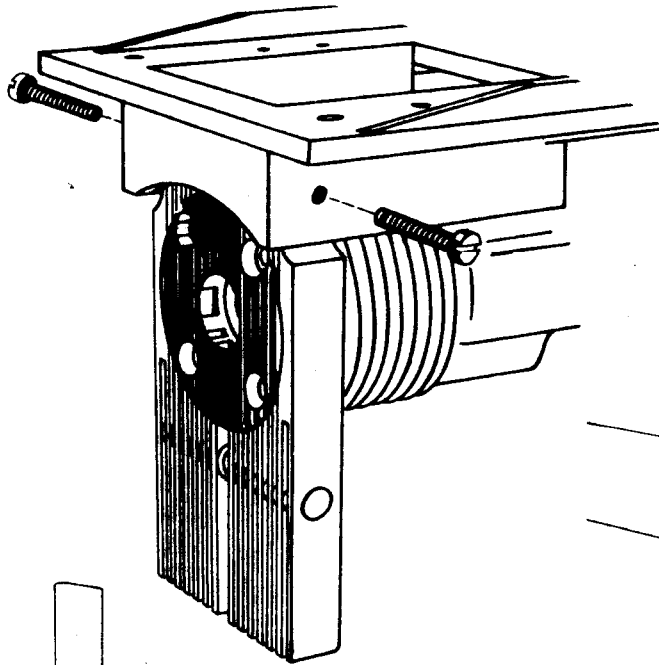
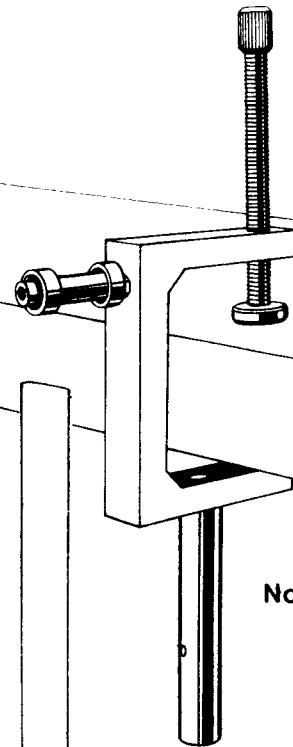
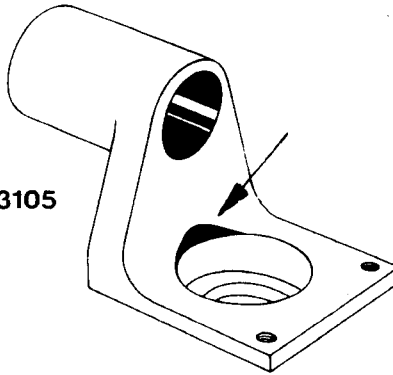


