DESCRIPTION

SENIOR Roofcars are designed for high-rise buildings or for buildings where access is difficult. This compact sized equipment is capable of servicing buildings with heights of **600 ft. (200 m) or more**.
Work platforms are typically designed for **two maintenance personel**, and SENIOR roofcars ensure fast and safe operation.

The installation consists of:
- a **mobile traversing roofcar** with a boom and lifting and control mechanisms
- a **work platform** suspended from the roofcar boom by four independent galvanized steel wire ropes
- **Track* or rail**

All the operations are controlled by a MAGTRON remote control unit:
- lifting and lowering the platform
- boom angle (luffing)
- boom telescoping
- traversing frame
- slewing of the turret and the spreader bar

2. THE SENIOR RANGE

2.1 Standard series

Standard machines (Fixed boom, Luffing boom, and Telescopic boom types) have single booms with a maximum reach of 35 ft (± 11 m). Hydraulic powered luffing & telescopic operation of the boom is used to bring the platform close to the façade.

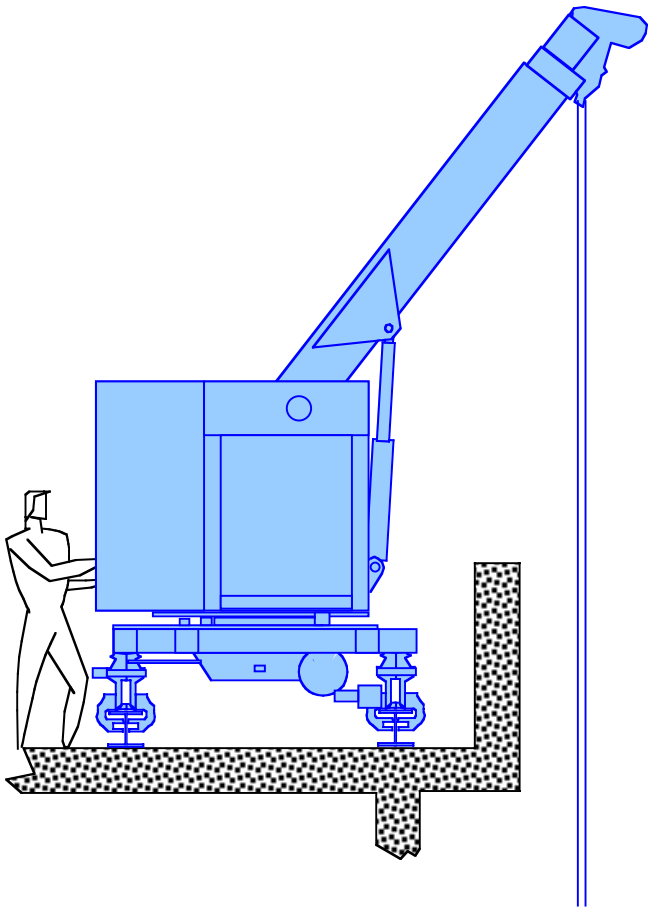
2.2 Special series

Tractel offers 2 series of **special machines**: the single boom can be fixed (series XF) or telescopic (series XT).

These machines have maximum boom reach of 60 ft (± 18 m).
Boom lengths of greater reach can be custom designed to suit virtually any special condition.

This type of machine **provides optimum access to every part of the building and in particular the building corners.** The end of the boom is fitted with a spreader bar which enables the platform to be rotated so that it is parallel to the building. These units offer a high level of comfort to operators.

** See technical sheet T4761.1 BMU Track*

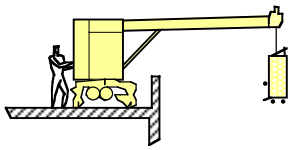


SENIOR SL515 ROOFCAR

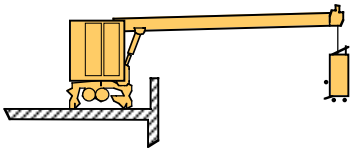
A study of each individual building application by Tractel's design office in consultation with the architect makes it possible to define a machine which is exactly right in terms of the:

- length of boom required to access the various locations of the building,
- lifting height required to cover the access areas.

