ASSEMBLY MANUALS FOR KITO MANUAL CRANES

N6 SERIES

ALWAYS SAVE THIS BOOK FOR FUTURE REFERENCE.

KITO CORPORATION

Thank you for purchasing our N6 series Manual Crane.
This crane has the simple construction of all our traveling cranes. Assembly requires only that the girder be coupled to the end carriage.
All Kito products are manufactured in line with thorough quality controls.
We are sure this crane will satisfy your requirements for durability.

DEFINITIONS

⚠ CAUTION : **indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.**

⚠ CAUTION : **Read this manual carefully to properly assemble your crane. Refer to other manuals provided with the equipment for instructions on operation and safety.**

Application notes ;
This manual includes N6 and N6C models. Both models have no interchangeability with each other. Models and types are classified in accordance with the next table.

Model \ Type	Plain	Geared
N6	PL005－6 PL010－6	Overhead type
N6C	PL005－3 PL005－9 PL010－9	Low－head type

‹CONTENTS›

‹Plain type end carriage›

‹Geared type end carriage›

《Plain Type》

1. End carriage parts

Check the delivered product conforms to your order. Follow the instructions herein to assemble parts.

The plain end carriage is packaged with parts as shown in Figs. 1 and 2.

End carriage packaging details

Type \ Part Code	End carriage frame (with track wheels)	Joint plate	Bolts and accessories*
PL005−3 N6PL105V PL010−6 N6PL210V PL010−9 N6PL310V	4 sets	4 sets	1 set

*High tension bolts (H.T.B.) are delivered to couple the end carriage to the girder as standard for low-head type.

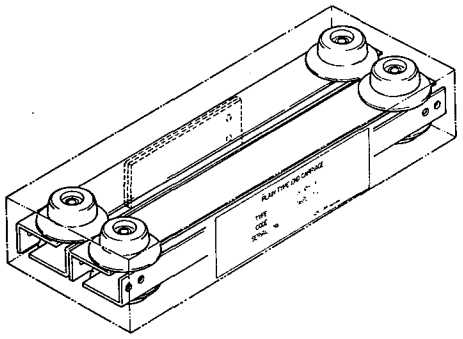


Fig. 1

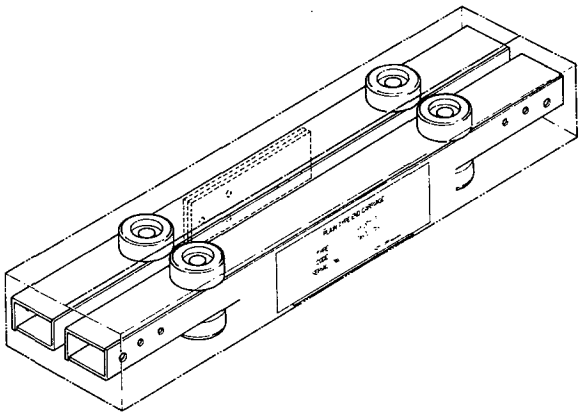


Fig. 2

2. Travel rail preparation

Travel rail size will depend on building structure and span (distance between pillars).

2.1 Determining rail size

Use I beam as travel rail.

(1) Travel rail height

Select a travel rail with a height of 150 mm or higher (See H in Fig. 3). If less than 125mm, make sure bolts and nuts do not protrude to the inside of the rail (Fig. 3).

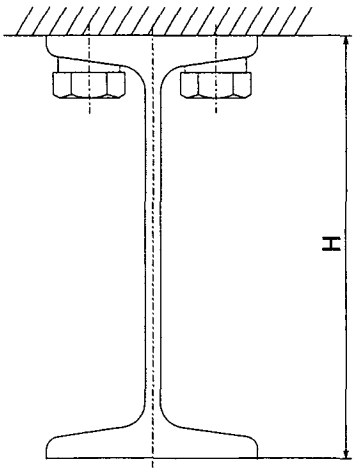


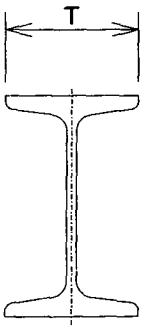
Fig. 3

(2) End carriage and travel rail combinations

Travel rail width (T) is detemined by the type of end carriage used. Refer to Table 1.

Table 1 Unit:mm

End carriage		Travel rail width (T)
Type	Code	
PL005−3	N6PL105V	75 to 100
PL010−6 PL010−9	N6PL210V N6PL310V	75 to 125



3. Girder preparation

Shop drawings of girders are not provided with the end carriage. Contact Kito with the type of end carriage purchased, as the shop drawing based on JIS material is available upon request.

3.1 Determining girder size

Girder size based on JIS material depends on the rated load of your hoist and travel rail span. Select your girder from the table on page 35 in the Kito Crane catalogue.

In case you use girder other than JIS material, make sure that your selected girder has sufficient strength for your crane.

Also, note that girder combinations in the table vary whether using an electric chain hoist or a wire rope hoist.

NOTE : If using an electric chain hoist with motorized trolley, or motorized traverse hoist (wire rope hoist), use a girder with a height of 200 mm or more.

3.2 Girder manufacture

Overhang dimensions are marked 400 mm as shown in Fig. 4. Contact Kito for longer dimensions.

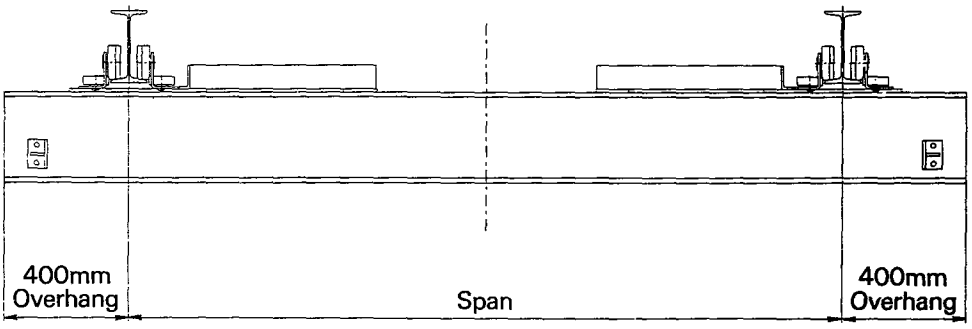


Fig. 4

4. End carriage punching and assembly

Punch holes in the end carriages to couple with girder, but note that hole pitch will vary with girder size.

4.1 Punching holes in low-head end carriages

Once girder size has been determined, drill holes at punch marks that conforms to the girder. Refer to Fig. 5 and Tables 2 and 3.

NOTE : Never open holes with a gas torch.
The "e" holes are only for PL010−6 and PL010−9.
Maintain dimension "e" when marking holes regardless of the size of the girder.

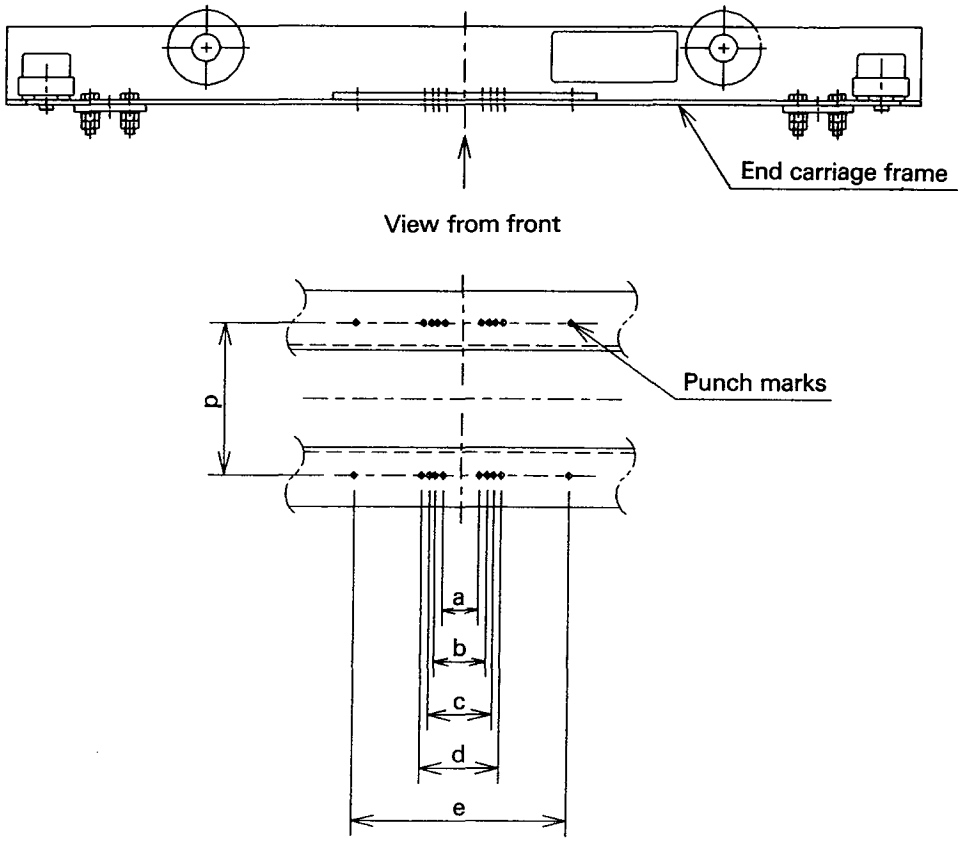


Fig. 5

Table 2 Girder width (B) and punch pitch for JIS I-beams

Unit: mm

End carriage Type	Code	Girder width (B) / Punch pitch a	b	c	d	e	p	Hole diameter	Bolt diameter
		75	100	125	150	—			
PL005−3	N6PL105V	45	65	—	—	—	T+107	φ16	M14 (H.T.B.)
PL010−6	N6PL210V	45	65	80	—	195	T+111		
PL010−9	N6PL310V	45	65	80	100	270	T+94		