# **KAVAN**

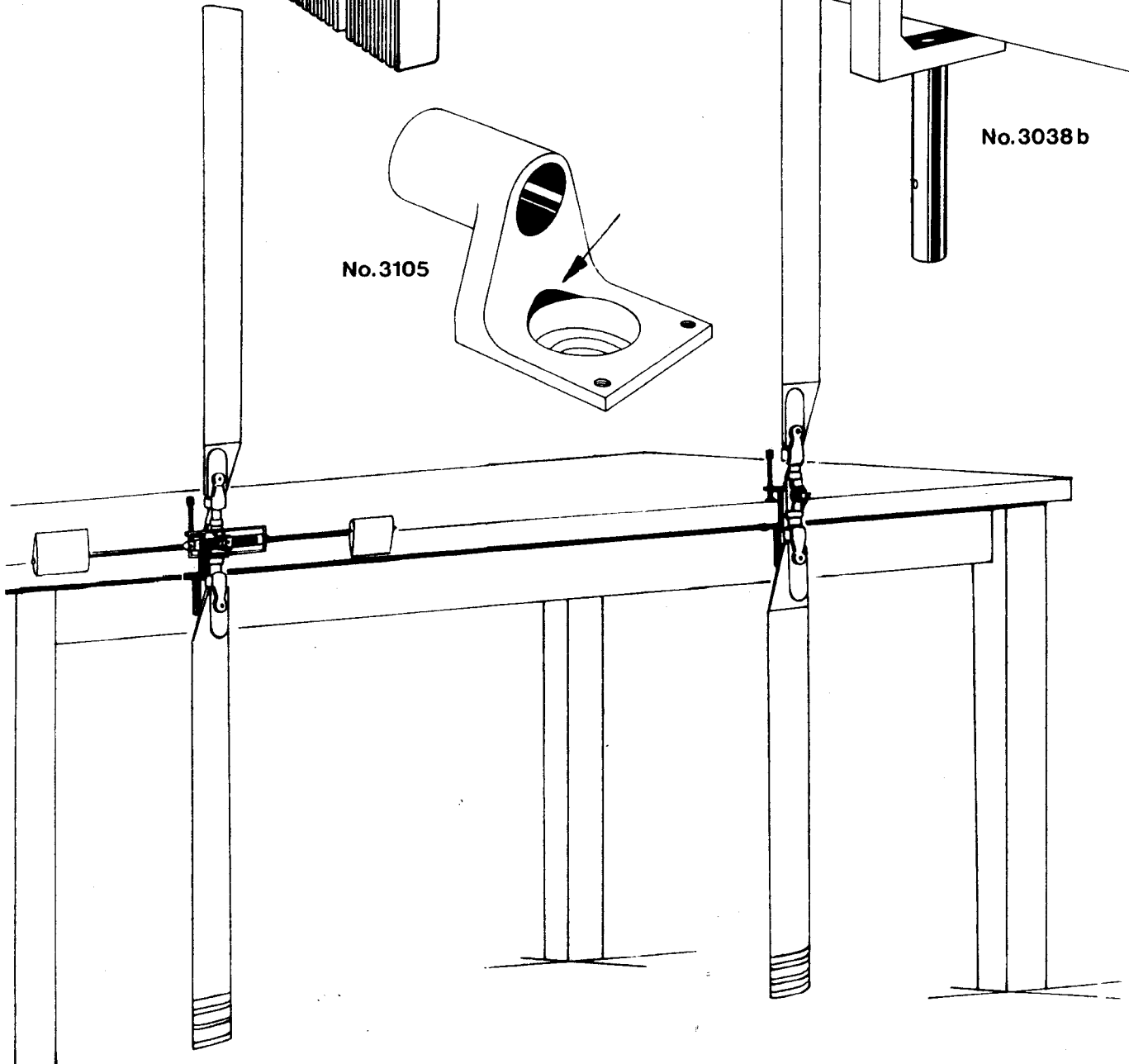
## *JetRanger*

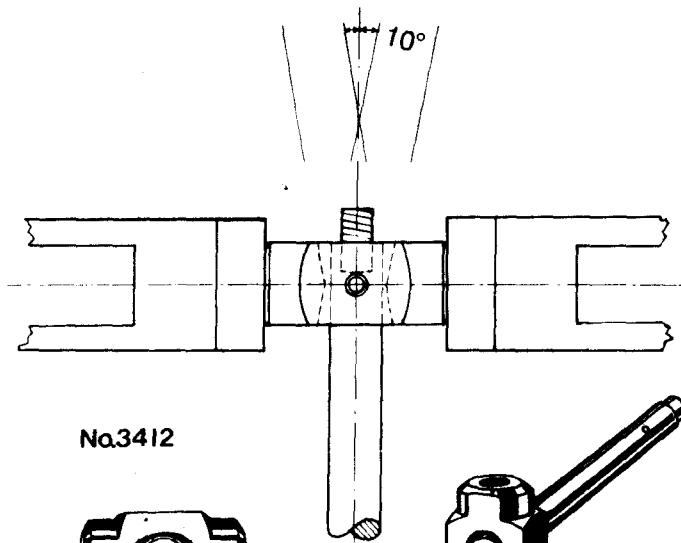


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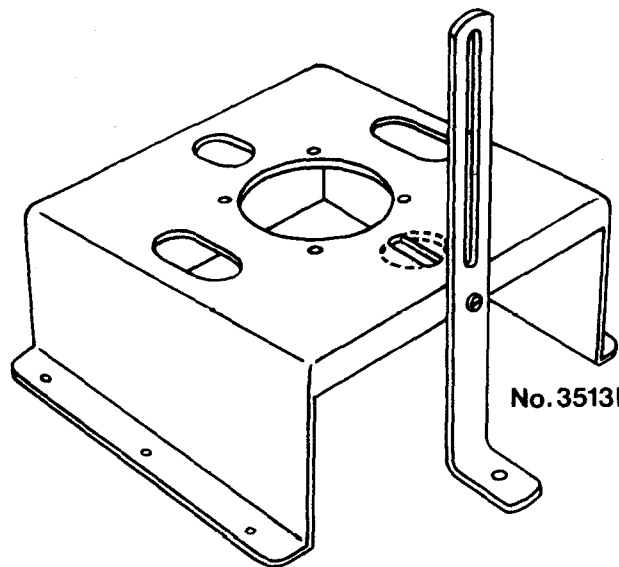
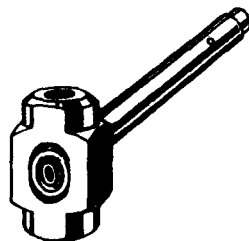


