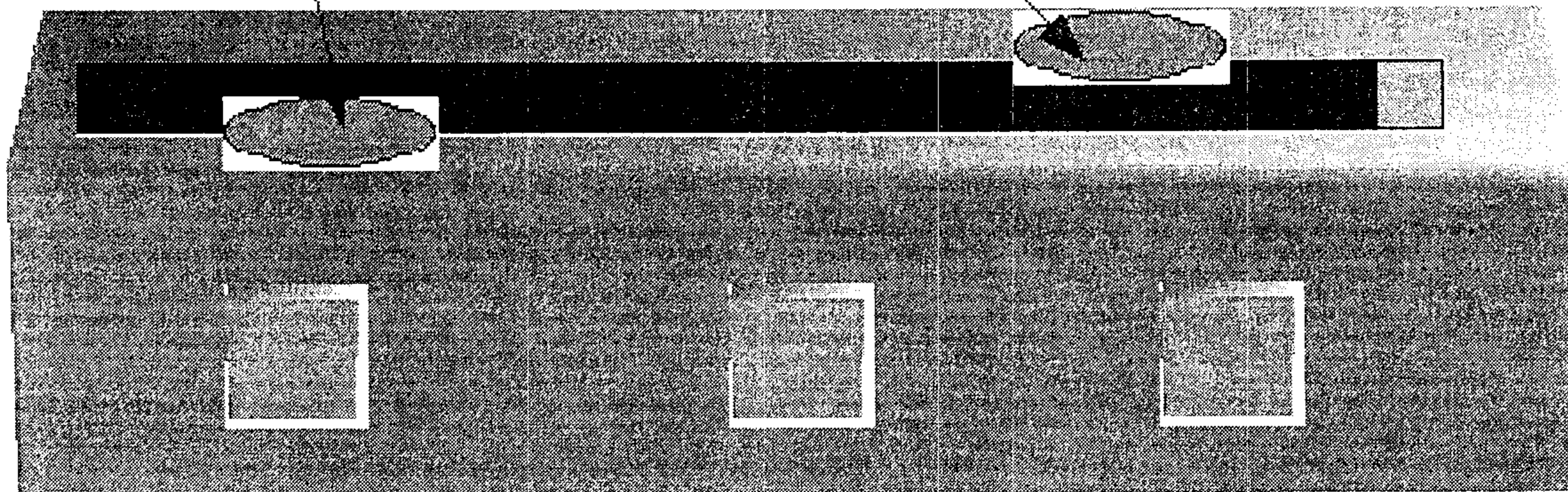


Figure 3

Optional  
Connector tab and groove  
to grab and dock TOM

Cushioning mechanism



Connector extending "prongs"

Connector "tube"

