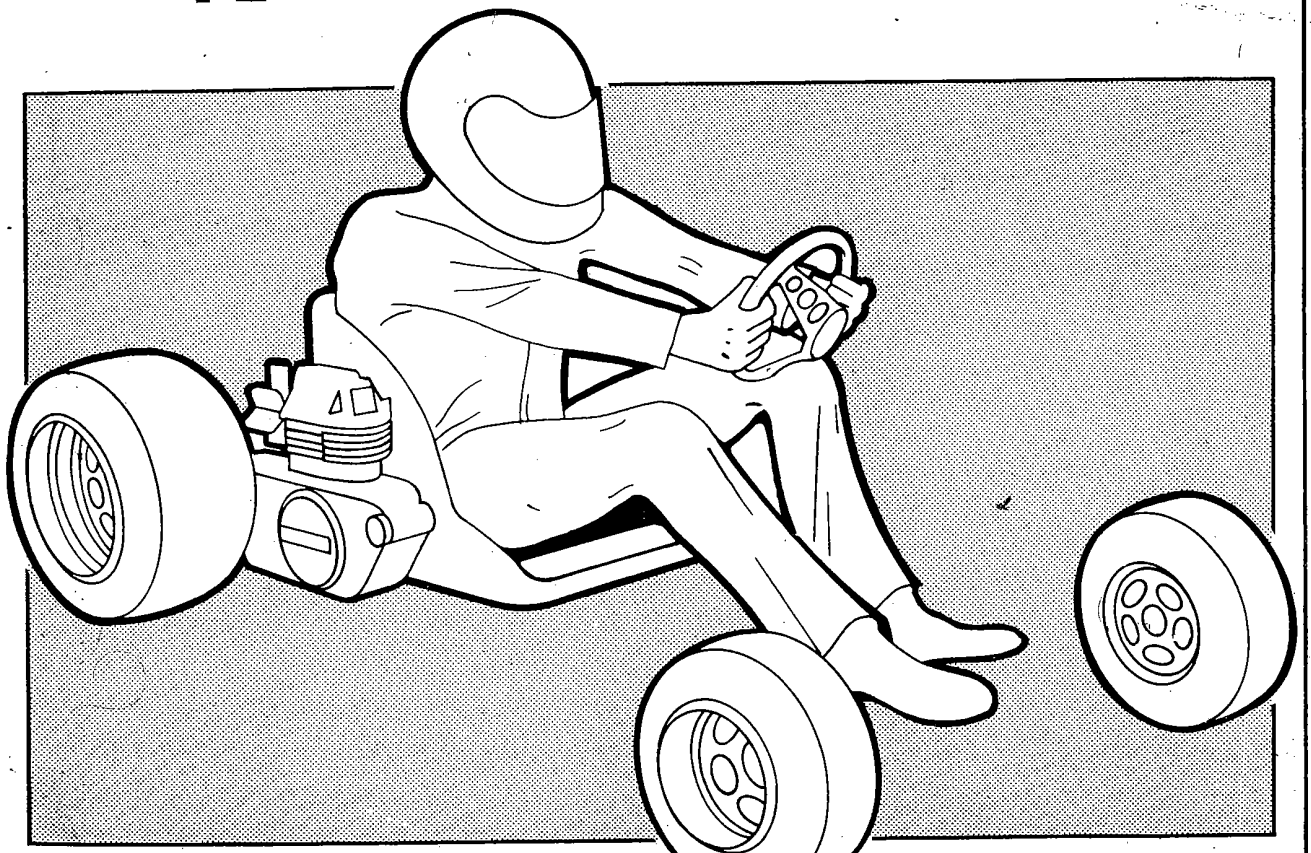
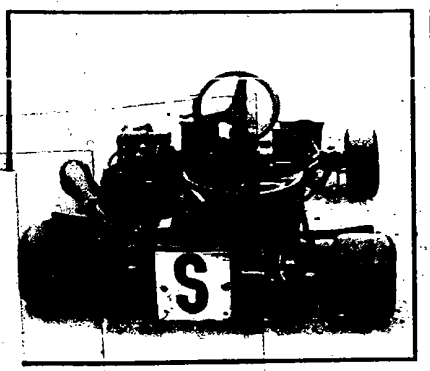
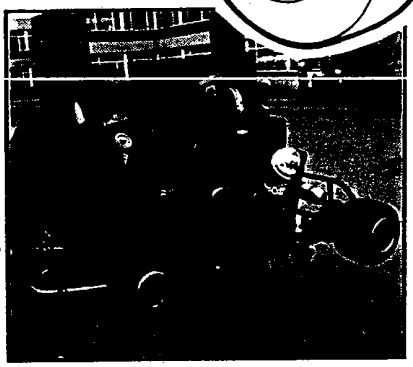
Castrol EDUCATIONAL DIVISION