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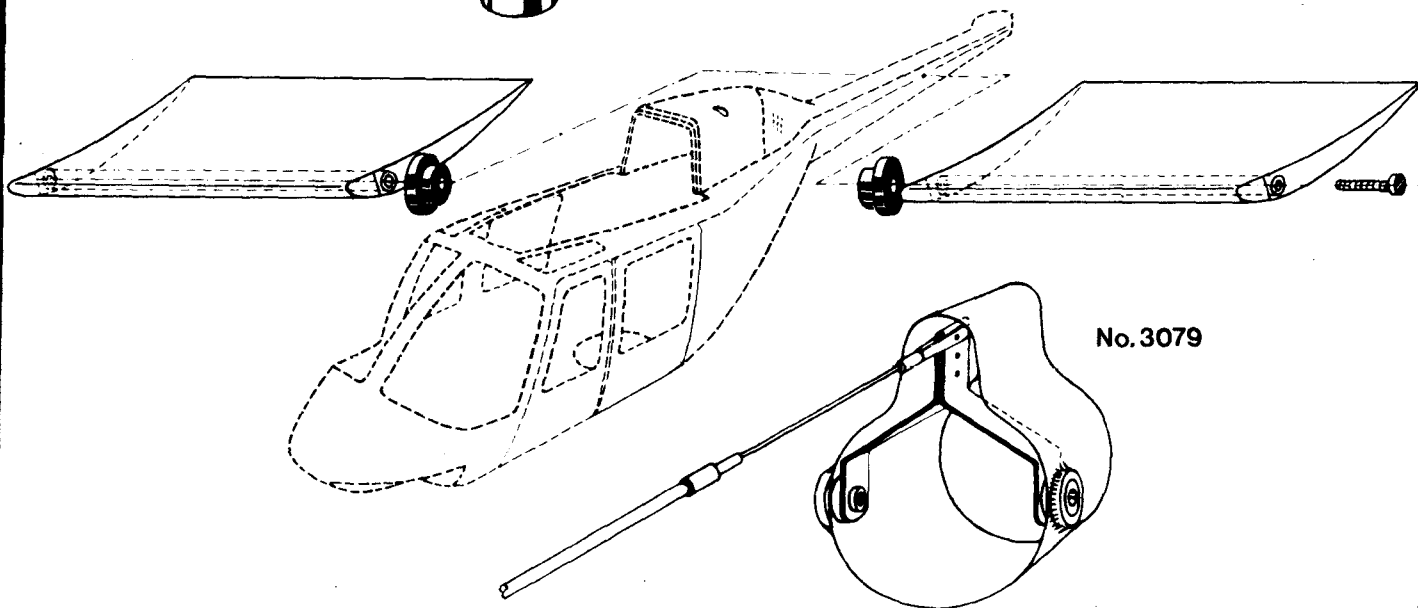




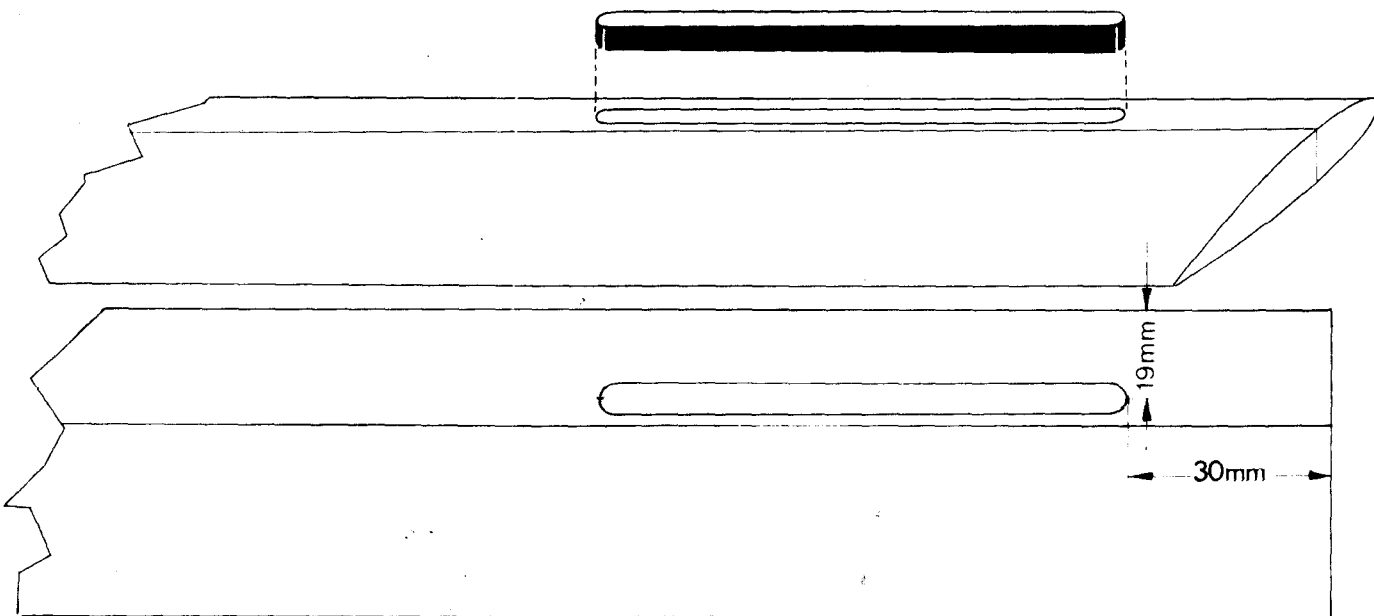