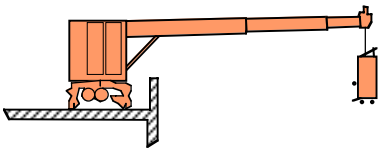
STANDARD FIXED SERIES *with fixed boom and crossboom*



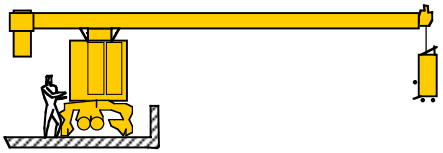
STANDARD LUFFING SERIES *with luffing boom and rotating crossboom*



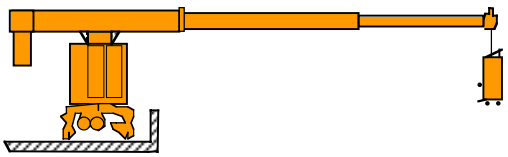
STANDARD TELESCOPIC SERIES *with telescopic boom and rotating crossboom*



MAXIMUM DUTY FIXED SERIES *with fixed boom and crossboom*



MAXIMUM DUTY TELESCOPIC SERIES *with telescopic boom and rotating crossboom*



Model no.	Track gauge	Boom reach (ft.)	Wheel capacity (kN)	Max Platform Length (ft.)
SF310	3'-0"	*10*	10	40'-0"
SF315		*15*	10	
SF410	4'-0"	*10*	10	
SF415		*15*	10	
SF420		*20*	20	
SF510	5'-0"	*10*	10	
SF515		*15*	10	
SF520		*20*	20	
SF525		*25*	20	
SF530		*30*	20	
SF535		*35*	30	
SF610	6'-0"	*10*	10	
SF615		*15*	10	
SF620		*20*	20	
SF625		*25*	20	
SF630		*30*	20	
SF635		*35*	30	
SL310	3'-0"	*10*	10	40'-0"
SL315		*15*	10	
SL410	4'-0"	*10*	10	
SL415		*15*	10	
SL420		*20*	20	
SL510	5'-0"	*10*	10	
SL515		*15*	10	
SL520		*20*	20	
SL525		*25*	20	
SL530		*30*	20	
SL535		*35*	30	
SL610	6'-0"	*10*	10	
SL615		*15*	10	
SL620		*20*	20	
SL625		*25*	20	
SL630		*30*	20	
SL635		*35*	30	
ST420	4'-0"	20	20	40'-0"
ST520	5'-0"	20	20	
ST525		25	20	
ST530		30	20	
ST535		35	30	
ST520	6'-0"	20	20	
ST525		25	20	
ST530		30	20	
ST535		35	30	
XF640	6'-0"	40	30	30'-0"
XF835	8'-0"	35	30	40'-0"
XF840		40	30	
XF850		50	30	
XF860		60	30	
XF1040	10'-0"	40	30	
XF1050		50	30	
XF1060		60	30	
XT640	6'-0"	40	30	30'-0"
XT835	8'-0"	35	30	40'-0"
XT840		40	30	
XT850		50	30	
XT860		60	30	
XT1040	10'-0"	40	30	
XT1050		50	30	
XT1060		60	30	

All Senior BMUs shown here are designed to suspend a work platform to a maximum drop of 1100 ft. (335m). All Senior units here are designed to slew 360° to permit optimum platform placement and parking.