THE NatSKA GUIDE TO KARTS AND KARTING







18mm diameter mild steel rod for the king pin post.
25 x 5mm BDS bar for yokes — or
25 x 25 x 4mm angle iron.

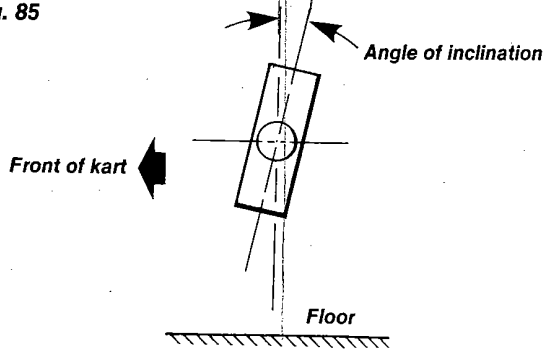
2) For ¾in. front hubs (from older, or gearbox karts):
¾in. diameter mild steel rod, with 1.0in. diameter spacers.

3) If Rose joints used:
King pin post made from 1½ x 1½ x $\frac{3}{16}$in. BDS angle.

Theory There are three principles involved in the provision of correct steering geometry:

1) Castor angle: This is the inclination of the king pin, whose top leans in a backwards direction towards the rear of the kart:

Fig. 85

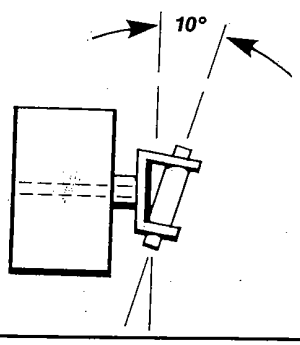


This is the most important factor governing how the kart will handle. However, this is interrelated with the other angles. In the case of the king pin inclination, the greater the angle, the greater the 'jacking effect' on the chassis, and the greater the oversteer the kart will develop. If there is too little, the kart will tend to understeer. The greater the angle, the heavier the steering and tendency to self-centre.

In practice, many people settle for angles between 20 degrees and 25 degrees.

2) Camber angle: This is the inclination inwards of the top of the king pin, towards the centre of the kart, and it is aimed at counter-acting the jacking effect of castor:

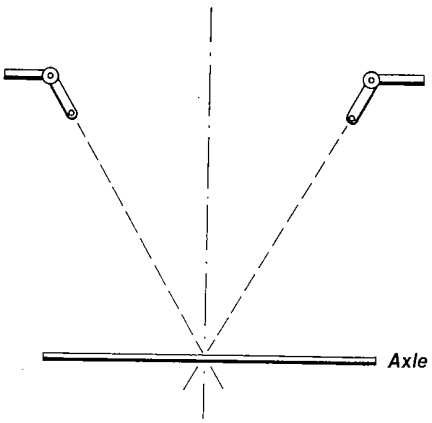
Fig. 86



— at the same time it helps produce a stronger joint, which will be able to withstand higher shearing forces. Generally, this angle is between 10 degrees and 12 degrees, and to allow the wheels to stand flat on the floor, is offset by a similar angle on the stub axle.

3) Ackermann angle: This refers to the placement of steering arms (when viewed from above), in relation to the chassis, and the rear axle:

Fig. 87

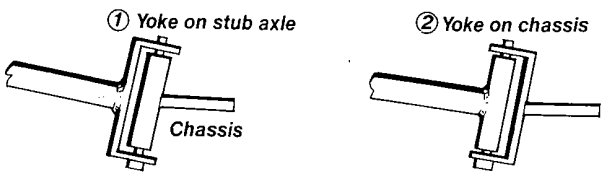


Ideally, lines projected through the centre of the king pins, and through the bolts holding the track rods, should meet at the centre point of the rear axle. The effect of this is that the inside wheel always describes a smaller-radius arc than the other wheel, when the kart is being turned — this is most especially important at low speeds, and on tight corners.