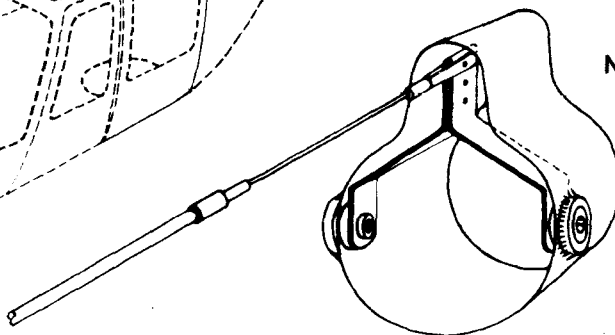
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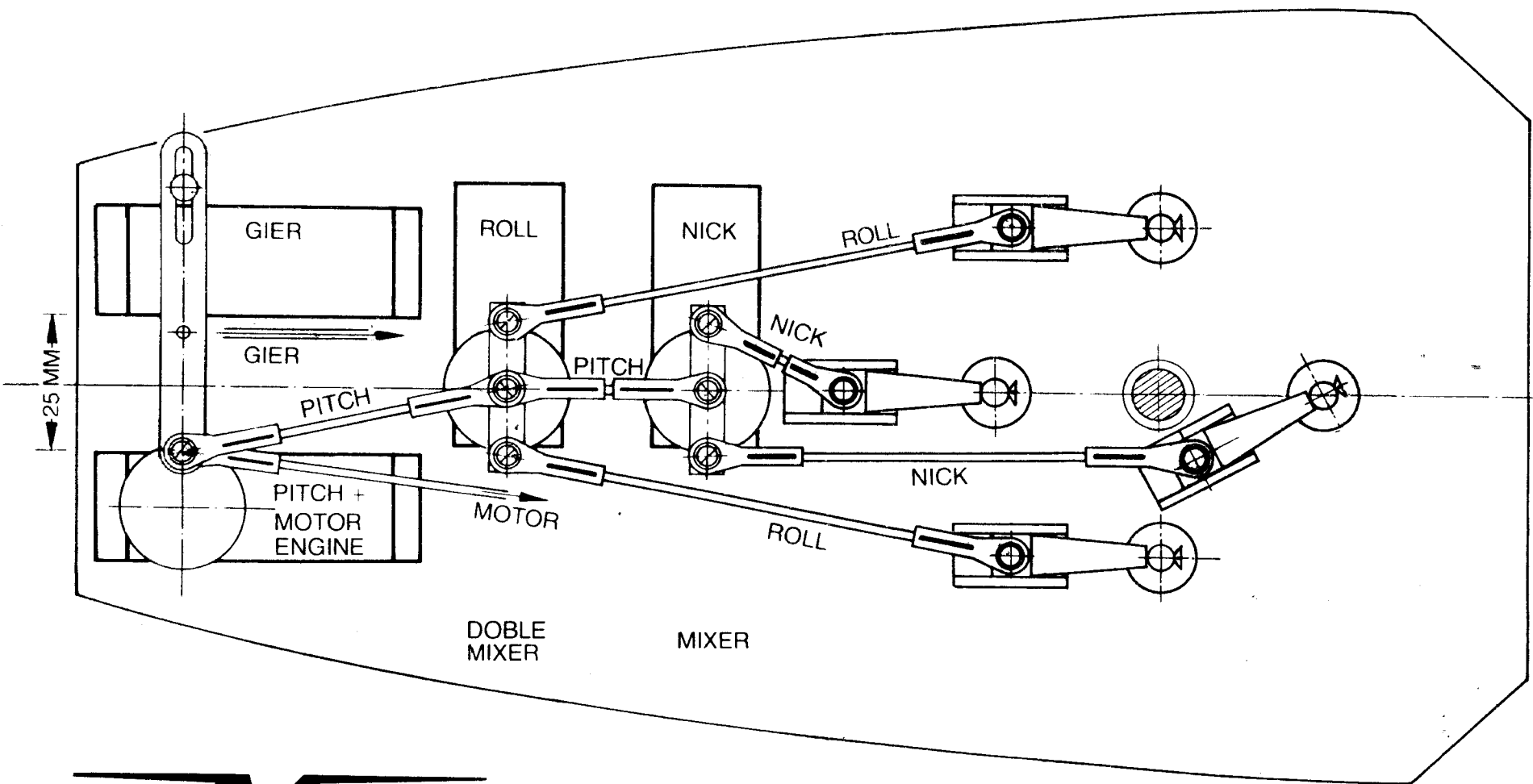