Figure 4

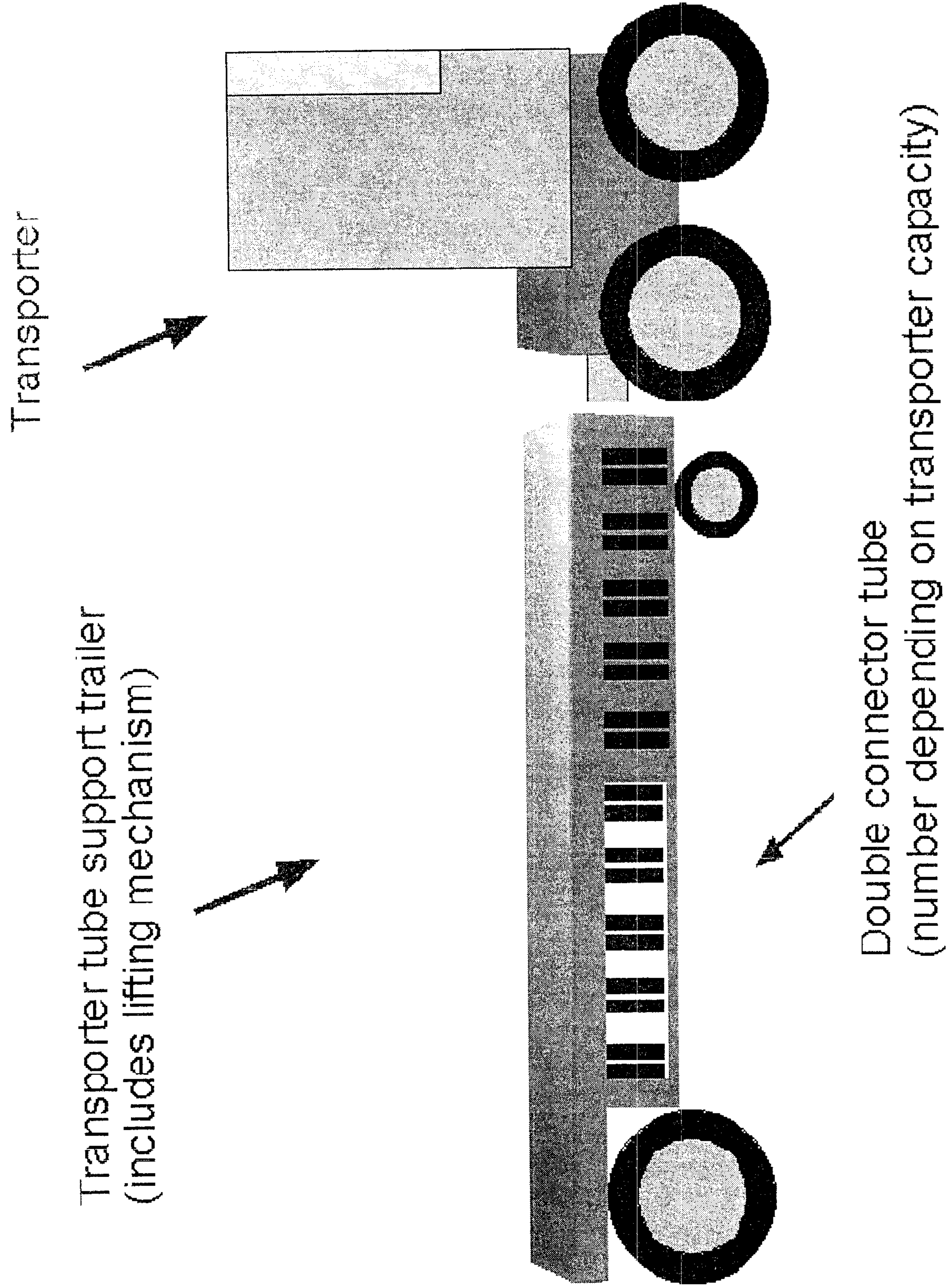


