How to tow safely:

Any current discussions about F3J soon get around to the topic of launching. The change of rules following the last 2001 CIAM meeting has affected every F3J enthusiast. During the third European Championships at Holic, safe launching methods were the focus of debate. After all the discussions and arguments, the German team resolved to determine the safest sensible method of pulley towing.

Since March 2001, it has been prohibited on alleged grounds of safety to fix the end of the towline to the ground. This rule has been fixed hastily as a consequence of an accident, that has never been clarified sufficiently in any detail. The only permissible way to use a pulley is to adopt the dangerous »men-in-line" towing method, with the end of the towline held by one person and the second person holding the pulley.

This method of towing has been forbidden in Germany since 1998 as a result of former casualties and the high risk of severe injuries in future. In the event of a line breaking, the ends of the line often have a whiplash effect, and the line can easily hit any person in its vicinity. Also, if any parts of the towing equipment come loose or are released by the tow persons, they can easily cause injury. Even under normal line tension, it is not unusual for persons weighing as much as 80kg to slip and/or be pulled to the ground, again likely to cause injury.

For these reasons, the »men-in-line-tow" method was and is prohibited in any German F3J event. The only turnaround pulley method allowed is as follows. The pulley must be connected to a bar or a V-rope, and the two tow-persons must hold each end of the bar or V-rope in such a manner as to keep them out of the line of the pulley and the tow-line itself. The end of the towline is attached to a ground stake. As long as the ground stake remains firmly in the ground and does not become loose, this method is recognised as the safest way of launching an F3J model.

To avoid ground stakes loosening in the ground or pulling out, the ground stake should have similar characteristics as the conventional F3B turnaround pulley used with electric winches.
The main stake must be tied back and braced by two additional anchors – safety pins. The safety pins must be a minimum of 30 cm long and driven into the ground as far as possible. The safety pins must be connected to the main stake by two strong steel, wire or textile ropes of equal length, each with a minimum length of 70 cm. The main stake must have a minimum length of 50 cm, and the end of the towline must be attached to it at a height not more than 10 cm above the ground. Additional measurements see drawing: »guideline for proven ground anchor set-up". A proper used ground stake looking like that will not be pulled out of the ground by the F3J-typical line tensions.

Testing the tied anchor stake.

On 21 September 2001, the German F3J Team carried out tests and tension measurements on the tied ground anchor in order to establish typical F3J line tensions during the launch and to prove the safety of this method of ground staking. These tests were witnessed by several international F3J pilots who were taking part in the 10th F3J Thermik Cup held at Herrieden in Germany. Many photographs and a video were taken during the tests.

Stage 1:
To check the range of towline tensions during launch, the specified tied ground anchor was set up – see drawing – and used in combination with a 1.3 m long steel bar with the turnaround pulley fixed at its centre point covered by an unbreakable shield of 20 cm diameter.
Two powerful towmen, each weighing about 85 kg, were instructed to pull as hard as possible. Winds were measured with an average of 4m/sec. The towline was 150 meters long with a diameter of 1.25 mm. One model, the Euromodell »Escape", carbon version, 2.1 kg flying weight, competition set-up, was used for all launches, and each launch was directly into wind. Between the main ground anchor and the line linkage, a calibrated tensiometer with a range of up to 1 kN was installed to record the maximum line tension during the launch. All the maximum line tensions recorded were between 400 N (40 kg) and 492 N (49.2 kg). There was no measurable movement of the stake or the safety pins, or loosening of the surrounding soil, over the whole test programme.

Stage 2:
To check on the safety of the tied ground stake, (main stake plus two safety pins as specified previously) the set-up was installed in semi-solid wet ground, and attempts were made to pull out the stake by attaching it to a car and pulling. A calibrated tensiometer with a range up to 10 kN, previously synchronised with the 1 kN meter used for the towline tension tests, was installed between the main anchor and the line linkage. First movement of the main stake was recorded at a tension of 2.7 kN (270 kg), and at that point the two safety pins had not moved.