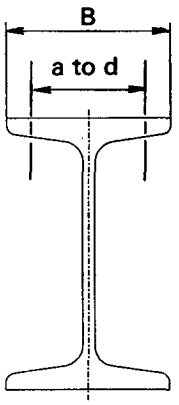
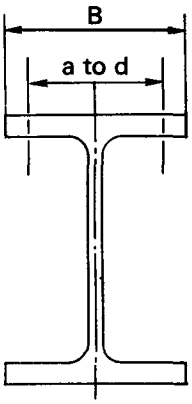


Table 3 Girder width and punch pitch for JIS H-beams

Unit: mm

End carriage Type	Code	Girder width (B) / Punch pitch a	b	c	d	e	p	Hole diameter	Bolt diameter
		75	100	125	150	—			
PL005−3	N6PL105V	45	65	—	—	—	T+107	φ16	M14 (H.T.B.)
PL010−6	N6PL210V	45	65	80	—	195	T+111		
PL010−9	N6PL310V	45	65	80	100	270	T+94		



4.2 End carriage and girder assembly

(1) Assemble parts, as shown in Fig. 6, with the provided bolts, nuts and washers. (Table 4)

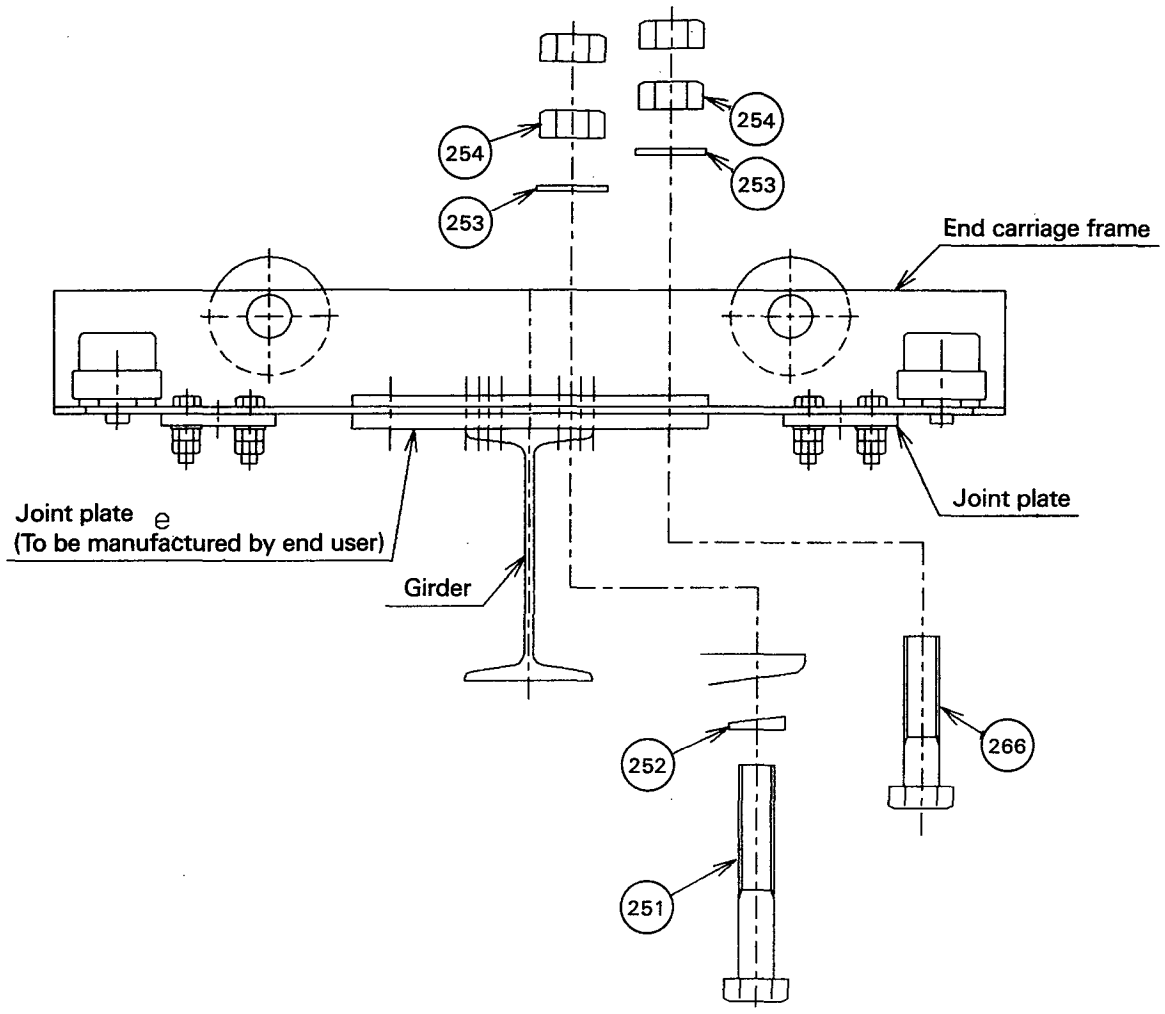


Fig. 6

Table 4

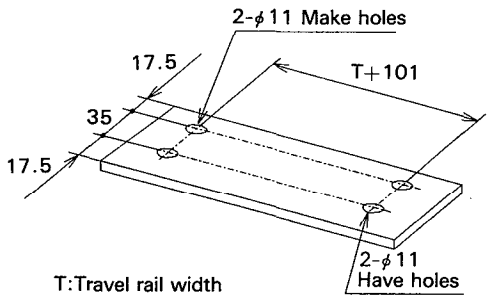
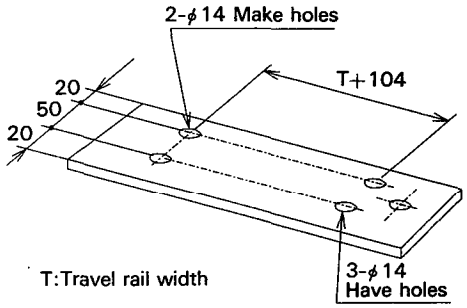
Unit: mm

Part No. / End carriage Type	Part Code	(251)	* (252)	(253)	(254)	(266)
		Bolt (H.T.B.)	Tapered washer	Washer	Nut	Bolt (H.T.B.)
PL005−3	N6PL105V	M14×70×50	8° for M14	For M14	M14	−
PL010−6	N6PL210V	M14×70×50				M14×60×40
PL010−9	N6PL310V	M14×85×65				M14×60×40

* ; Tapered washer part No. (252) is used for I-beam girders and not with H-beam girders.

(2) Joint plate punching

Make holes in the joint plate as shown in Fig. 7.