FIGURE  
5

Can haul multiple trailers

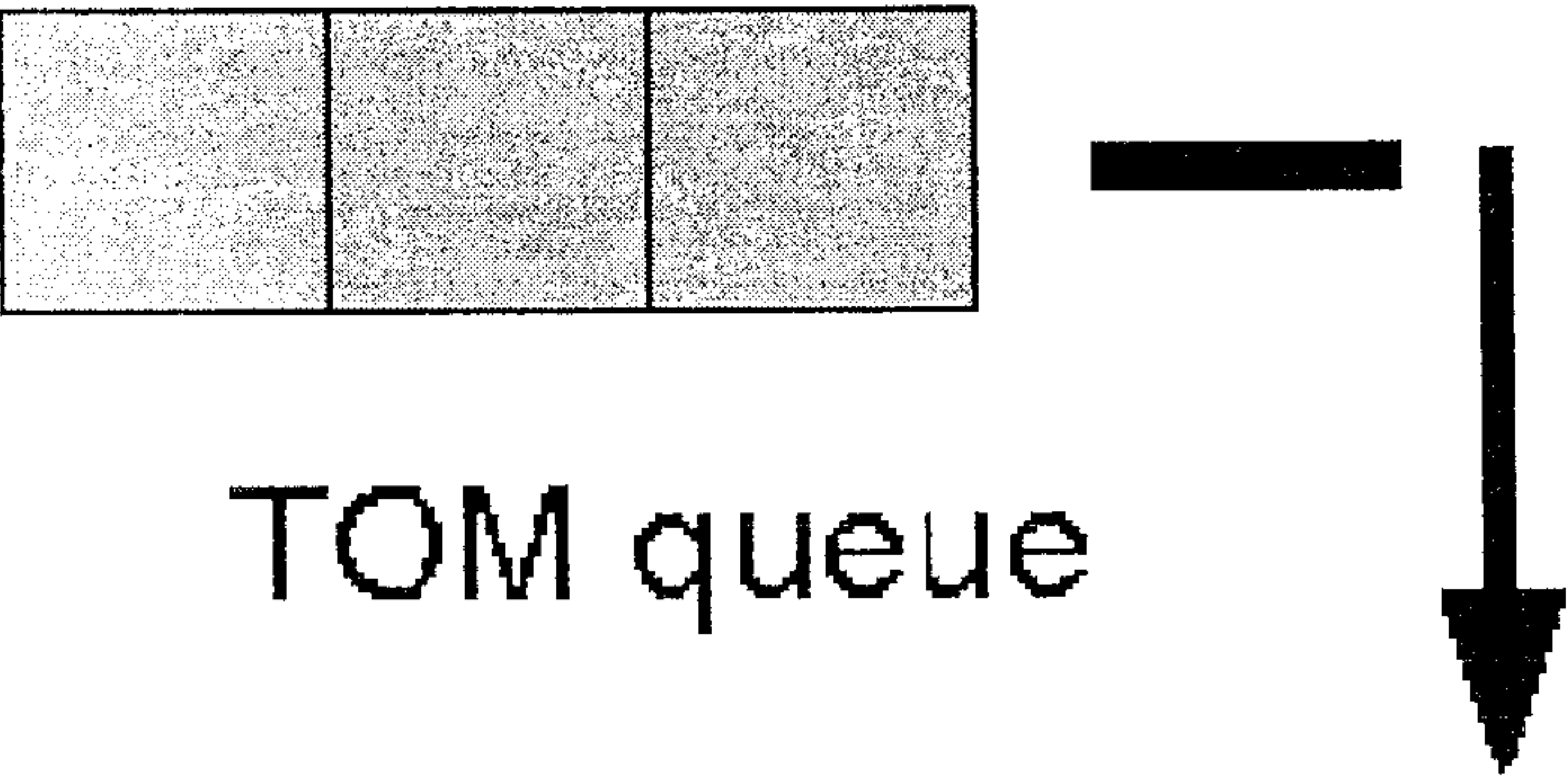
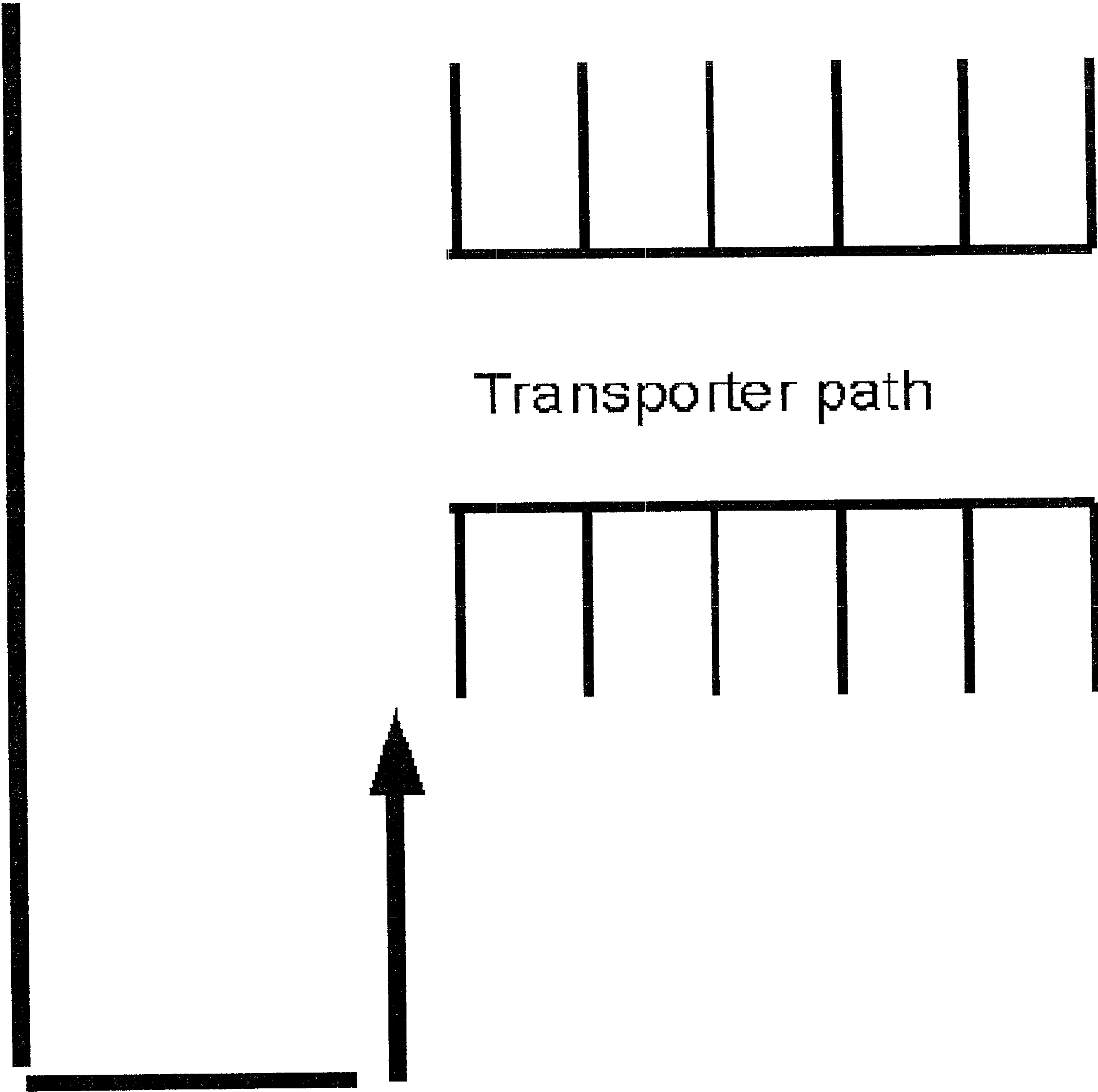