Conclusion:
The tied ground stake, as specified in this document, with its two safety pins, is capable of safely withstanding any towline tension which can be generated by any current or likely F3J model, in any wind speed, during launch. Normal line tension during launch is unlikely to ever exceed 500 N (50 kg). A securely installed tied stake will not become loose or pull out of the ground at less than 2700 N (270 kg), at least more than five times the towline's maximum tension. There is a considerable safety margin between the towline tension likely to be generated and the tension required to move the stake, anchored in any ground conditions likely to be met on sites suitable for model flying. Monofilament towlines are available in varying diameters and strengths, but the strongest likely to be used has a breaking strength of 1000 N – Speedline XXL 1.42 mm diameter, by EMC-Vega on slow stretch. Even with such a strong line, the factor of safety before any movement occurs in the main ground stake is 2.7. In order to put into other words: The 1.42mm diameter line will break 2.7 times earlier than the first movement of the ground anchor can be noticed. Pull-out forces are even higher.

Incident report:
Junior F3J pilot Jan Vacha (CZE) seriously injured.

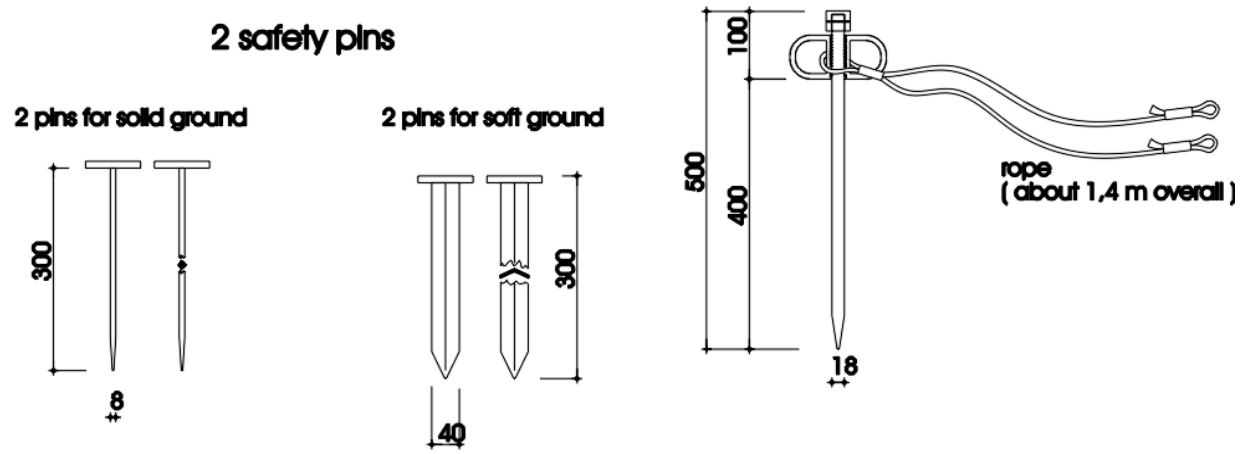
Since March 2001, any method of fixing the end of the towline to the ground has been prohibited by CIAM on the grounds of safety. But it is obvious that use of a turnaround pulley under the new FAI rules – »men-in-line"-towing method – is not safe. Apart from the danger of whiplashes by the broken ends of a towline, or the danger of being dragged along the ground, harsh crosswinds or temporary tailwind can produce a further launching hazard. Crosswinds an tailwind will make it difficult or even impossible for the tow-men to gain enough line tension and ground speed to generate sufficient lift for the safe launch of the model. Use of two tow persons on the pulley does provide enough line tension and ground speed.

In the Czech National Team Trials for the World Championships 2002, junior F3J pilot Jan Vacha from the Czech Republic was seriously injured in these crosswind circumstances.