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No.3079



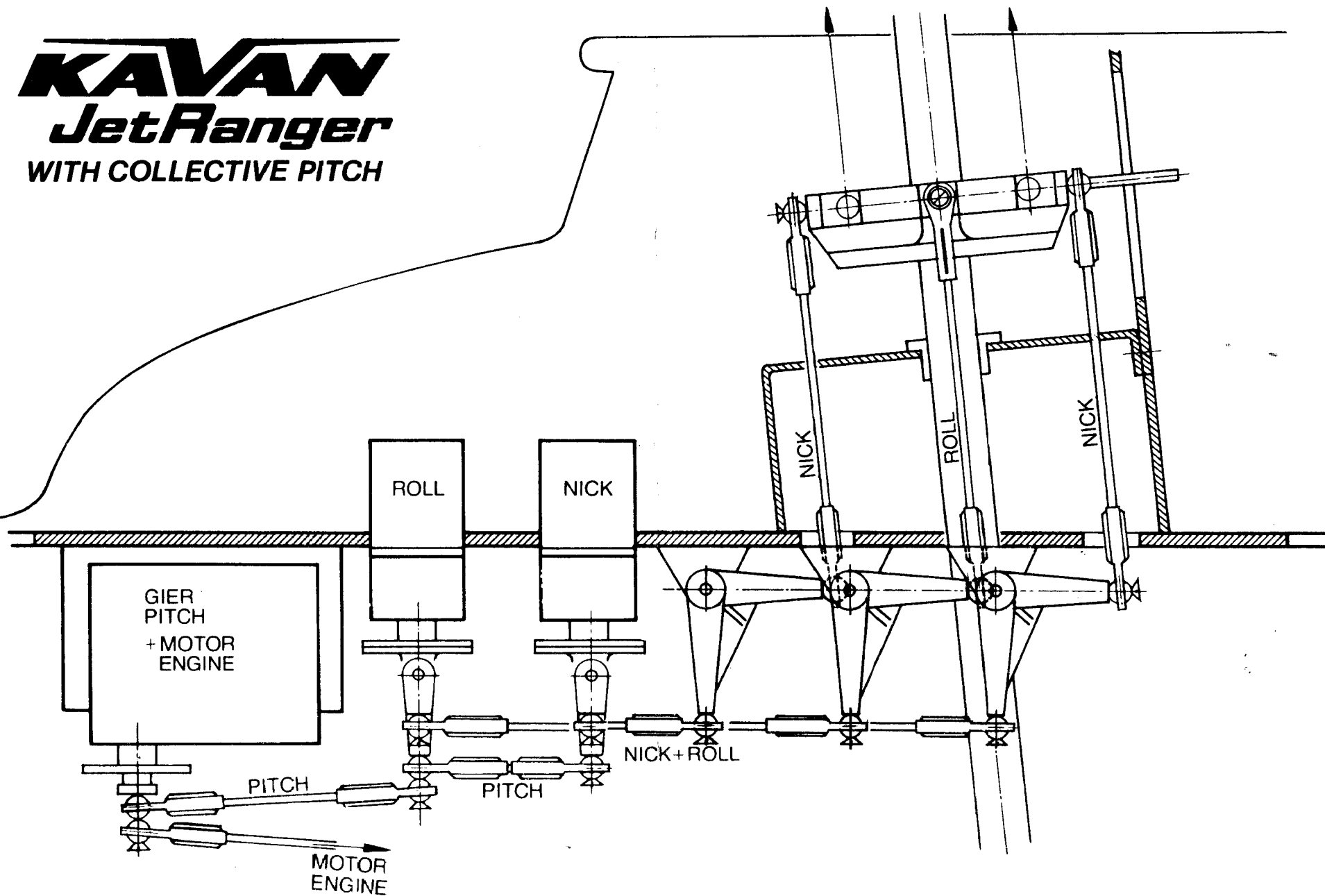


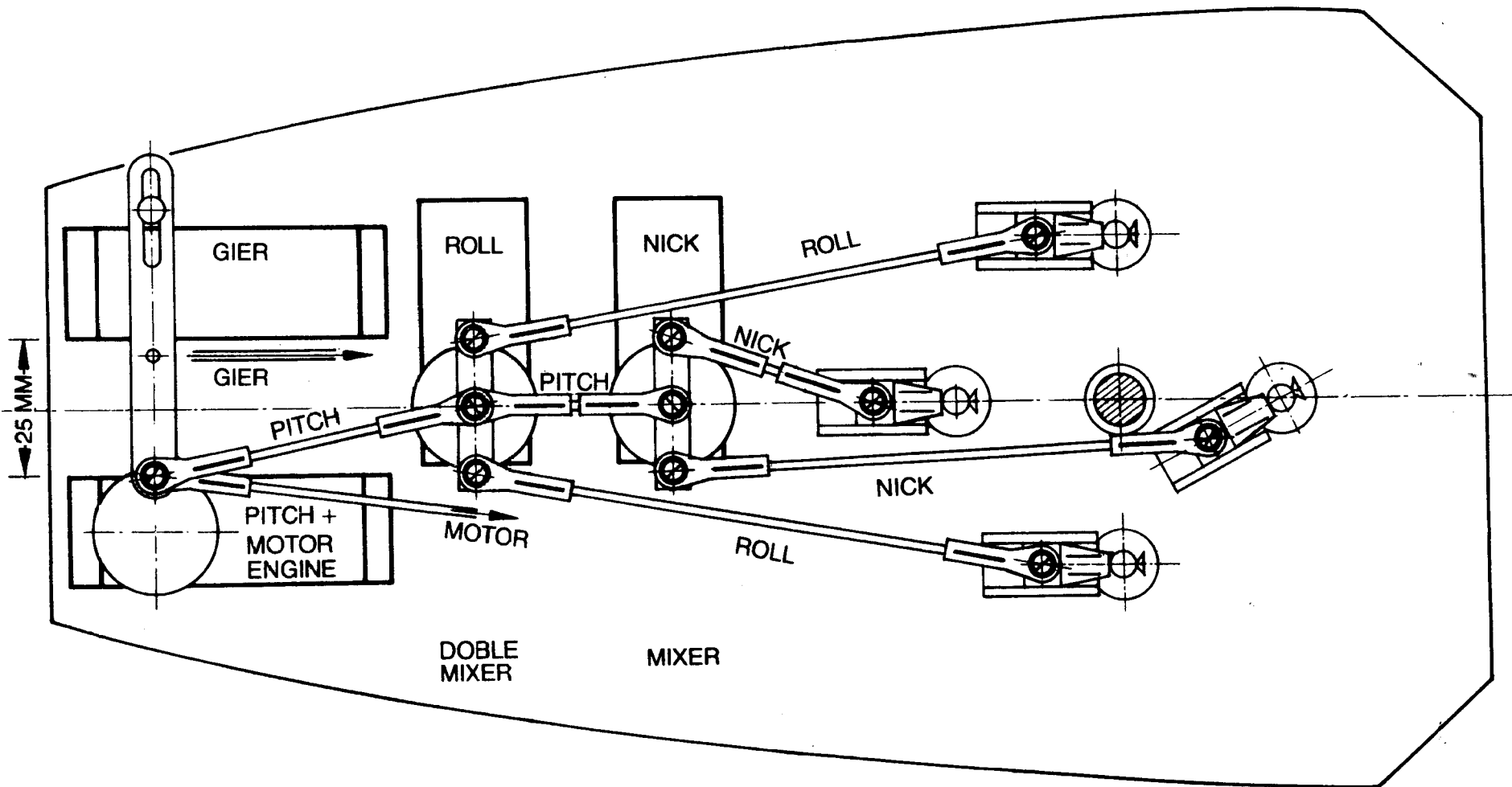
**KAVAN**  
*JetRanger*  
 WITH COLLECTIVE PITCH