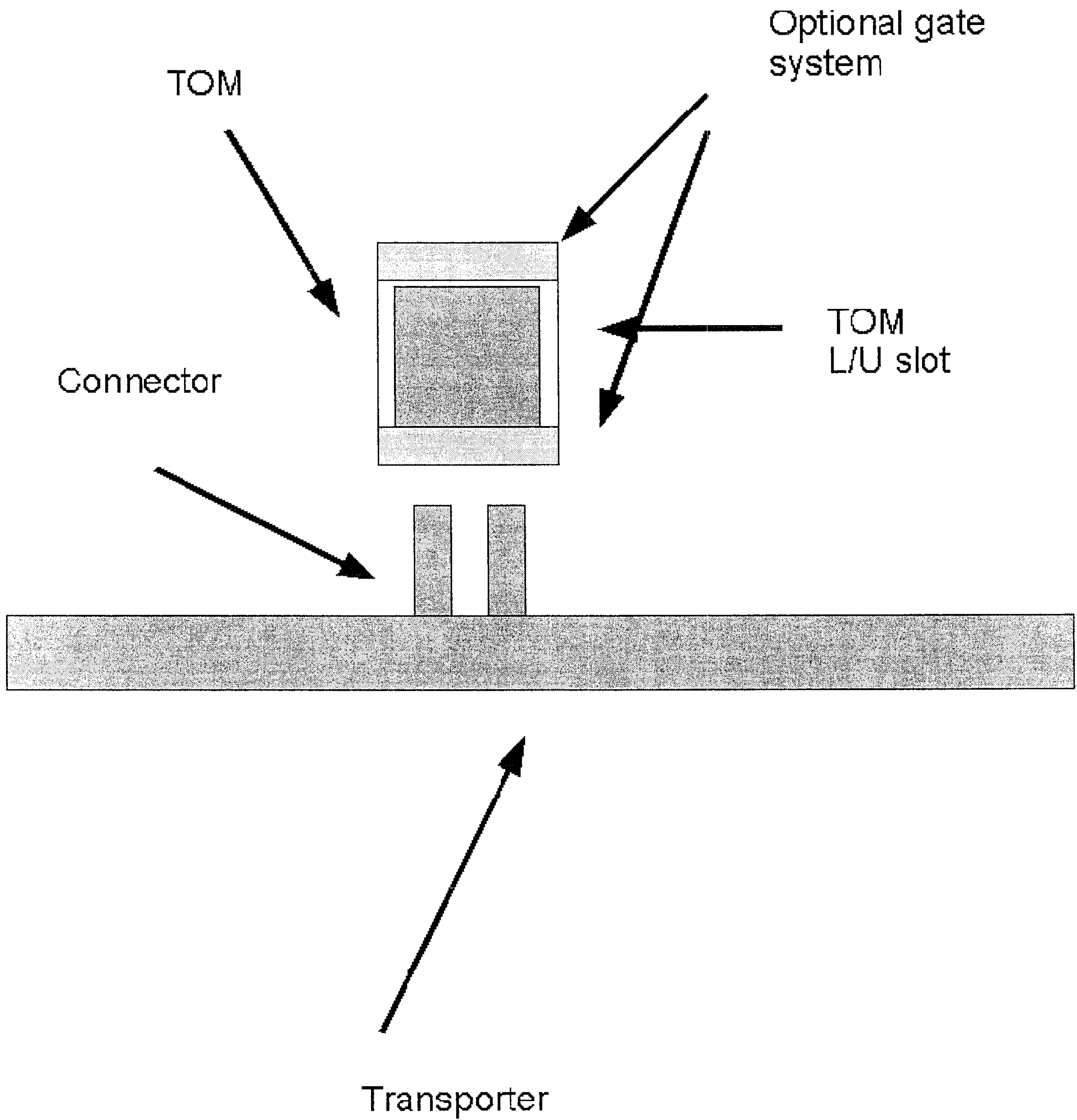