		
Type/Code	PL005−3/N6PL105V	PL010−6/N6PL210V PL010−9/N6PL310V

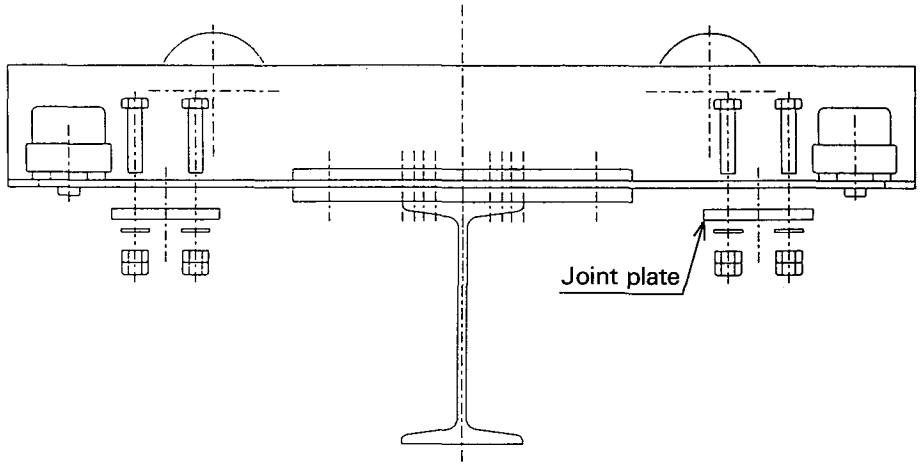


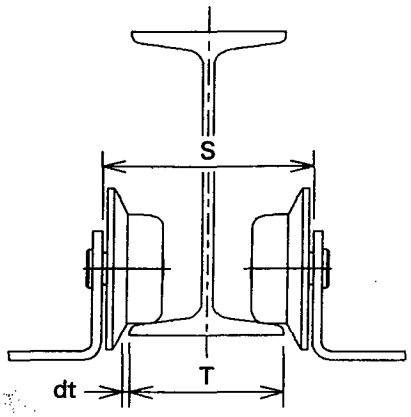
Fig. 7

(3) End carriage adjustment

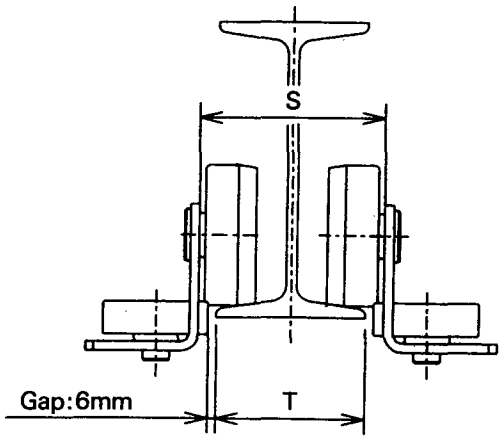
The gap between the track wheel flange and the travel rail is important in determining whether the crane travels smoothly on the rails or not. Adjust the end carriage frame referring to Fig. 8 and Table 5.

Table 5 S dimension

End carriage		S (mm)
Type	Code	
PL005−3	N6PL105V	T+37
PL010−6	N6PL210V	T+41
PL010−9	N6PL310V	T+24



PL005-3 dt=4mm
PL010-6 dt=4.5mm



PL010–9

Fig. 8

4.3 Bolt tightening torque

High tension bolts (H.T.B.) are used to couple the end carriage to the girder. Tighten bolts to the appropriate torque.

M14 bolt tightening torque : 1150kg·cm

5. Erecting the end carriage on the travel rail

Refer to "Assembly, wiring and test run" is the Manual Plain type and Geared type Crane Instruction Manual.

《Geared Type》

6. End carriage parts

Check the delivered product conforms to your order. Follow the instructions herein to assemble parts.

The end carriage and driving accessories are packaged separately (Figs. 9 and 10).

End carriage packaging details

Part	End carriage	
	End carriage	Bolts and accessories*
Low-head (GL)	2 sets	1 set
Overhead (GO)		—

* High tension bolts (H.T.B.) are to couple the end carriage to the girder as standard for low-head type.

Packing list for drive parts

Type \ Part	Hand wheel ass'y	Hand chain	Shaft bearing	Joint shaft	Joint	Bolt A	Bolt B
GA−9	1 set	1	1	1	2	3 sets	1 set
GA−12			2	2		5 sets	

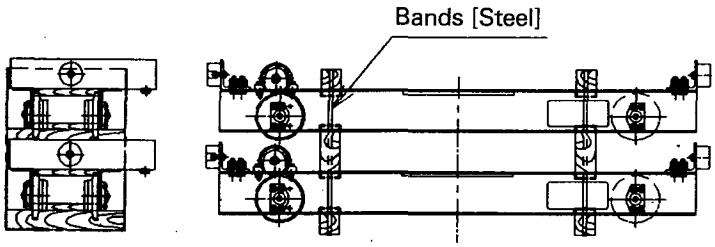


Fig. 9

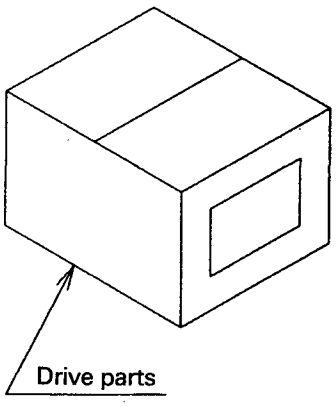


Fig. 10

7. Travel rail preparation

Travel rail size will depend on building structures and span (distance between pillars).

7.1 Determining rail size

7.1.1. Low-head cranes

Use I-beam as travel rail.

(1) Travel rail height

Select a travel rail with a height of 150 mm or higher. If less than 125 mm, make sure bolts and nuts do not protrude to the inside of the rail (Fig. 11).

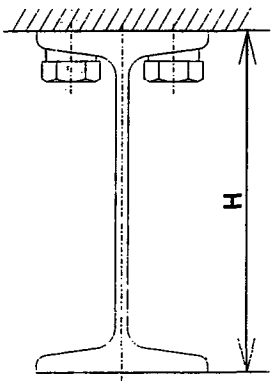


Fig. 11

(2) End carriage and travel rail combinations

Travel rail width (T) is determined by the type of end carriage used. Refer to Table 6.

Table 6

Unit:mm

End carriage		JIS Travel rail width (T)
Type	Code	
GL010−6 GL010−12	N6GL210V N6GL410V	75 to 150
GL020−6 GL020−12 GL030−6 GL030−12	N6GL220V N6GL420V N6GL230V N6GL430V	100 to 150
GL050−6 GL050−12	N6GL250V N6GL450V	125 to 150

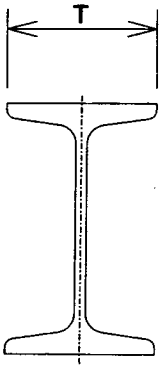


Fig. 12

7.1.2 Overhead cranes

(1) Use a light rail or square rail for the travel rail. Refer to Fig. 13 and Table 7.

Table 7

〈JIS Light rail〉 Unit: mm

Dimension \ Rail type	9 kg/m	15 kg/m	22 kg/m
H	63.5	80	94
T	32	43	51

〈JIS square rail〉 Unit: mm

Square rail	32	38	40	45	50
H・T	32	38	40	45	50

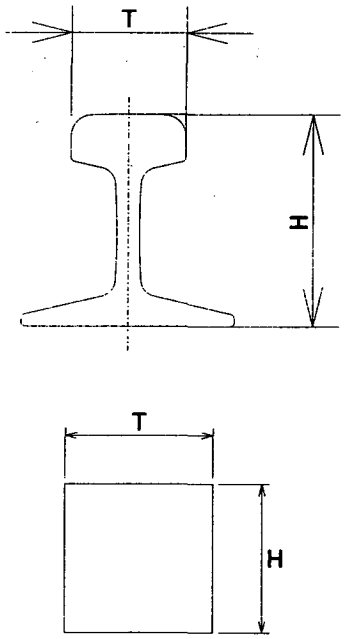


Fig. 13

(2) End carriage and travel rail combinations

The type of travel rail is determined by the type of end carriage used. Refer to Table 8.

Table 8

End carriage		JIS Travel rail
Type	Code	
GO010−12	N6GO410E	(9 kg/m) 15 kg/m (32□) 38□, 40□, 45□
GO020−12	N6GO420E	(9 kg/m) 15 kg/m (32□) 38□, 40□, 45□
GO030−12	N6GO430E	(15 kg/m) 22 kg/m (38□,40□,45□) 50□
GO050−12	N6GO450E	22 kg/m 50□

NOTE 1: Rails shown in parentheses can be used, but girder span must be adjusted.

2: Contact Kito for details on using rails not listed in the above table.

8. Girder preparation

Shop drawings of girders are not provided with the end carriage. Contact Kito with the type of end carriage purchased, as the shop drawing based on JIS material is available upon request.

8.1 Determining girder size

Girder size based on JIS material depends on the rated load of your hoist and travel rail span. Select your girder from the table on page 35 in the Kito Crane catalogue.

In case you use girder other than JIS material, make sure that your selected girder has sufficient strength for your crane.

Also, note that girder combinations in the table vary whether using an electric chain hoist or a wire rope hoist.

NOTE : If using an electric chain hoist with motorized trolley, or motorized traverse hoist (wire rope hoist), use a girder with a height of 200 mm or more.

2 Girder manufacture

〈For low-head cranes〉

Overhang dimensions are marked 400 mm as shown in Fig. 14. Contact Kito or your local Kito distributor for longer dimensions. Refer to Fig. 14.