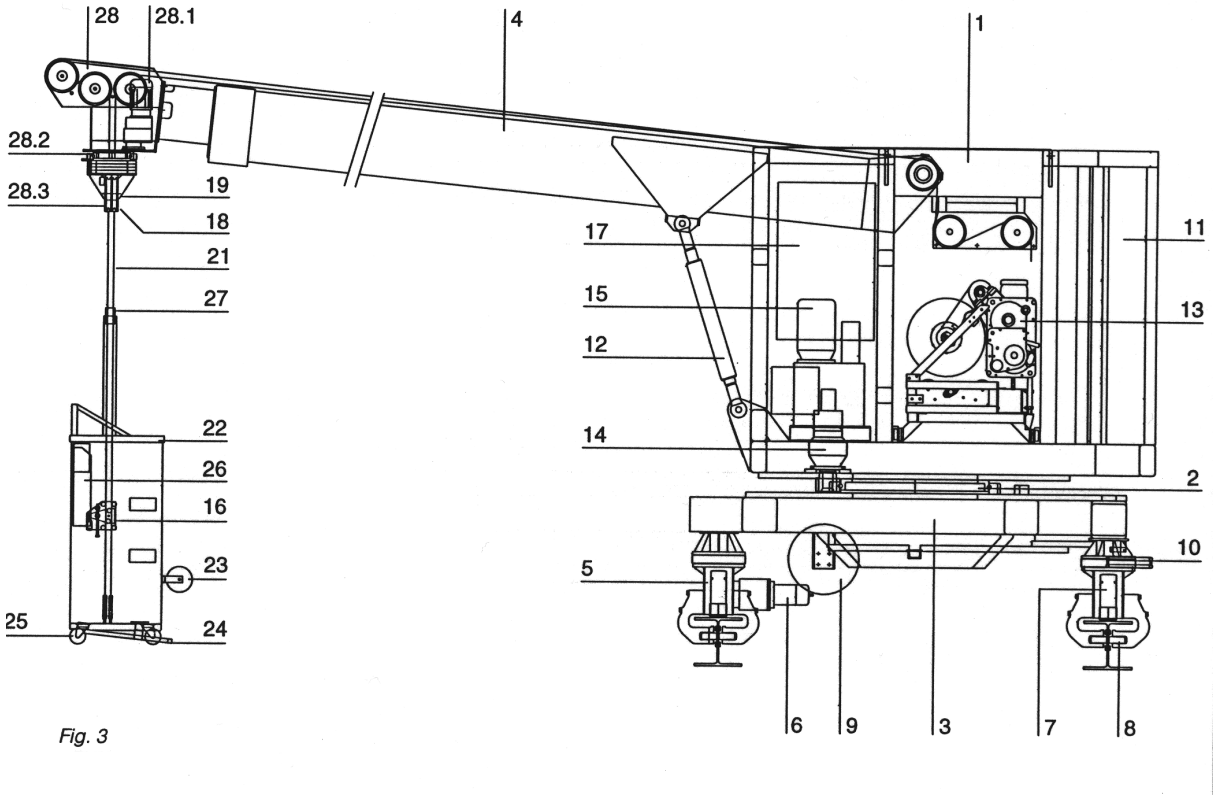


Fig. 3

3. MAIN COMPONENTS OF A SENIOR ROOFCAR

1. Turret
2. Powered slewing ring
3. Traversing frame
4. Boom
5. Drive wheel assembly
6. Geared motor with brake
7. Rear wheel assembly (not powered)
8. Guide wheel
9. Reel for power supply cable
10. Guide for power supply cable
11. Counterweight
12. Hydraulic ram/ connecting bar
13. TWIN-TIRAK hoist with dual wire rope reeler
14. Geared slewing motor
15. Hydraulic unit
16. overload limit device
17. Roofcar control box
18. Upper limit switch
19. FINAL upper limit switch
21. Suspension wire rope
22. Work platform
23. Support roller
24. Lower obstruction bar
25. Swivel castor
26. Platform control box
27. Transducer
28. Side beam

28.1 Side beam motor
28.2 Cross boom rotation (slewing) ring
28.3 Cross boom arm

4. DESCRIPTION OF THE COMPONENTS

4.1 Traversing frame

The lower frame is constructed of galvanized rectangular steel tube.
The traversing frame and the turret are connected by slewing ring which is powered by a hydraulic motor.
Four wheel assemblies are fitted to the frame. The rear wheel assemblies are mounted on an articulated spreader beam to ensure an even load distribution.

4.2 Traversing system

Traversing is powered by an electrical motor with a speed approximately 20 ft./min (6 m/min.) In general, only the two wheels nearest the building facade are powered.
The Traversing Frame is guided along the track by guide wheels placed laterally on the wheel assemblies, whether 'L' shaped guide track (Fig. 4), or I-beam track (Fig. 5) is used. X series machines can in some cases be fixed to a central part of the building and be designed to reach all areas requiring access from this fixed point.

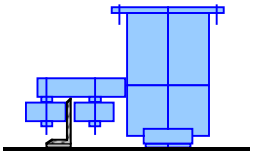


Fig. 4 - Traversing on concrete track, with 'L' shaped guide rail

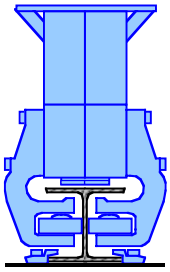


Fig 5 - Traversing on rails

4.3 Lifting mechanism

The lifting mechanism consists of two TWIN-TIRAK model T-1000 hoists, manufactured by the TRACTEL Group and specially designed for TRACTEL building maintenance units. The wire rope travels in an 'S' shaped path around the two adhesion pulleys (Fig. 6). The TWIN-TIRAK hoist is fitted with an overspeed safety brake which automatically engages if the platform descends too fast, and a disc brake, which stops the hoist during normal operation.