FIGURE  
6

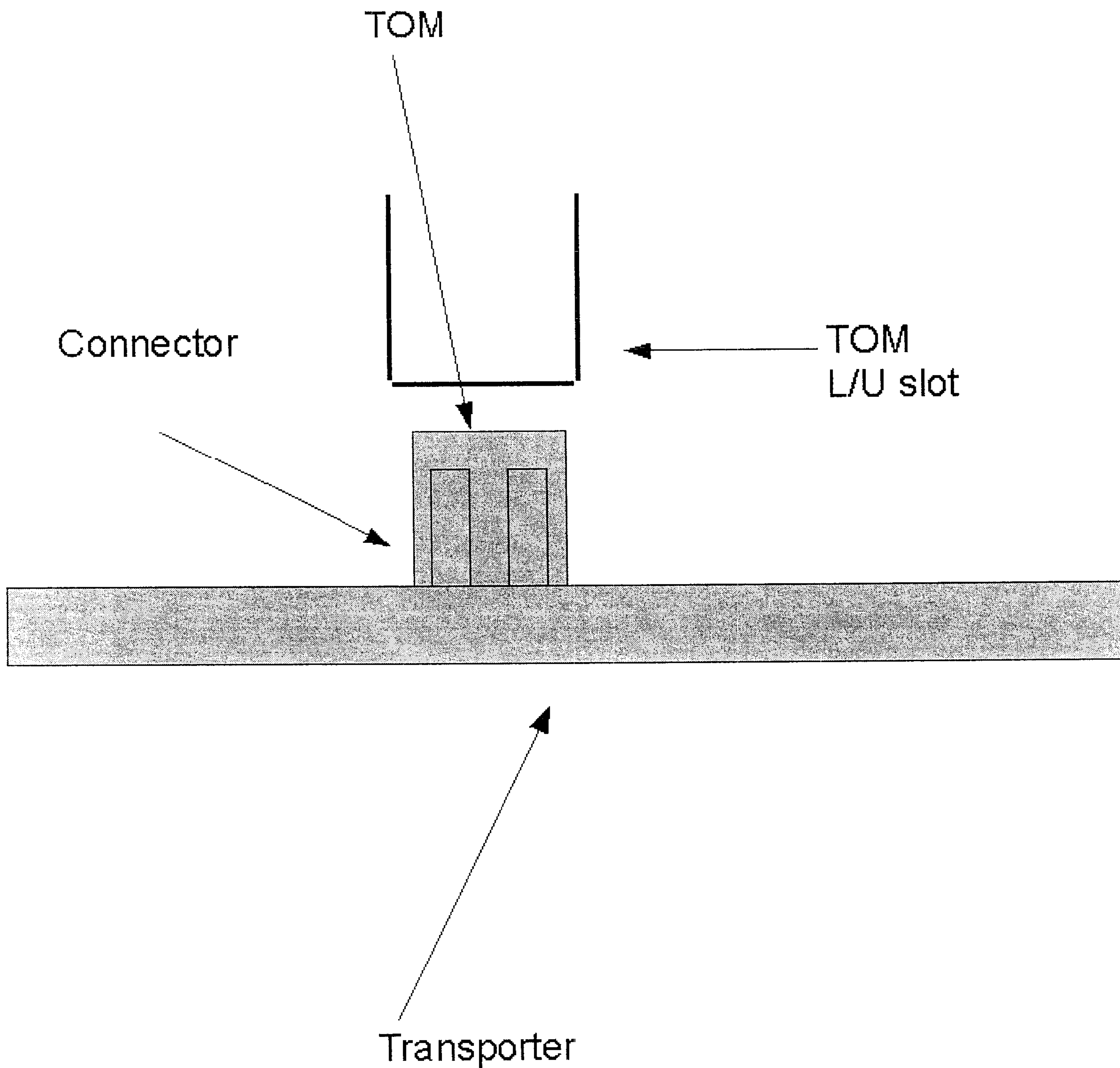


Transporter path



TOM before docking

Figure 7



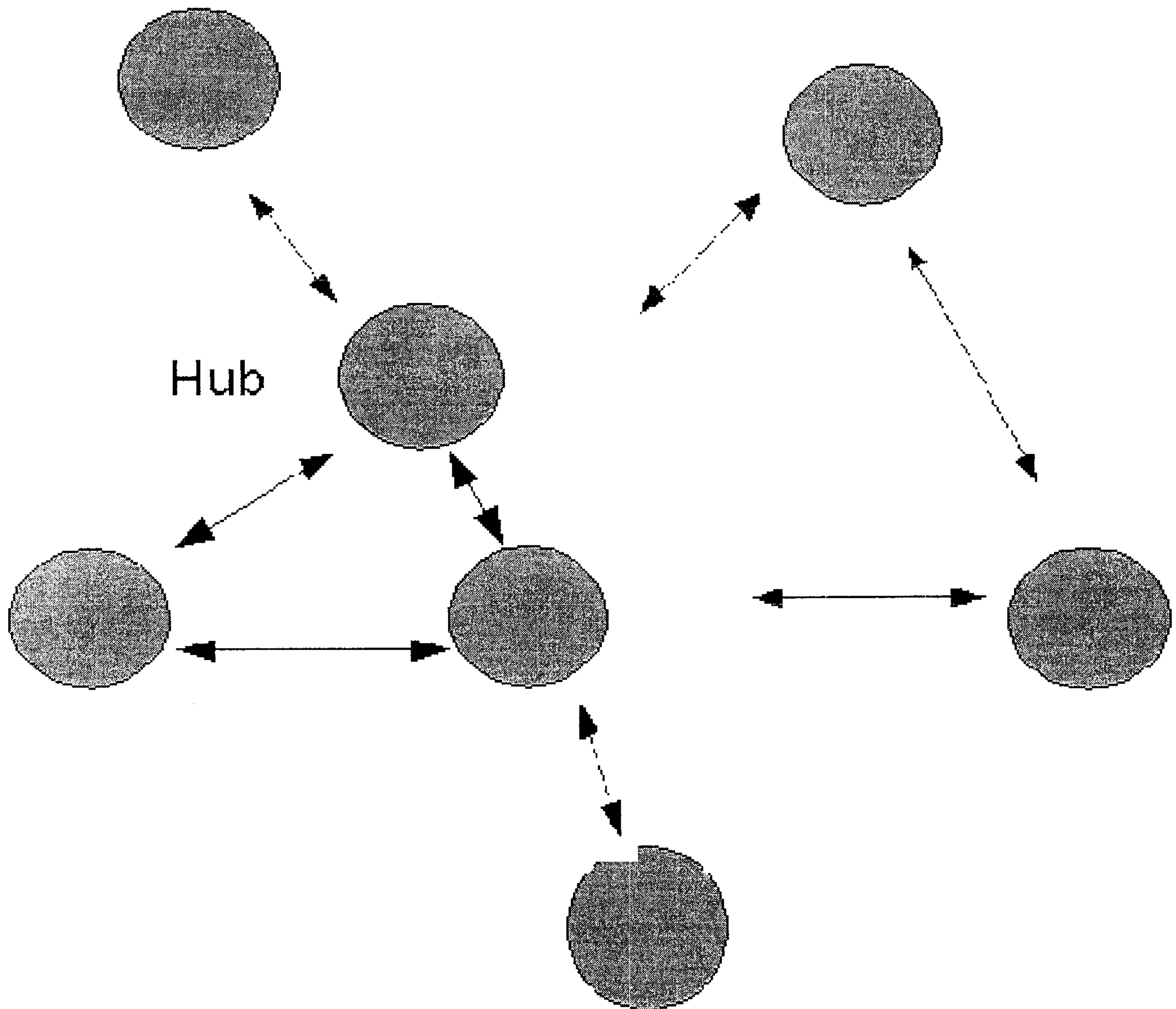
TOM before docking

Figure 8

## Internet-style routing and networking

FIGURE 9

Load/Unload point



TOM queue

Similar to the Network in Fig. 8

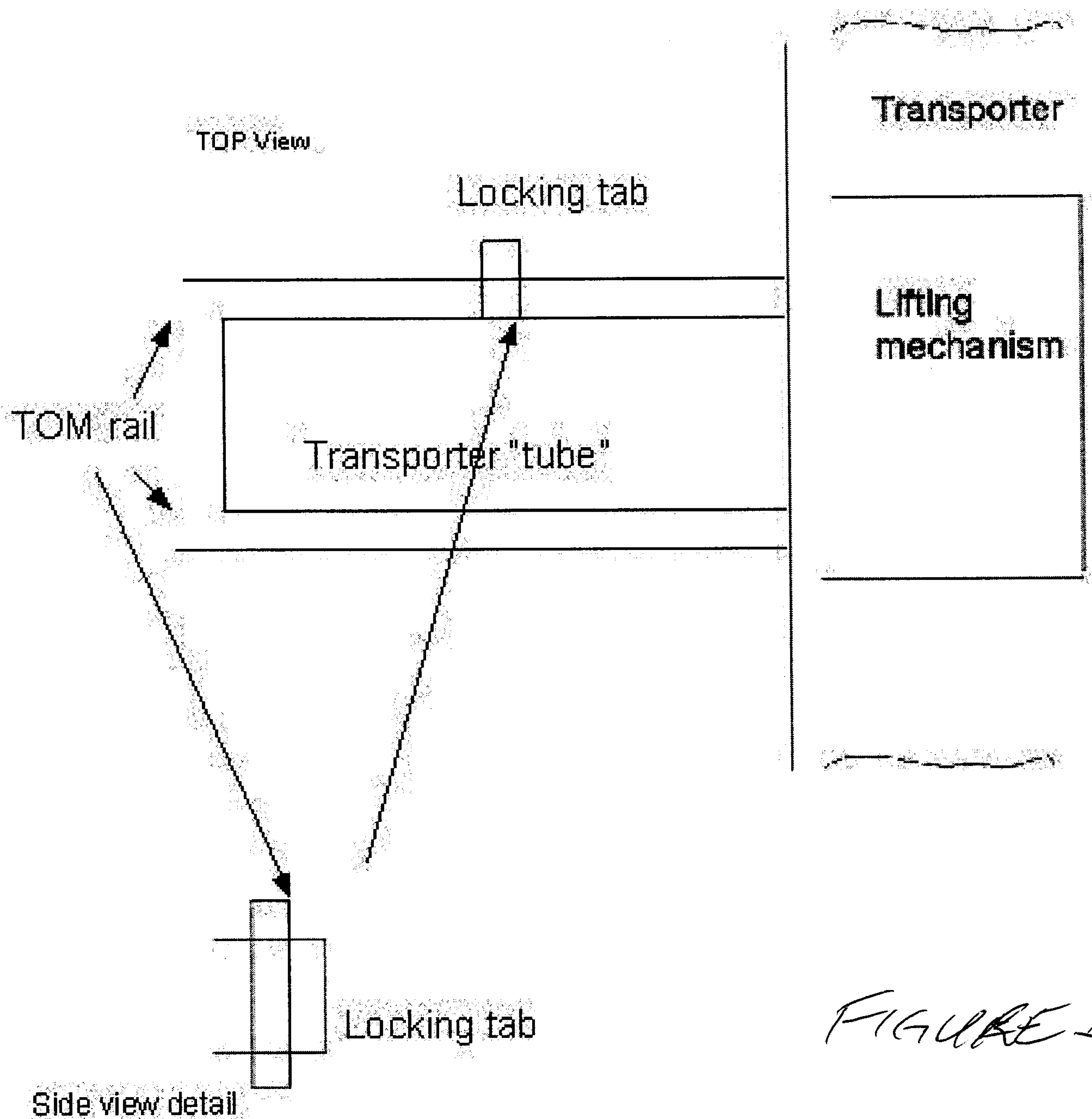


FIGURE 10

- 1) TOM rail fits in transport tube when TOM driven in transporter slot
- 2) Locking tabs are engaged to secure transport by mechanism that extends the locking tab into the TOM rail
- 3) Transporter lifts tube (TOM rail and TOM)
- 4) Reverse operation to unload

# Transportation proposal

A modular transportation implementation that creates a near term solution for today's problems

Gowling Lafleur Henderson LLP

*FIGURE*  
*11*

Steve Harris

# Urgency

Current crises in

Auto sector

Consumer sector

Financial sector

Environment and Global warming  
City congestion and quality of life

FIGURE  
12

# Relevance- Individual

FIGURE  
13

- provides affordable efficient mobility
- reduces commuting time and hassle
- Supports both short and long distance travel – ideal for commuting
- has comfort and safety in a variety of weather conditions
- can be used without transport infrastructure/ or when temporarily unavailable