# **KAVAN**

## ***JetRanger***

WITH COLLECTIVE PITCH



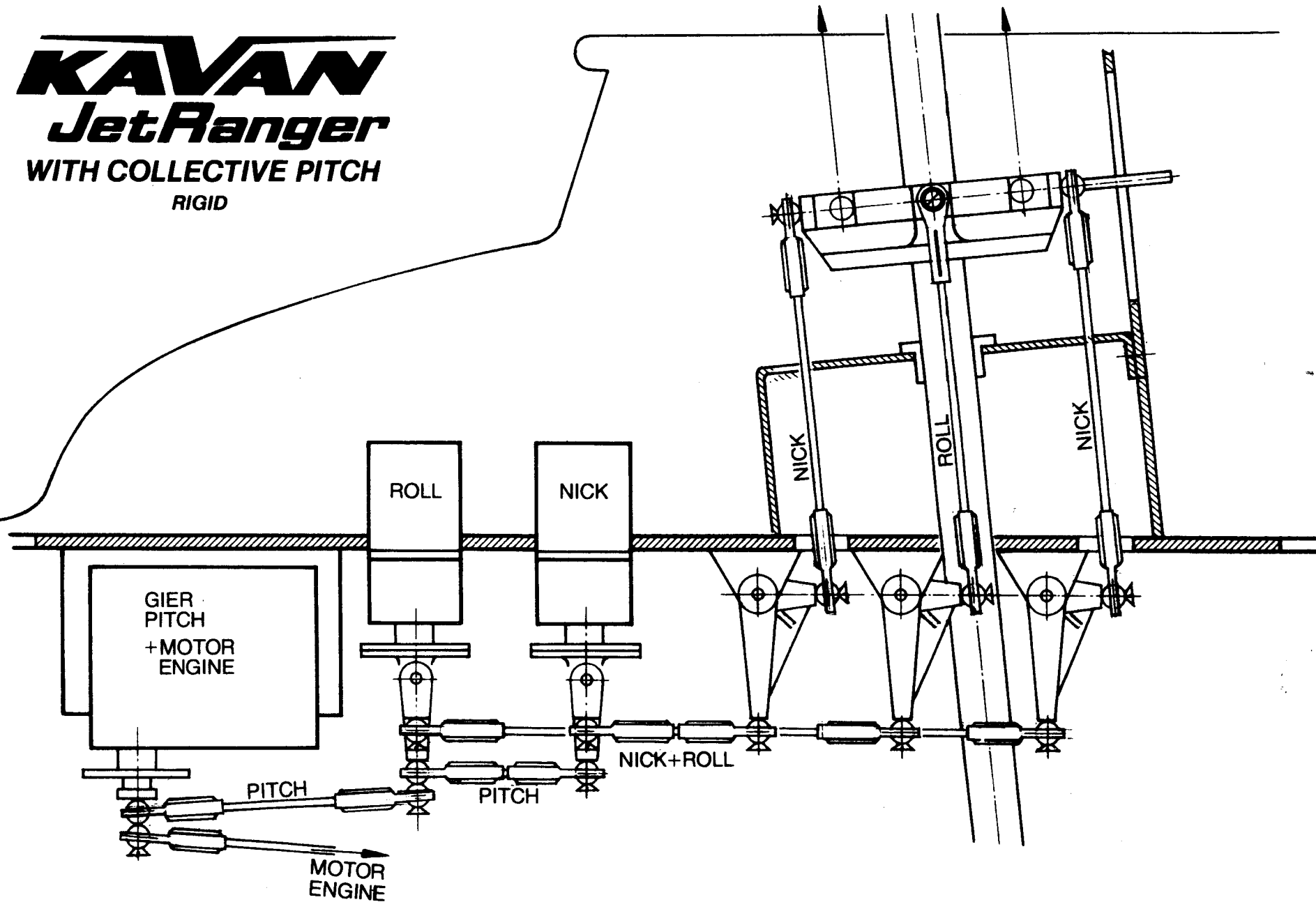


**KAVAN**  
***Jet Ranger***  
 WITH COLLECTIVE PITCH  
 RIGID

# **KAVAN**

## ***JetRanger***

**WITH COLLECTIVE PITCH**  
**RIGID**



NEWS ABOUT THE JET RANGER

Although our Jet Ranger, in its original form, remains in "top place" for this size model helicopter, we have improved it in many respects. It is not our policy to stand still while experience leads to further evolution and development. Our goal was to reduce the overall weight, and to take better advantage of today's more powerful Schnuerle engines. Additionally we introduced a new rotor technology.