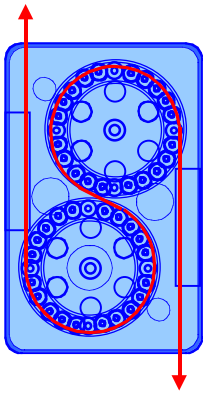


Fig. 6 - TIRAK lifting mechanism

4.4 Hydraulic system

A hydraulic ram is used to operate the angle of the boom (see item 4 on page 3). SENIOR roofcars have one ram.

4.5 Boom luffing (series SL)

The boom can be articulated on an axle fixed to the frame of the turret. A crossbar fixed to the boom takes the head of the hydraulic ram for operating the boom.

4.6 Cross-boom

The Cross-boom is fixed at the head of the boom. It enables the platform to be rotated approximately 140°.

4.7 Telescopic mast (series ST & XT)

SPECIAL designs: A telescopic mast can be incorporated for discrete parking of the machine and lifting it for the work position.

4.8 Electrical system

The electrical system consists of the following main items:

a) On the building
- the main switch, located on the roof
- power supply points, 3-phase + ground, positioned along the track and protected by a 30 amp circuit-breaker (supplied by the customer).

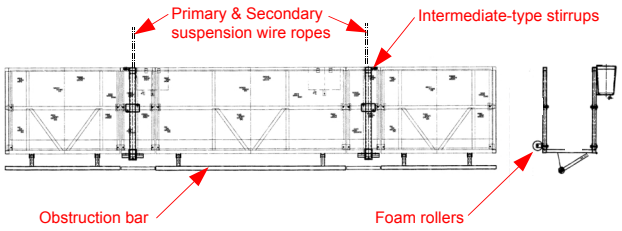
b) On the traversing frame
- the power supply cable for connecting the roofcar frame to the power points. This cable is stored on a reel under the unit.
- an electrical panel with a remote control for the unit.

c) On the platform
- a MAGTRON control box.
- an auxiliary control box.

4.9 Platform

All SENIOR model Roofcars suspend 'F-type platforms' as defined by US Federal OSHA (dual-line suspension). The platforms are driven by hoists on the roof unit, instead of on the platform. These work platforms are constructed of tubular aluminum, clad in perforated aluminum panels. Typical length is 10 ft. (3 m), however this may be increased to a maximum of 40 ft. if required. Typical capacity is 525 lbs. (240 kg) max.

4.9 Platform (continued)



Senior F-Type Platform

Two foam rollers allow the platform to rest lightly against the facade (max. effort 56 lbs. / 0.25 kN) and absorb the swaying movements of the unit. Four swivel castors fitted to the base of the platform make movement easier on the ground. Suspension stirrups can be end mounted or intermediate-type for a cantilever.
An obstruction bar fitted under the platform prevents collision with obstacles on descent.

4.10 Wire ropes

The platform is suspended from the boom by four greased and galvanized steel wire ropes 5/16" (8.4 mm) nom. dia. (5x26) (see item 21), minimum guaranteed breaking load 11,500 lbs. (51.5 kN). When the wire ropes have passed through the hoist they are wound on powered dual reelers (13.1), driven by the output shaft of the hoist, via a chain and pinion system.

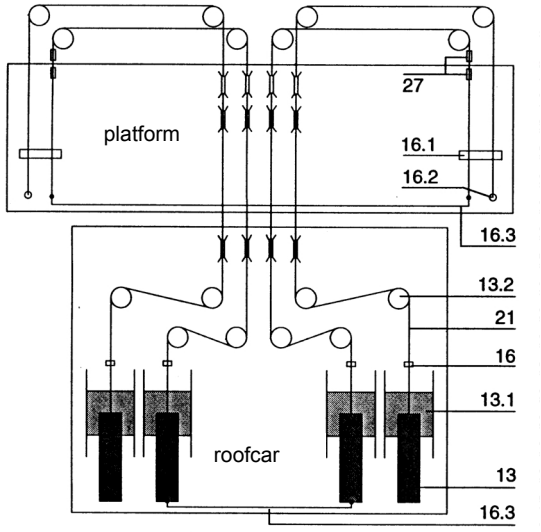


Fig. 7 - Diagrammatic representation of the wire ropes standard machine

13 TWIN-TIRAK hoist
13.1 Wire rope reel
13.2 Return pulley
16 Slack wire rope safety device
16. 1 Overload safety device
16.2 Insulated attachment
16.3 MAGTRON link
21. Suspension wire rope
27. Transducer