- covers multiple applications and situations
- will be less expensive, faster end to end and more versatile than car for commuting, flexible for off-peak timing and errands
- has flexibility of source and destination
- reduces environmental impact
- is modular so only buy/use what you need
- can modify capacity/range/function over time

# Relevance - Corporate

FIGURE  
14

- is near term
- adds new product that is similar to car
  - does not obsolete the car
- uses standard automotive technology
- creates multiple new product opportunities – TOMs, transporters, extension modules
- has simplified engineering for TOM because low speed, short distance requirements for TOMs
- has a modular design allows manufacturing scale cost benefits and common components
- transporter travel frees TOM occupants to engage in entertainment/comfort options/upgrades

# Relevance - Government

FIGURE  
15

- is near term
- is a green initiative in automotive sector
- creates new consumer product employment
- creates infrastructure employment for loading/unloading and transport
- is a low cost option that can be implemented in the near term at low infrastructure cost
- uses existing roads, rails parking,
- can use high occupancy lanes and bus lanes for transporters
- reduces emissions
- makes existing roads gain greater capacity – reduce traffic congestion
- can increase number of parking spots in same area due to small TOM size
- requires only small social changes
- extends to rail implementation

Private and Confidential

# Solution Concept

FIGURE  
16

- Introduce new transport product that is small, efficient and modular
- Use “hub and spoke” and “uniform package transfer” features to support short and long range flexibility
- Uses existing infrastructure
- Does not require significant new technology

# Solution Components

TOM – Transport optimized Module

TOM-T –TOM transporter

TOM-C –TOM connector

Loading/unloading and transport routes can use existing infrastructure with small/affordable modifications

FIGURE -  
17

# Why it will work

- Multiple crises provide opportunity for action
- Individuals, corporate and government recognize need for new ideas
- Low cost and efficient
- Reduces most drawbacks of small car proposals by extending range/capacity at lower cost
- Modular and standard connector allows flexibility
- Transporters provide range and speed
- Modular so can be acquired in stages by consumer

*FIGURE*  
*18*

Side view