New Clutch, art.no. 3149

Although it served well, we never became extremely happy with the present clutch. Experience led to an improved version with the Alouette 2. This System, art.no. 3149 has now been adopted for the Jet Ranger (the famed three bolts were omitted). We now mold the large Alu-Timing Belt Gear, art.no. 3133 from glass reinforced nylon instead of aluminium. As a further step, we made the Timing Belt Gear, art. no. 3149a 4 mm higher than the metal wheel which means a gain of 50%. This also applies to the Timing Belt, art.no. 3149c and the small Alu-Timing Belt Gear, at the engine, art.no. 3149d. For the latter, a new Split Cone, art.no. 3149e is required. The article, no. 3150 is the new Clutch Bell Housing with Shaft. Since the new clutch is smaller and consists partially of plastic, its weight has been considerably reduced.

Blade Mounts, new, with Seesaw, art.no. 3302c

The pitch arm is a one-piece casting now with the blade mounts. The seesaw was re-designed, the bearing receiving wells are now machined rather than diecast. Thus, an improvement of this unit was achieved. Additionally, there is a new Seesaw, art. no. 3320 which includes the new Stabilizer System, art.no. 3328. With this design a new, one-piece Stabilizer Rod, art.no. 3317a is required. The present Paddles (aluminium, art.no. 3318 or wood, art.no. 3318a) are used further on. The Axles, art.no. 3306 were also reinforced from 6 mm dia to 7 mm dia, art.no. 3306a.

Rigid Rotor Head, art.no. 3303

Now, the Jet Ranger can be flown rigid, without a stabilizer rod and without paddles. The Rigid Rotor Head, art.no. 3303 is equipped with thrust bearings. A must for setting-up rigid rotors is the new Levelling Fixture, art.no. 3038b. By using this device the rotor blades can be perfectly adjusted and balanced. As a slight out-of-balance condition of the main rotor causes vibration and might result in heavy oscillation (due to harmonic frequencies), this device is an indispensable tool. Jet Ranger owners, already possessing the article, no. 3038 out of the helicopter need only the Supplement: Ball Bearing Unit with Screws and Bushings, art.no. 3038c. In the future, all main rotor blades, either rigid or with stabilizer rod will be levelled in the improved way (see sketch). In combination with the rigid rotor head, only the Expert Main Rotor Blades, art.no. 3040 are to be used. Notice the centre line on these wider blades have been moved back from 17 mm to 19 mm (measured from the leading edge).

Lead Weights, art.no. 3040a

Lead weights, cast especially for the expert rotor blades, are particularly useful for rigid rotors. See sketch how they are installed. By this means, the helicopter becomes very stable and responsive at the same time. By using heavyweight rotor blades, the centrifugal forces increase enormously, thus, the requirement for accurate adjustment and balance must be mentioned again! Last but not least, a new Control Hardware Set consisting of Bell Cranks 2:1, art.no. 3513,

Bearing Blocks, art.no. 3513a and an Anti-Rotate Bracket, long, art.no. 3513b is required for the rigid rotor system. The Bearing Bracket, art.no. 3208 is to be modified (see sktech). The oval shaped hole must be filed to a circular shape. During the past two years we observed several Jet Ranger pilots - even people claiming to be experts - leaving their main rotor blades swivel freely about the attaching bolts. While this may ease the storage and transportation, it might on the other hand, completely upset the dynamic behaviour of the rotor. Rather than designing lead/lag hinges, we made provisions for super-free blade adjustments which assure a vibration-free operating rotor system when properly set. Therefore, by all means, level your main rotor as described and instructed. Do not pivot your main rotor blades.

#### New RPM Drive-Train

We have also developed a new RPM drive-train for the main rotor, consisting of the Plastic Spur Gear, new, art.no. 3204a and the Metal Spur Gear, art.no. 3114a. With this drive-train the main rotor RPM increase is about 20%. The new metal spur gear does not fit into the Angular Gear Case, art.no. 3105 of the original version. This one is to be widened 1 mm by machining. Anyone not being equipped for doing this himself, is advised to send it to us for replacement or to order a modified one under the above article no.. The original case is discontinued in favour of the new version.

#### Pitch Levers, art.no. 3506a and 3507a

This new device (see sketch) is remarkably simplified and acts considerably more exact and more free moving than the previous one. Through the resulting play the swash plate is to be controlled more directly and, thus, more accurately.

#### Servo Mounting Plate

This aluminium part was omitted, again contributing to weight reduction. Two newly developed Mixers, art.no. 3080 take over its function. The mixers are to be mounted to the servos. (see sketch).

#### Main Rotor Shaft, hollow, art.no. 3201a

A new hollow shaft also serves the purpose of weight reduction (app. 75 grams), however, it only can be recommended to pilots who are able to avoid touching the ground with the rotor tips.

#### Steel Wire Landing Skids, art.no. 3078

Use of piano steel wire landing skids means another step in reducing the flying weight (100 grams). The additionally reduced drag results in higher top speeds and better overall performance. It is recommended that you reinforce the fuselage attachment points with 30 mm dia plywood disks. Here, the skid brackets are fastened with plastic clamps.

#### Horizontal Stabilizer Control Set, art.no. 3079

This control set connects the horizontal stabilizer, in an elevator-like manner, to the longitudinal cyclic control. It will aid in aerobatic flying, especially on the pull-up phases of loops. Notice the included instructions for flying loops and rolls.

#### Rubber Damper, art.no. 3326 N

A new damper piece out of harder rubber material, and with a tapered bore, is used for stiffening the rotor head on the rotor shaft. This contributes to a better cyclic response, desirable for aerobatic flying. It is an optimal extra.