5. ELECTRONIC EQUIPMENT

In order to meet customers' requirements quickly upon installation, to reduce maintenance costs and improve operators efficiency, the design of our electrical equipment incorporates the most modern technology:

- programmable logic controller (PLC)
- MAGTRON patented remote control system
- microprocessor card, developed by TRACTEL for the remote control of the Senior Roofcar.
- LED display units to assist with control and maintenance.

5.1 Control circuit

The equipment is controlled by a programmable controller (PLC) with commands via:

- 1 Roofcar control panel with a 20-function keypad
- 1 work platform remote control panel with MAGTRON 4020

The PLC performs three essential functions:

a) Control of the various operating sequences
b) Fault detection and display
c) Decoding the trolley and platform control signals.

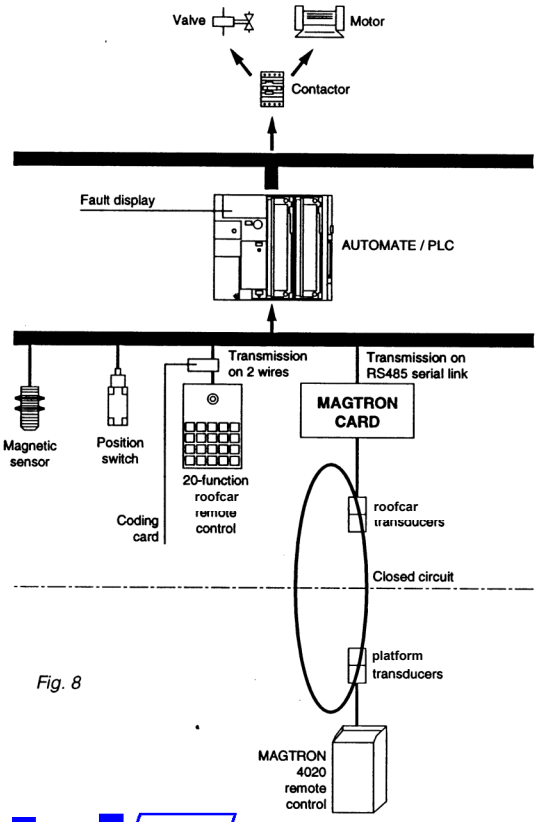


Fig. 8

5.2 MAGTRON remote control

The MAGTRON system is used for duplex transmission of data and telephone signals between the platform and the roofcar, by induction of the magnetic field in a **closed circuit created by the steel suspension wire ropes** (Fig 8). The signals are transmitted by 4 transducers (1 transmitter /1 receiver each on the platform and the roofcar).

5.2.1. MAGTRON system advantages

- Transmission of commands via the standard metal suspension wire rope, removing the need for a pendant electrical cable or a special suspension cable with integrated electrical wires.
- The MAGTRON system does not need a special frequency band as the transmission medium is the wire rope and not radio waves, MAGTRON is much less sensitive to interference created by other devices and does not cause interference for other systems (electronic or data processing systems, etc…).
- The MAGTRON control is used exclusively on TRACTEL machines whereas radio remote control systems are used by many other applications. The risk associated with radio transmission is the possibility of there being 2 nearby systems using the same frequency, causing interference and potentially dangerous conditions.
- Control voltage reduced to 10 V, thus preventing any risk of electrocution.
- The telephone and LED display assist with control operation are provided as standard.
- One MAGTRON model covers the entire TRACTEL range of roofcars.
- The MAGTRON platform control box is easy to re-move in order to protect it from adverse weather conditions and prevent improper use of the machinery. MAGTRON equipment has been the subject of a safety analysis (APAVE no. 9454079 - France) which guarantees that a system failure will not cause a dangerous situation, such as the loss of the emergency stop or the transmission of an incorrect command.