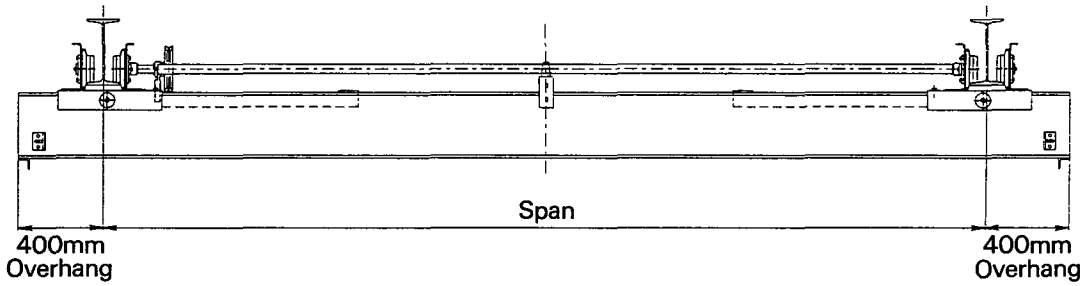


Fig. 14

〈For overhead cranes〉

Due to building structures, sometimes girder ends need to be notched or trimmed. Depth of cut limit, however, varies with girder material. Refer to Fig. 15 and contact Kito or your local Kito dealer for details.

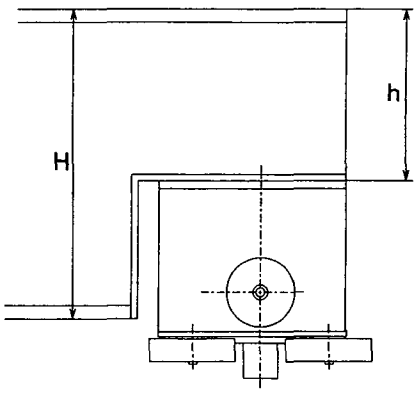


Fig. 15

9. End carriage punching and assembly

Punch holes in the end carriages to couple with girder, but note that hole pitch will vary with girder size.

9.1 Punching holes in low-head end carriages

Once girder size has been determined, drill holes at a pitch that conforms to the girder. Refer to Fig. 16 and Tables 9 and 10.

NOTE: Never open holes with a gas torch.

Maintain dimension "e" when making holes regardless of the size of the girder.

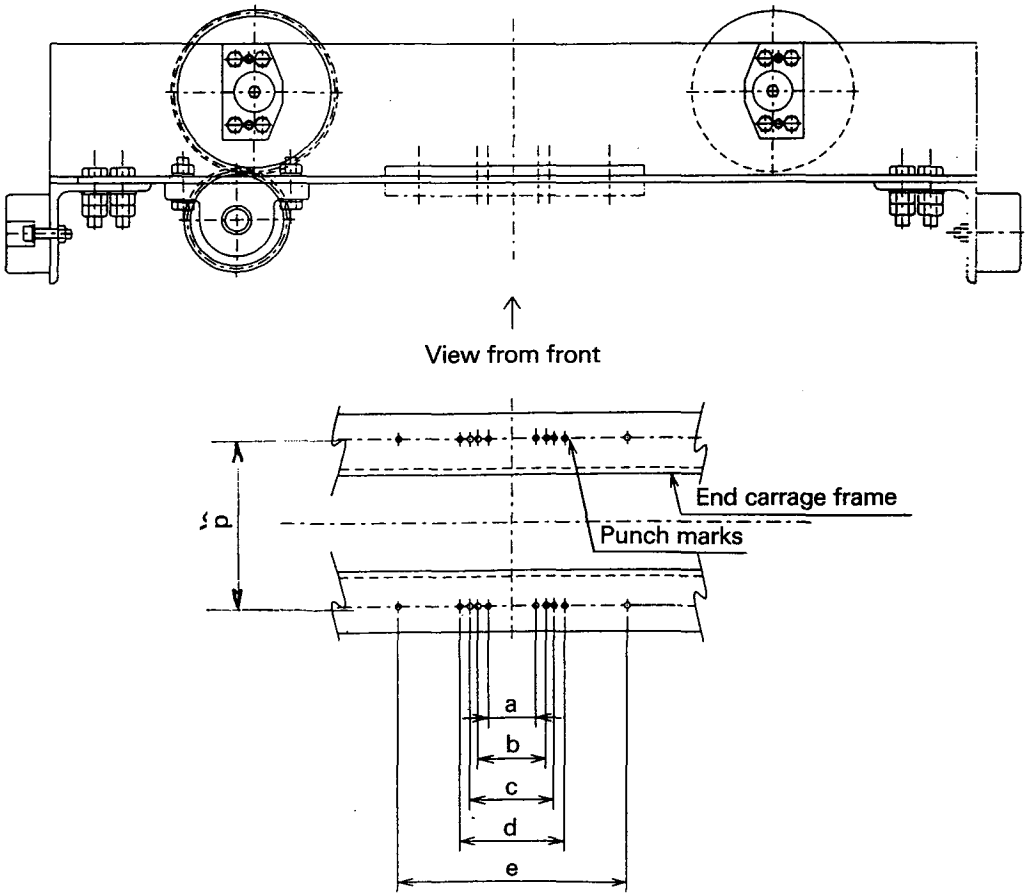


Fig. 16

Table 9 Girder width (B) and punch pitch for JIS I-beams

Unit: mm

End carriage Type	Punch pitch Code	Girder width (B) 75 a	100 b	125 c	150 d	— e	p	Hole diameter	Bolt diameter
GL010−6	N6GL210V	45	65	80	—	195	T+121	ϕ 16	M14 (H.T.B.)
GL010−12	N6GL410V	—	65	80	100	270	T+131		
GL020−6	N6GL220V	—	65	80	100	270		ϕ18	M18 (H.T.B.)
GL020−12	N6GL420V	—	—	—	100	270			
GL030−6	N6GL230V	—	—	80	100	270			
GL030−12	N6GL430V	—	—	—	100	370			
GL050−6	N6GL250V	—	—	80	100	370		ϕ22	M20 (H.T.B.)
GL050−12	N6GL450V	—	—	—	100	370			

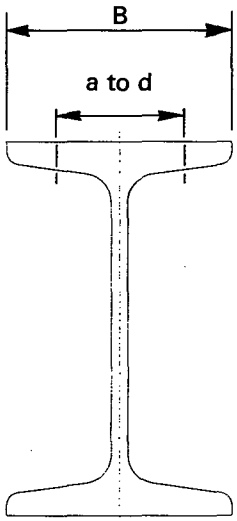
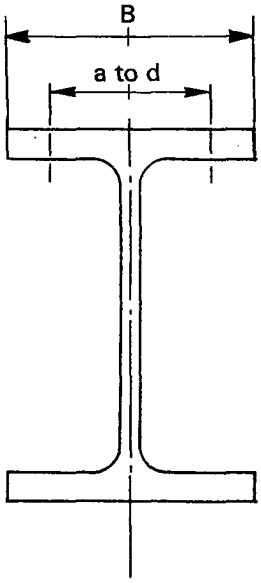


Table 10 Girder width (B) and punch pitch for JIS H-beams

Unit: mm

End carriage Type	Punch pitch Code	Girder width (B) 75 a	100 b	125 c	150 175 200 d	— e	p	Hole diameter	Bolt diameter
GL010−6	N6GL210V	45	65	80	—	195	T+121	ϕ16	M14 (H.T.B.)
GL010−12	N6GL410V	—	65	80	100	270	T+131		
GL020−6	N6GL220V	—	65	80	100	270		ϕ18	M16 (H.T.B.)
GL020−12	N6GL420V	—	—	—	100	270			
GL030−6	N6GL230V	—	—	80	100	270			
GL030−12	N6GL430V	—	—	—	100	370			
GL050−6	N6GL250V	—	—	80	100	270		ϕ22	M20 (H.T.B.)
GL050−12	N6GL450V	—	—	—	100	370			



NOTE : When the girder width is 300 mm, the hole is elective.

9.1.1 End carriage assembly for low-head cranes

(1) End carriage to girder assembly

Assemble parts, as shown in Fig. 17, with the provided bolts, nuts and washers.