The length of the steering arm, in relation to the spade/drop arm, effects the 'speed' of the steering reaction. A long steering arm causes 'slow' but very light steering, whereas a short arm causes 'quick' steering, but requires greater efforts.

Examples There are two principal methods of arranging the king pin/stub axle assemblies. One is to mount the yoke on the chassis, with the post on the stub axle, the other finds this reversed, with the yoke on the stub axle, and the king post on the chassis:

Fig. 88



If brakes are to be fixed to the front wheels, the latter layout is easiest to adapt — otherwise there is little advantage in choosing either method.

Here are several mechanical solutions:

Fig. 89

Yoke on chassis

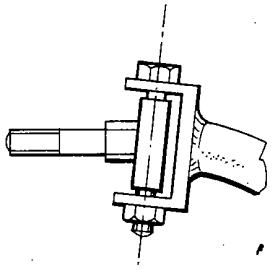


Fig. 90

Yoke on stub axle

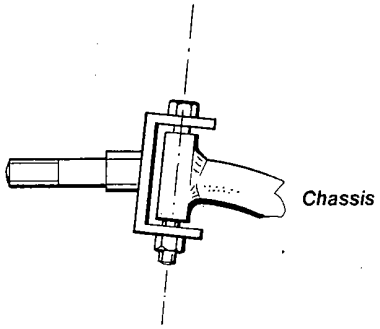


Fig. 91

Use of rose joints (min. 10mm)

Camber angle only adjustable

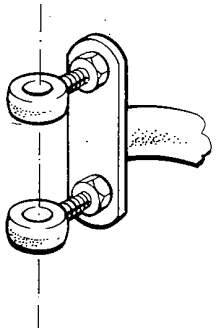


Fig. 92

Use of rose joints with camber and caster adjustable

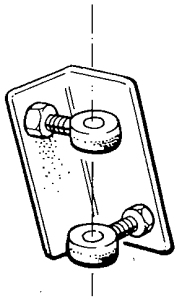


Fig. 93

TYPES OF STEERING ARM

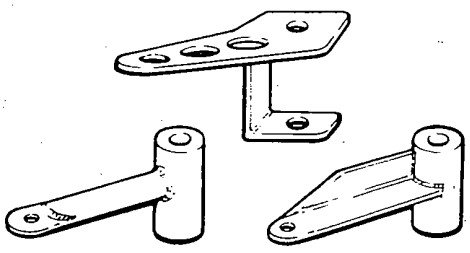
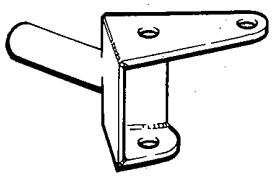


Fig. 94

Use of angle with steering arm providing top of yoke



Constructional Hints It is known that 25 degree Castor and 10 degree Camber angles usually produce acceptable handling, so we recommend these as the basis of your own design. However, if you want to vary the handling characteristics for different tracks, there is much to be said for adjustable designs. However, once the axle is welded in position, and the spade/drop arm on the steering column fixed, your scope for modification is limited.

Try to create the largest possible welding area at the junction of the axle and the king post. The use of angle iron helps this aim, because both sides of the joint can be welded. To weld a round-section axle to a round king post, we recommend that you shoulder the axle, drill the post, and fit the two together, to give additional support.

Steering arms tend to be stronger if made from tube, rather than from flat or angled material. Incidentally, always remember not to flatten tube along the line of the tube's weld.

If you decide to use Rose joints, remember that 12mm joints are those recommended, and never use any joint smaller than 10mm. Because the wheels have to absorb many heavy knocks — and Rose joints may be partly protected by angle iron arms.

To make up yokes, we recommend that you make up a simple jig:

Fig. 95

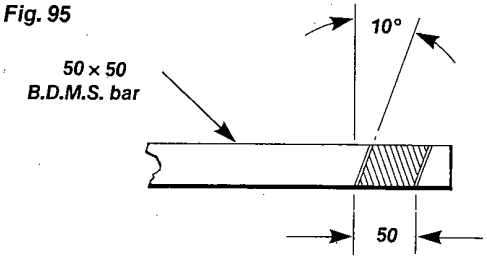


Fig. 96

Yoke jig