5.3 Telephone and alarm system

5.3.1 Trolley/platform telephone

The MAGTRON remote control is fitted with a telephone (106) for communication with the roofcar telephone, using the principle of alternate transmission.

5.3.2 Control office telephone (optional)

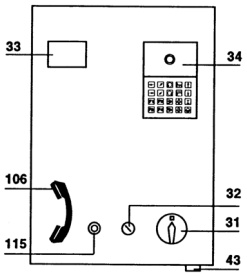
Telephone link between the platform and the building's control office (using the principle of alternate transmission).

5.3.3 Control office alarm (optional)

In the event of a fault, an alarm (1 volt-free contact) is sent automatically to the control office or the technical room.

5.4 Controls

The equipment has two control panels:
1 main control panel (112) on the platform (Fig. 11)
1 control panel (Fig. 9) on the roofcar for switching to work phase and for backup operations in the event of failure of the main panel.
The control panel is selected using the key switch (32) on the main control box.
The electrical enclosure is fitted with a heater to prevent condensation.



5.4.1 Main control box

31. Main switch
32. Lockable rotary switch for ROOFCAR control or PLATFORM control
33. PLC display
34. Roofcar remote control
43. Buzzer
106. Telephone
115. Call platform

Fig 9 - Main control box and roofcar remote control

5.4.2 MAGTRON remote control in the platform *(fig. 11)*

113. MAGTRON control keypad (identical commands to those of the roofcar remote control)
104. Display
106. Telephone
114. Charger

5.4.3 Platform auxiliary control box *(Fig. 10)*

42. Emergency stop
102. Start/Stop MAGTRON
103. Lower obstruction bar shunt
105. Keypad validation

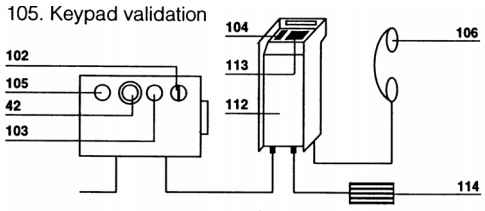


Fig. 10 - Platform auxiliary control box *Fig. 11 - Roofcar control box*

5.5 Power supply to platform MAGTRON control box

The platform assembly is supplied with a NI/MH (nickel hydride) main battery with a capacity of 9 hours. Recharging takes 3 hours.
A NI/CD (nickel cadmium) back-up battery which provides one hour's operation is brought into operation automatically when the main battery is exhausted so that the user can take the platform back up to the roof.

6. SAFETY DEVICES

To ensure safe operation and user safety, the machine is fitted with a number of safety devices which monitor the correct operation of the various components and operate in the event of a breakdown or fault.

6.1. Safety devices on the platform

- emergency stop
- lower obstruction bar
- overload safety device
- anti-tilt safety device

6.1.1 Optional safety devices on the platform

- upper obstruction bar

6.2 Safety devices on the roofcar

- emergency stop
- platform final upper limit switch
- Cross boom rotation
- slack wire rope safety device
- end of wire rope safety device
- electrical supply cable end limit
- traversing end limit
- turret slewing
- overspeed protection
- emergency lowering handle
- phase order safety device
- manual lowering in the event of a power break
- telescopic boom retraction/extension
- telescopic mast retraction/extension (special design)

6.2.1 Optional safety devices on the roofcar

- boom lifting safety device
- boom anti-collision device
- anemometer(wind speed indicator)
- track detector