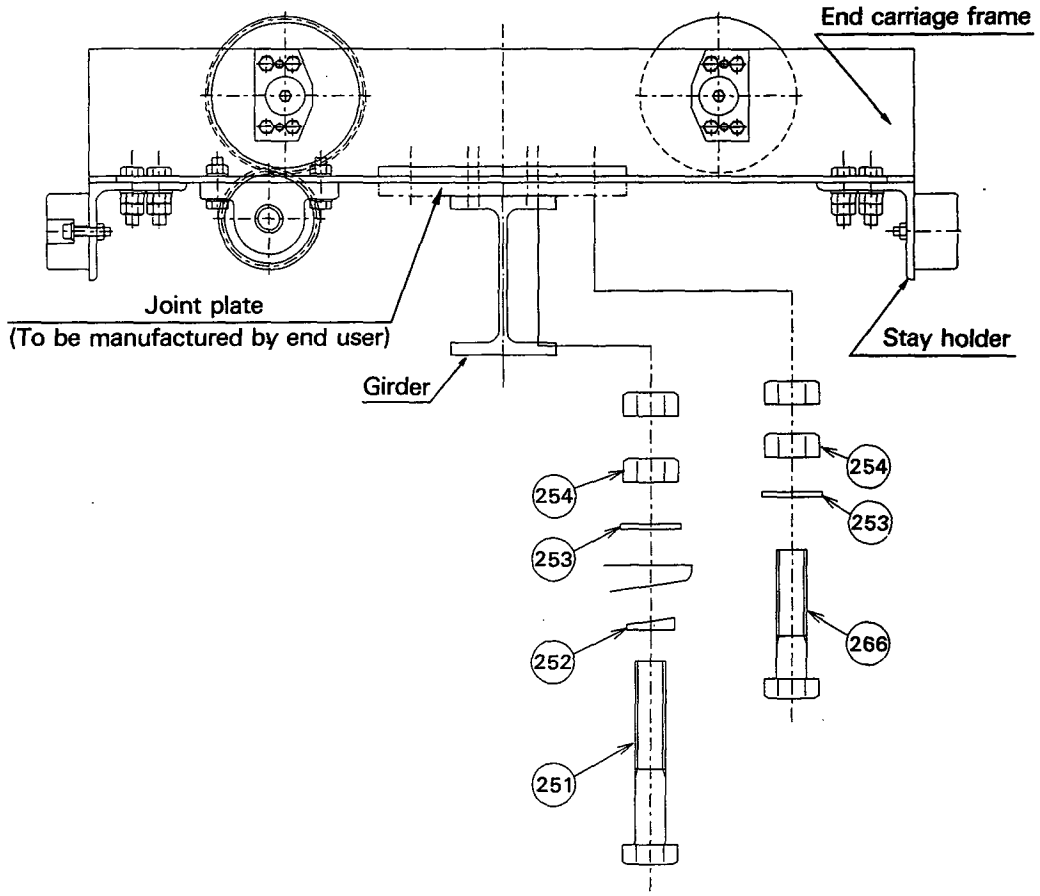


Fig. 17

Table 11

Unit: mm

End carriage Type	Part Code	Part No. *3 (251) Bolt (H.T.B.)	*1 (252) Tapered washer	(253) Washer	(254) Nut	(266) Bolt (H.T.B)
GL010−6	N6GL210V	M14×70×50	8° for M14	For M14	M14	M14×60×40
GL010−12	N6GL410V	M14×85×50				
GL020−6	N6GL220V	M16×105×65	8° for M16	For M16	M16	M16×75×50
GL020−12	N6GL420V					
GL030−6	N6GL230V					
GL030−12	N6GL430V					
GL050−6	N6GL250V	M20×110×80	8° for M20	For M20	M20	M20×80×60
*2 GL050−12	N6GL450V					

NOTE *1: Tapered washer part No. (252) is used only for I-beam girders.

*2: This model comes without bolts and accessories. Contact Kito or your local Kito dealer for details.

*3: Bolt length varies depending on how much of the girder coupling is notched or trimmed. Contact Kito or your local Kito dealer for details.

(2) Stay holder assembly and hole punching

<For JIS rail>

The stay holder can be used as is.

Stay holder is punched for end carriage installation (Fig. 18). Assemble the holder to each width of travel rail.

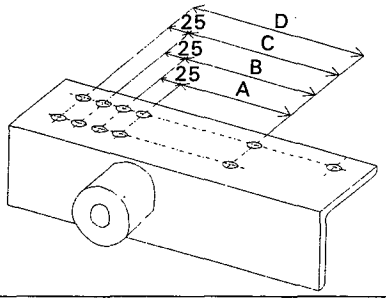
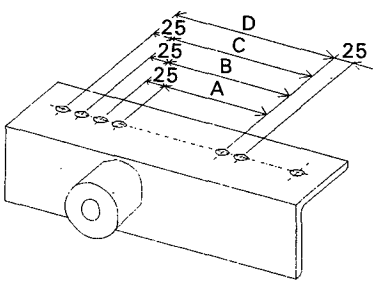
Stay holder		
Type/Code	GL010−6/N6GL210V	Other models than the left ones

Fig. 18

Table 12 JIS rail width (T) and stay holder holes

End carriage		Hole			
Type	Code	A	B	C	D
GL010−6 GL010−12	N6GL210V N6GL410V	75	100	125	150
GL020−6 GL020−12 GL030−6 GL030−12	N6GL220V N6GL420V N6GL230V N6GL430V	−	100	125	150
GL050−6 GL050−12	N6GL250V N6GL450V	−	−	125	150

〈For other than JIS rail〉

Make holes in the stay holders A and B coupled with the end carriage in accordance with travel rail width (T).

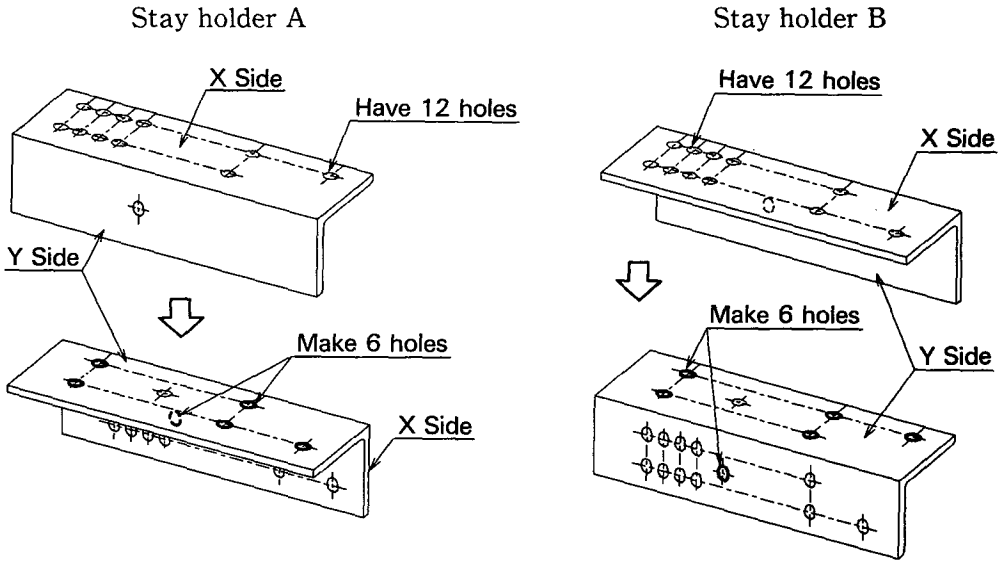


Fig. 19

As shown in the above Fig. 19, holes were made in X side for JIS rails.

Make holes in Y side in accordance with travel rail width (T). Drawing for the holes are packed in the end carriage.

(3) Assembling pinion axle, collars and washers

<For JIS rail>

The pinion axle can be used for JIS rail as is.

Numbers of collar A determined by the travel rail width (T) is built in the pinion axle (Fig. 20) for adjustment of coller A, by referring to Fig. 20 and Table 13.