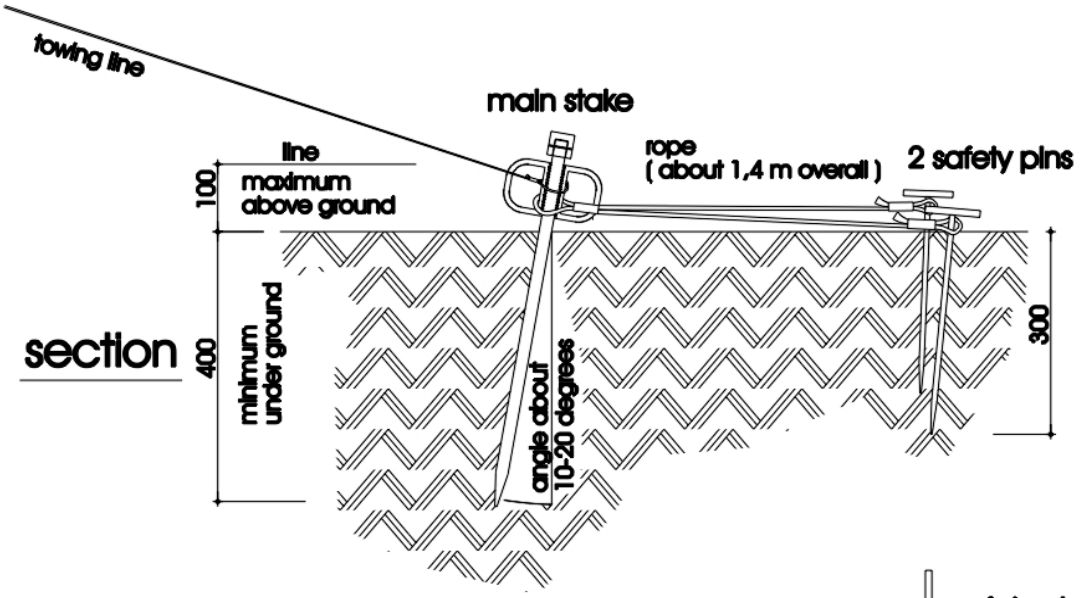
Immediately after releasing his own model, Vacha was hit by the model launching from the adjacent spot. This model had not gained sufficient flying speed to be controllable, and it fell liftless out of the sky, unfortunately piercing Vacha in the lower leg just above his foot. Bone was visible in the wound. He was taken to hospital where he was detained for several weeks after a complex operation. All Pilots, taking part on this competition required higher line tensions due to these hard crosswind conditions and mentioned the towing-rules as not safe enough. The accident prevented Vacha from flying in the F3J European Championships in Holic.

guideline for proven ground anchor setup

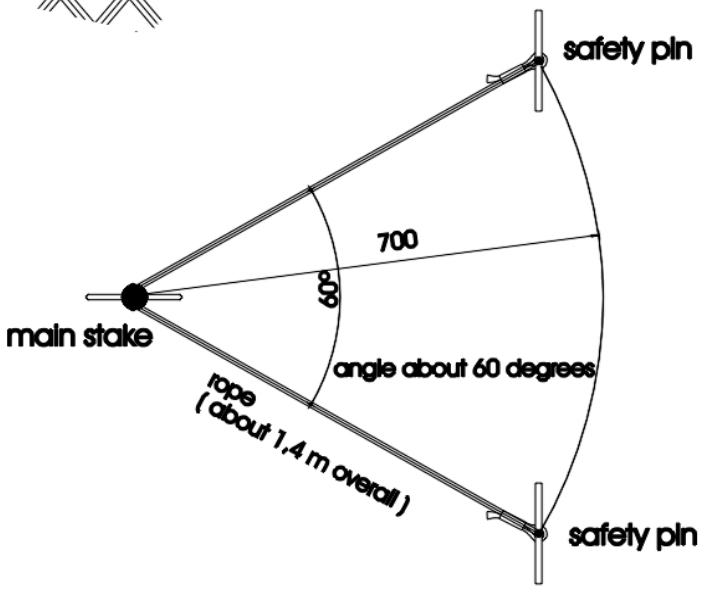
equipment



section



view from top



all dimensions in [mm]

all dimensions are minimum except when mentioned

material:
Anchor, pins : metal
rope: textil , metal