6.3 Self-test safety devices

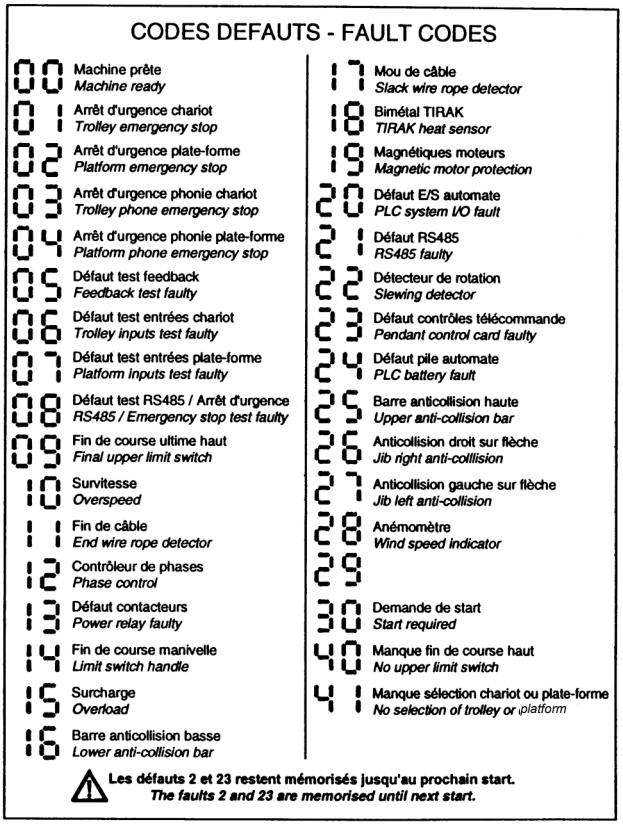
- on the MAGTRON
- on the roofcar remote control
- on the contactors

7. FAULT MANAGEMENT

7.1 Display on the PLC

The faults listed below are handled by the TSX 37-10 PLC and shown on the display (33).
The display can also be temporarily assigned to the following maintenance functions:

- display of the state of the PLC I/O
- display of faults on the I/O cards
- display of codes sent by the roofcar or platform remote controls



7.2 Platform display

This display provides the operator with information on:

- the battery capacity
- the state of the sensors fitted on the cradle
- the control fault codes.

technical sheet	building maintenance units (BMU) steel track	ref.: T4761 rev. no.: date: 10/99 page: 1/2

1. DESCRIPTION

Building Maintenance Units (BMUs) in the U.S. and Canada typically traverse along steel track. Standard Tractel BMUs are designed to run on flanged track. Special conditions arise from time to time when other track types are employed.

1.1 Standard steel track

The track components are designed for fast and accurate assembly. Track sections are joined together using bolted or welded fishplates.

The track and track supports are hot galvanized to prevent corrosion. The size of the rail depends on the weight of the machine and the distance between the track supports.

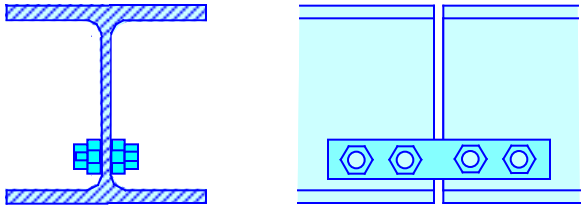
Five rail sizes are recommended: *W10x22*, *W10x30*, *W12x50*, *S12x31.8*, & *S12x35*.

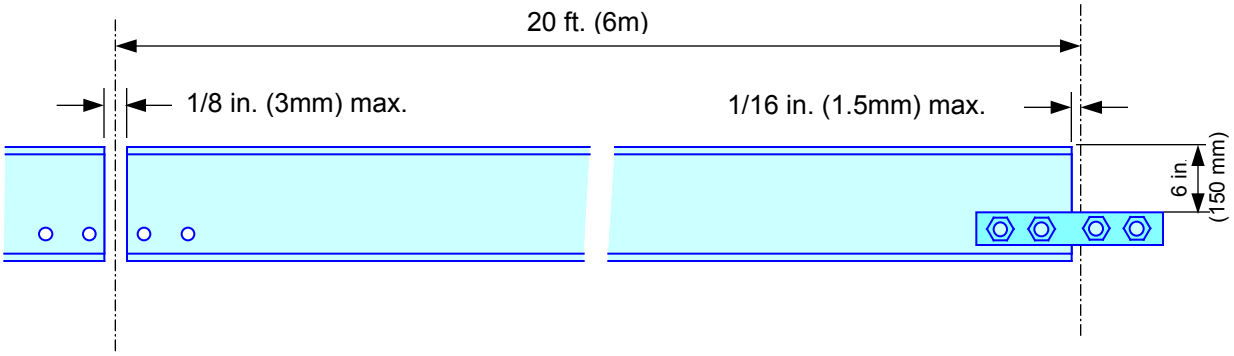
The wheel assembly types are defined by the type of BMU machine (Fig. 2 and 3).

General track tolerances:

1. Track joints to be within 1/16 in. (1.5mm) max. in all directions
2. Track joints should not exceed 1/8 in. (3 mm) gap.
3. Track to maintain a constant elevation of ±1/4" in. (6.4 mm) over every 120 in. (3m) length.
4. Track system (by elevations) to maintain a constant elevation of ±1" in. (25 mm).