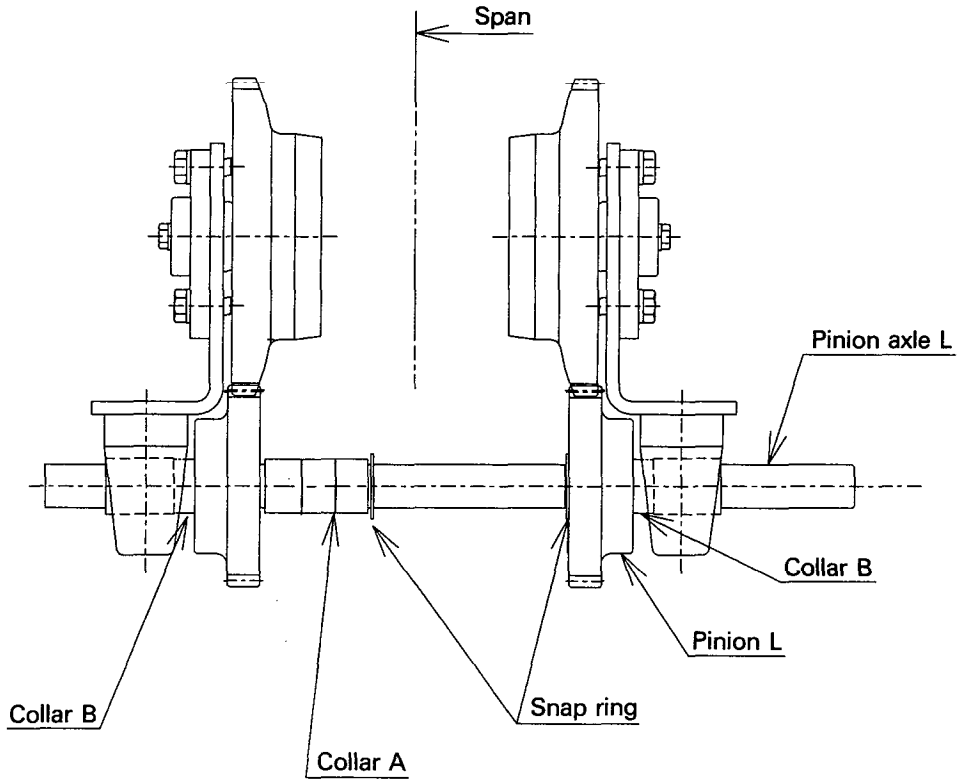


Fig. 20

Table 13 Numbers of collar

End carriage		Travel rail width (T) mm			
Type	Code	75	100	125	150
GL010−6 GL010−12	N6GL210V N6GL410V	0	1	2	3
GL020−6 GL020−12 GL030−6 GL030−12	N6GL220V N6GL420V N6GL230V N6GL430V	−	1	2	3
GL050−6	N6GL250V	−	−		
GL050−12	N6GL450V	−	−	0	1

〈For other than JIS rail〉

The pinion axle can be used for travel rail other than JIS material. Numbers of collar A determined by the travel rail width (T) is built in the pinion axle (Fig. 21) for adjustment of collar A by referring to Fig. 21 and Table 14.

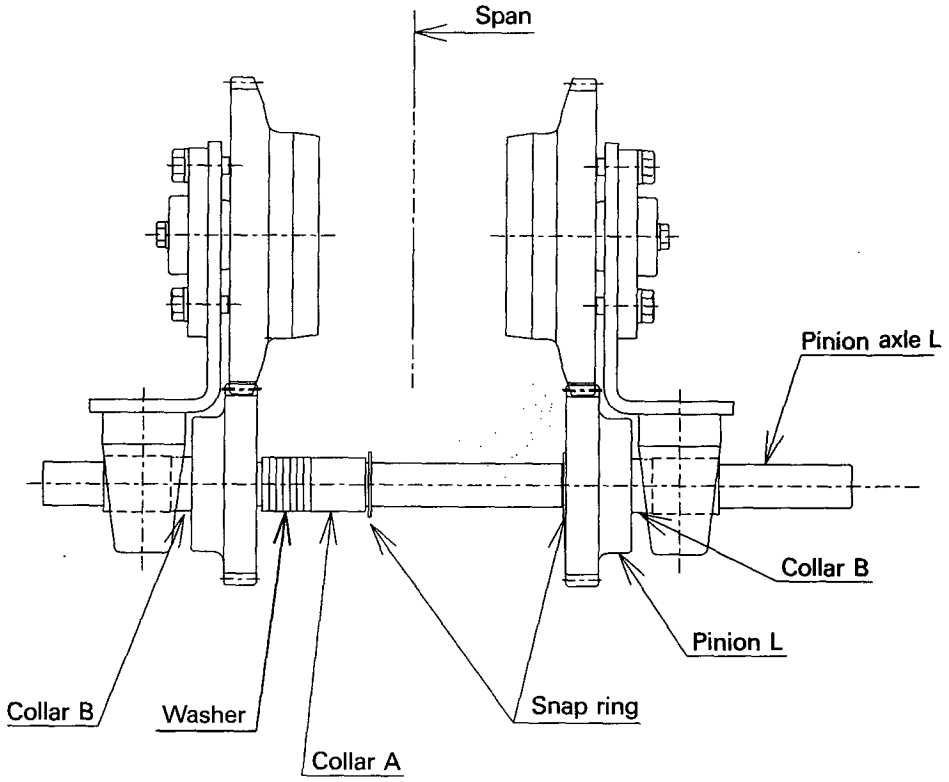
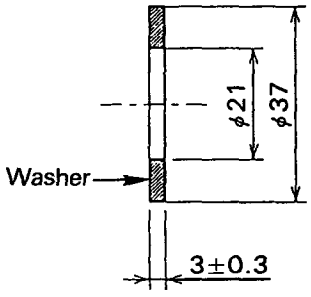


Fig. 21

Numbers of washer and collar A for travel rail width (T).

Table 14

Code	Type
N6GL210V	GL010−6
N6GL410V	GL010−12
N6GL220V	GL020−6
N6GL420V	GL020−12
N6GL230V	GL030−6
N6GL430V	GL030−12
N6GL250V	GL050−6



T	[in]	3	3 1/4	3 9/16	3 7/8	3 15/16	4	4 13/16	4 15/16	4 7/16	4 11/16 4 3/4	4 15/16	5	5 3/16	5 5/16	5 3/8	5 5/8	5 7/8 5 15/16	6
	[mm]	75·76	82	90·91	98	100	102	106	110	113	119·120	125	127	131	135	137	143	149·150	153
Nos of washer		0	2	5	7	0	0	2	3	4	6	0	0	2	3	4	5	0	1
Nos of collar A		0				1 p'ce						2 p'cs						3 p'cs	

Code	Type
N6GL450V	GL050−12

T	[in]	4 15/16	5	5 3/16	5 5/16	5 3/8	5 5/8	5 7/8 5 15/16	6
	[mm]	125	127	131	135	137	143	149·150	153
Nos of washer		0	0	2	3	4	5	0	1
Nos of collar A		0						1 p'ce	

(4) End carriage adjustment

The gap between the track wheel flange and the travel rail is important in determining whether the crane travels smoothly on the rails or not. Adjust the end carriage frame inner distance S referring to Fig. 22 and Table 15.

Table 15 S dimension

(Unit: mm)

End carriage		S
Type	Code	
GL010−6	N6GL210V	T+51
GL010−12	N6GL410V	
GL020−6	N6GL220V	
GL020−12	N6GL420V	
GL030−6	N6GL230V	
GL030−12	N6GL430V	
GL050−6	N6GL250V	
GL050−12	N6GL450V	T+69

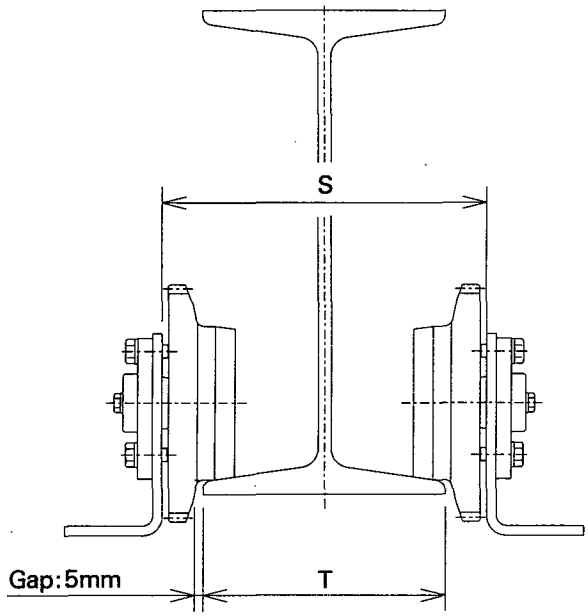


Fig. 22

(5) Bolt tightening torque

High tension bolts (H.T.B.) are used to couple the end carriage to the girder. Tighten bolts to the appropriate torque (Table 16).

Table 16 Tightening torque

H.T.B.	M14	M16	M20
Tightening torque (kg•cm)	1150	2580	5070

9.2 Punching holes in overhead cranes

With overhead cranes, a joint plate B is welded to the surface where the end carriage frame is coupled to the girder. Each two punch marks indicating the center of the end carriage and travel rail are already opened in the connecting surface.

Note that (a), ℓ_1 and ℓ_2 vavies by type of end carriage. Refer to Fig. 23 and Table 17.

NOTE : Never open holes with a gas torch.

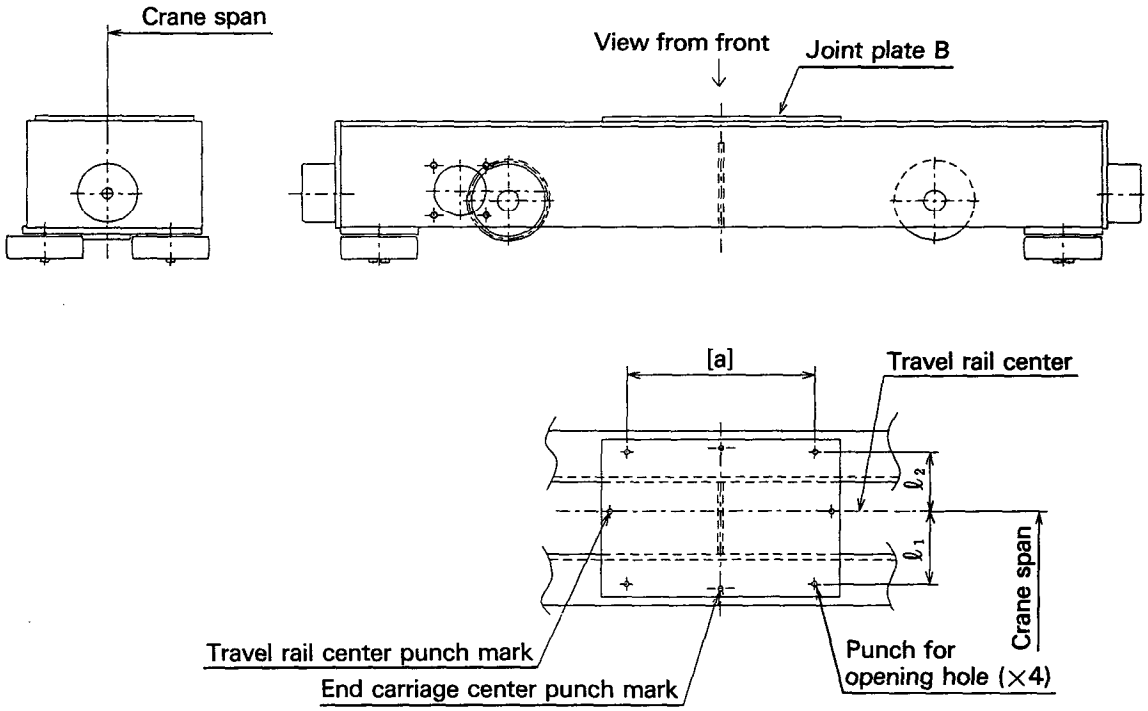


Fig. 23

Table 17 Girder holes

Unit: mm

End carriage / Punch		(a)	ℓ_1	ℓ_2	Recommended bolt size	
Type	Code				Hole diameter	Bolt diameter
GO010−12	N6GO410E	270	85.5	69.5	ϕ 18	M16 (H.T.B.)
GO020−12	N6GO420E	270	100.5	84.5		
GO030−12	N6GO430E	370	115.5	99.5		
GO050−12	N6GO450E	—	—	—	ϕ 22	M20 (H.T.B.)

9.2.1 End carriage assembly for overhead cranes

Overhead end carriage do not come with bolts, nuts and washer for coupling the end carriage to the girder, therefore supply them yourself. Refer to Table 17 for type of end carriage and bolt size.

NOTE : Use high tension bolts (H.T.B.) to couple the end carriage to the girder.

(1) End carriage assembly

A gap is opened between the side rollers and the travel rail to help the crane travel smoothly on the rails. You can get this gap by opening holes as indicated in Table 17.

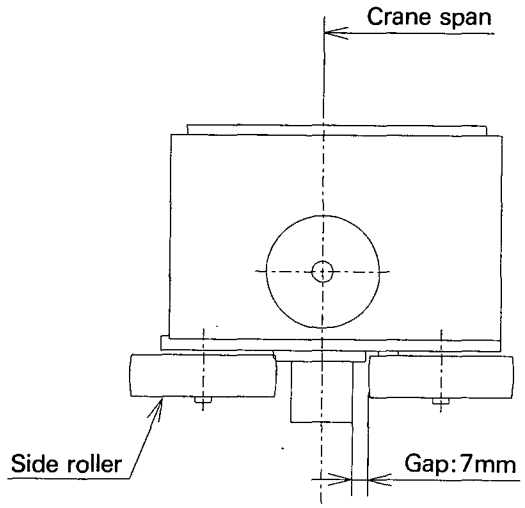


Fig. 24

9.2.2 Bolt tightening torque

Use high tension bolts (H.T.B.) to couple the end carriage to the girder. Tighten bolts to the appropriate torque (Table 18).

Table 18 Tightening torque

H.T.B.	M16	M20
Tightening torque (kg•cm)	2580	5070

10. Drive shaft manufacture and assembly

Assemble the drive accessories with drive shaft prepared by you.

10.1 For low-head end carriages

10.1.1 For GL010-6 to GL020-12

(1) Assembly to end carriage

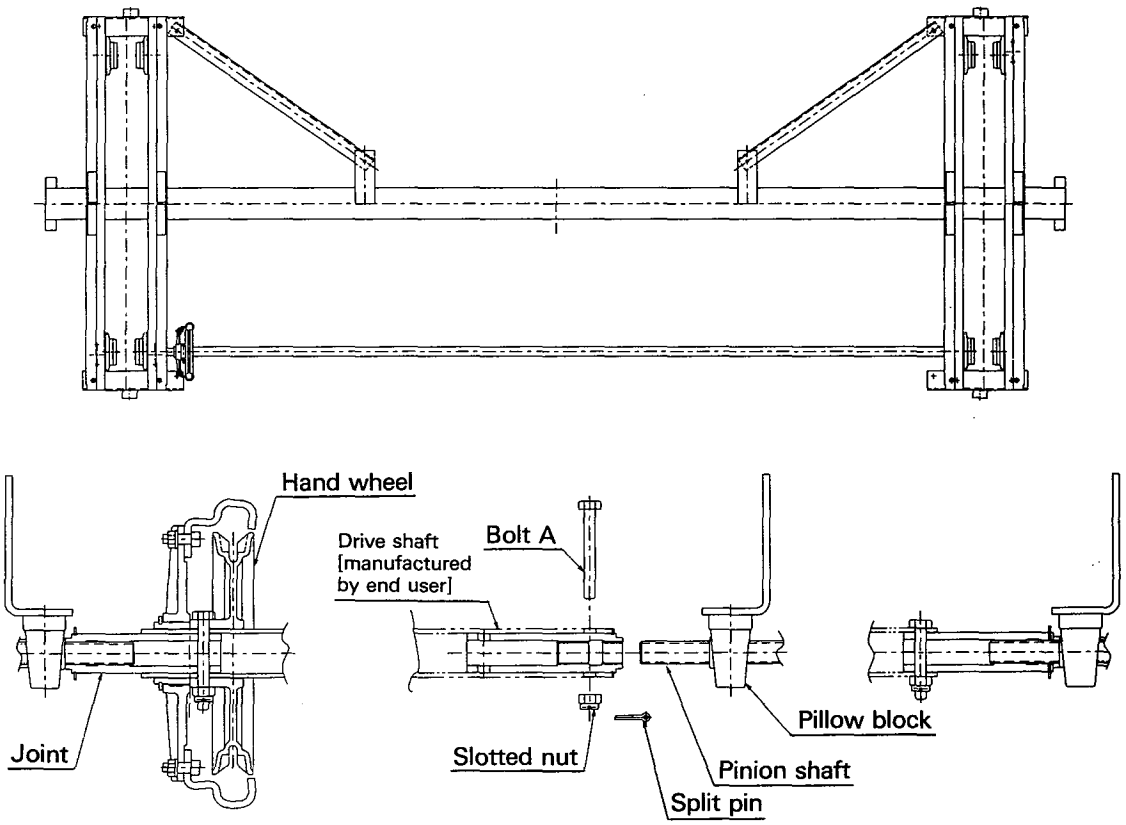


Fig. 25

(2) Support arm installation

Though unnecessary with spans of less than 5 m, anything wider requires support arm as shown in Fig. 26. The arm is to be manufactured by the customer. Refer to Figs. 26 and 27.