Fig. 1:
Track joint using 2 bolted fishplates





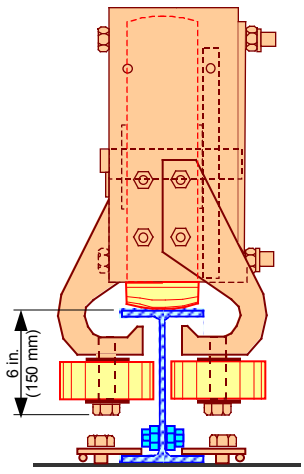


Fig. 2
10 K (45kN) wheel assembly on I-Beam IPE 160

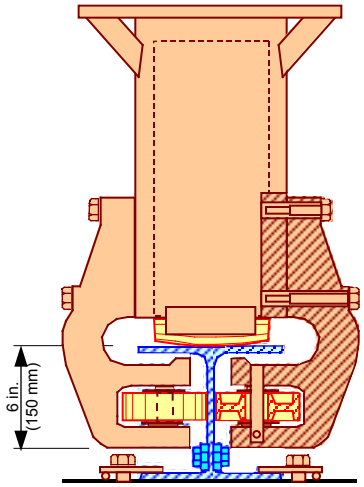


Fig. 3
Over 10K (45kN) wheel assembly on WF-Beam HEB 180

1.2 Track supports

Track sections are supported on supports every 8 to 10 ft. (2.4 to 3 m) depending on the loading on the BMU wheels.

Standard steel track supports (Fig. 4) are a length of tube section with a welded top plate. The track sections are fixed to the top plates with clamp plates.

The clamps have been specially designed to meet the requirements of Tractel machines, particularly the transverse adjustment and resistance to the lateral pressure applied by the guide rollers.

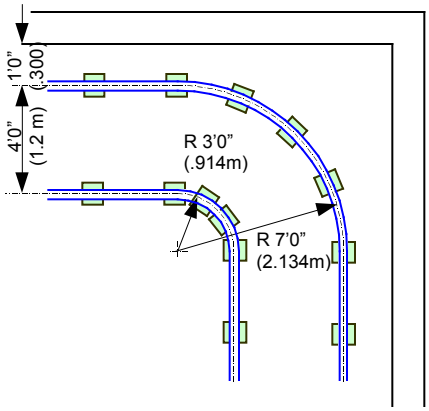


Fig. 5 – Example of track layout

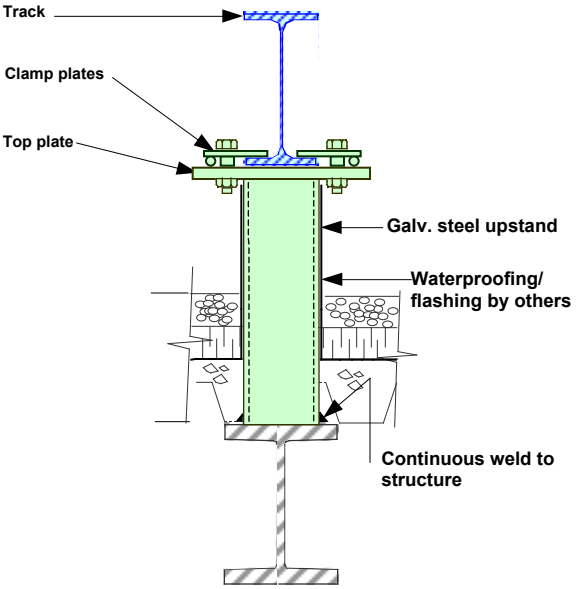
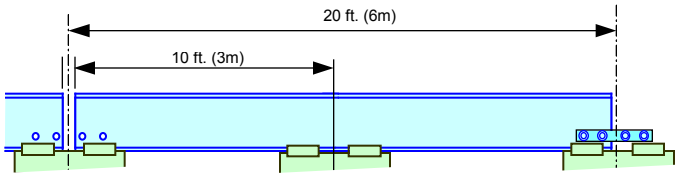


Fig. 4



The low profile clamp plates allow the uninterrupted travel of the wheel assemblies. Each are fixed to the top plate with A235 galvanized bolts.