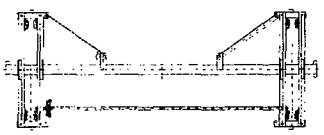
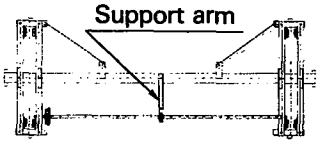
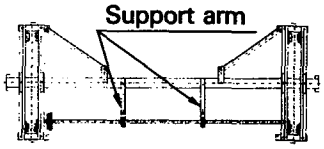
Span	Up to 5m	5.1 to 10.0m	10.1 to 12.0m
Support condition			
Support arm	None	1 point	2 points

Fig. 26

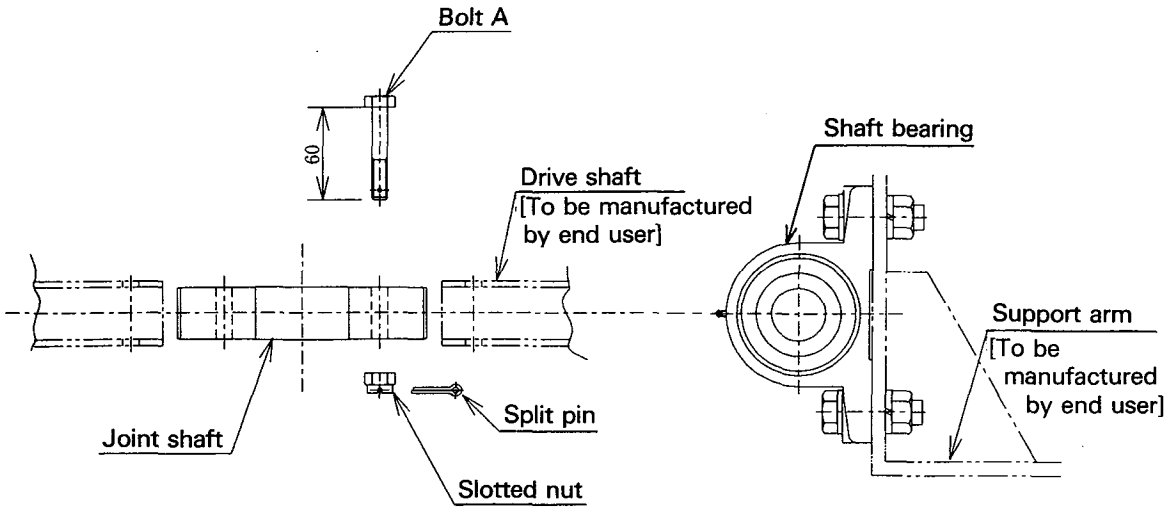


Fig. 27

10.1.2 For GL030-6 to GL050-12

(1) Drive shaft to end carriage assembly

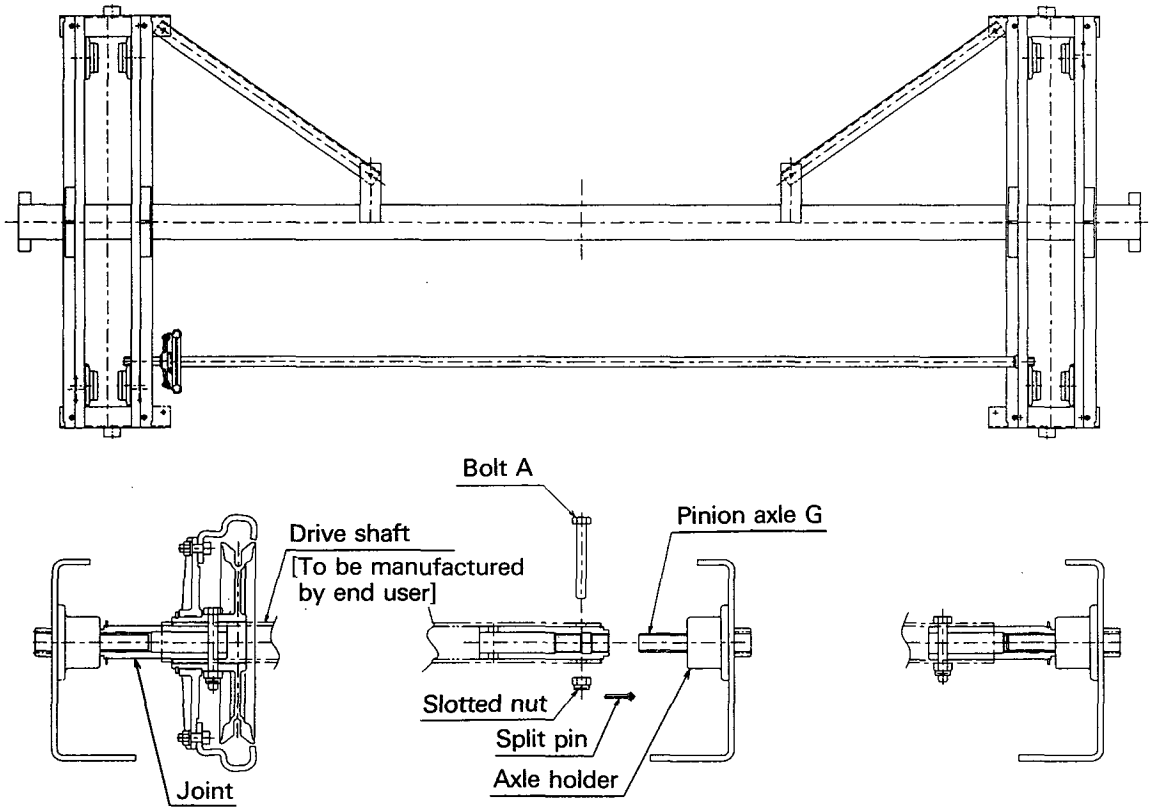


Fig. 28

(2) Support arm installation

Refer to (2) in 10.1.1.

10.2 For overhead end carriages

(1) Assembly to end carriage

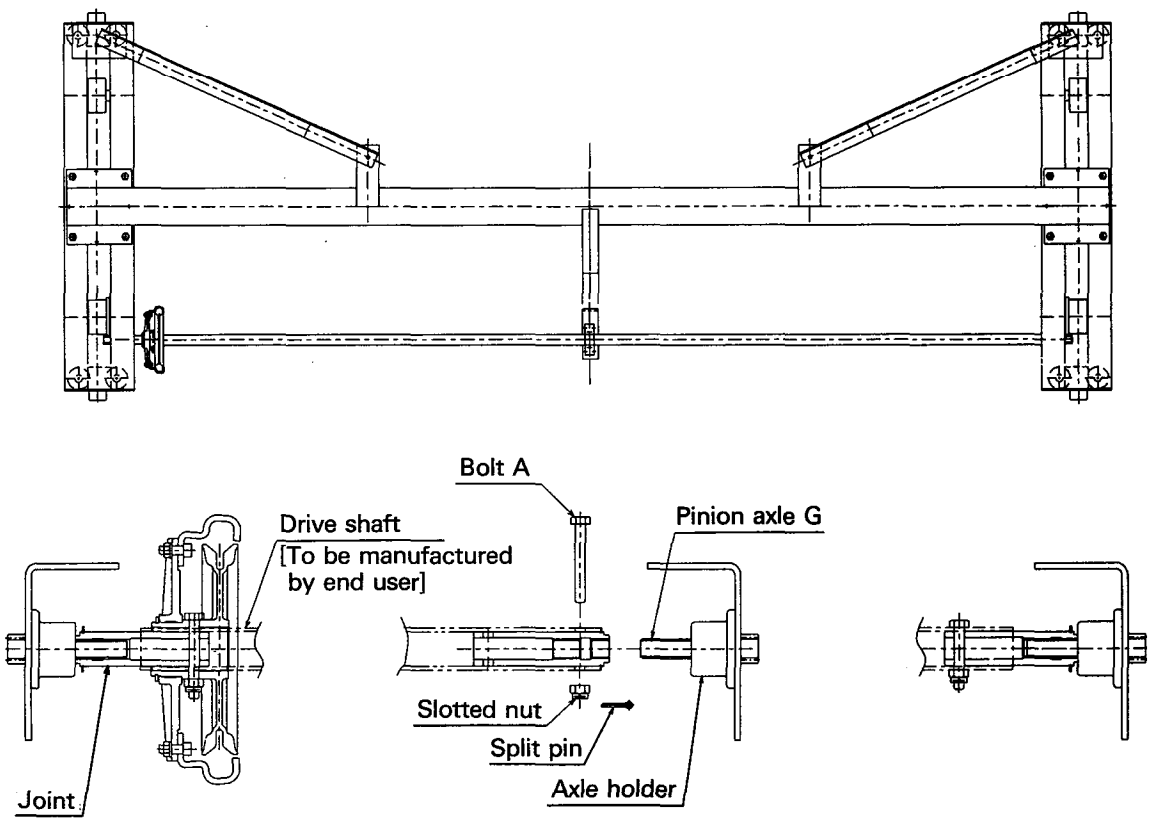


Fig. 29

(2) Support arm installation

Refer to (2) in 10.1.1.

11. Painting

The end carriage comes coated with a paint base primer. Refer to the below table when selecting a top coat.

End carriage length	1500mm and less	1501mm and more
Primer	Melamine resin base	Phenol alkyd base
Compatible top coat	Melamine resin base Phenol resin base	Phenol resin base Melamin resin base
Incompatible top coat	Epoxy resin base Urethane base	Lacquer base

NOTE 1: When adding your top coat, never paint over bolts and nuts. Paint coated threads will make it harder to loosen parts and thus maintenance more difficult.

NOTE 2: Protective shield for name plate

The name plate on the end carriage is covered with a protective shield, therefore you can paint over it directly. Be sure to strip off the shield when finished painting.

12. Erecting the end carriage on the travel rail

Refer to "Assembly, wiring and test run" in the Manual Crane Instruction Manual.

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