#### Plastic Clamp for Angle Measurement, art.no. 134

The clamp is ideally suited for measuring blade angles of any helicopter. Included is a spirit level and a plastic angular template of  $6^\circ$ , the hovering angle for most helicopters.

#### Helicopter Book, art.no. 137

This book is a must for the serious helicopter modeller because it covers the entire area of model helicopter flight, including the aerodynamic principles. Since it was written in English, it is just right for you.

#### Gyro, art.no. 3901

Having been well known for quite a long time, the gyro remains a valuable aid in flying helicopters. Many pilots use it, and they appreciate the simplification of control due to gyro stabilization.

#### Heat Sink, art.no. 3910

Referring to the sketch, notice how the future version of our Heat Sink, art.no. 3910 is bolted to the transmission plate by two bolts. This modifies the entire power transmission to form a rigid, vibration-proof unit.

#### Ball Joints, art.no. 3324

We and some of our expert customers check the ball joints and if a ball joint does not move easily enough (too strong) the balls will be polished with the finest sandpaper.

#### Autorotation

Much information has been learned about autorotation. A widespread opinion is, "a built-in autorotation device would always save the helicopter in case of an in-flight engine failure". In fact - it is not that simple! We have been exploring this problem for years. Besides other measures, we had a freewheel unit installed in the power train which released the rotor system when the engine started to "sag". Recently, we found a completely cost-free solution: by simply shortening the Tension Spring, art.no. 2107 (which retains the clutch shoes) by 5 to 10 mm, the clutch releases sooner, setting-free the rotor system at an earlier stage of decreasing propulsion. If the rotor blades are also loaded with lead weights, they will even speed-up, exceeding the normal operating RPM. This provides for a controlled descent, leaving sufficient motion energy for recovery near the ground and hopefully, smooth landing.

Prepared like this, future autorotations will be less a matter of luck, and they could even be practiced at will by the experienced pilot.

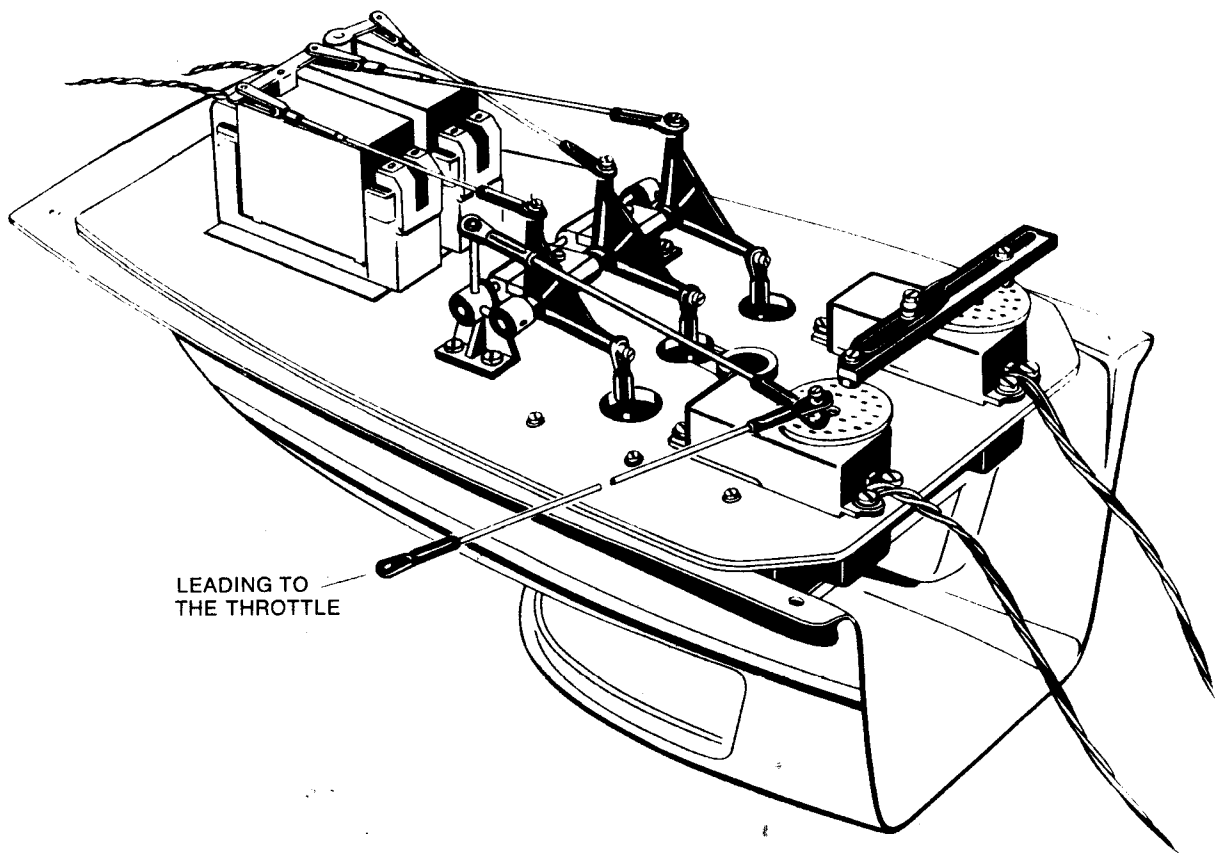
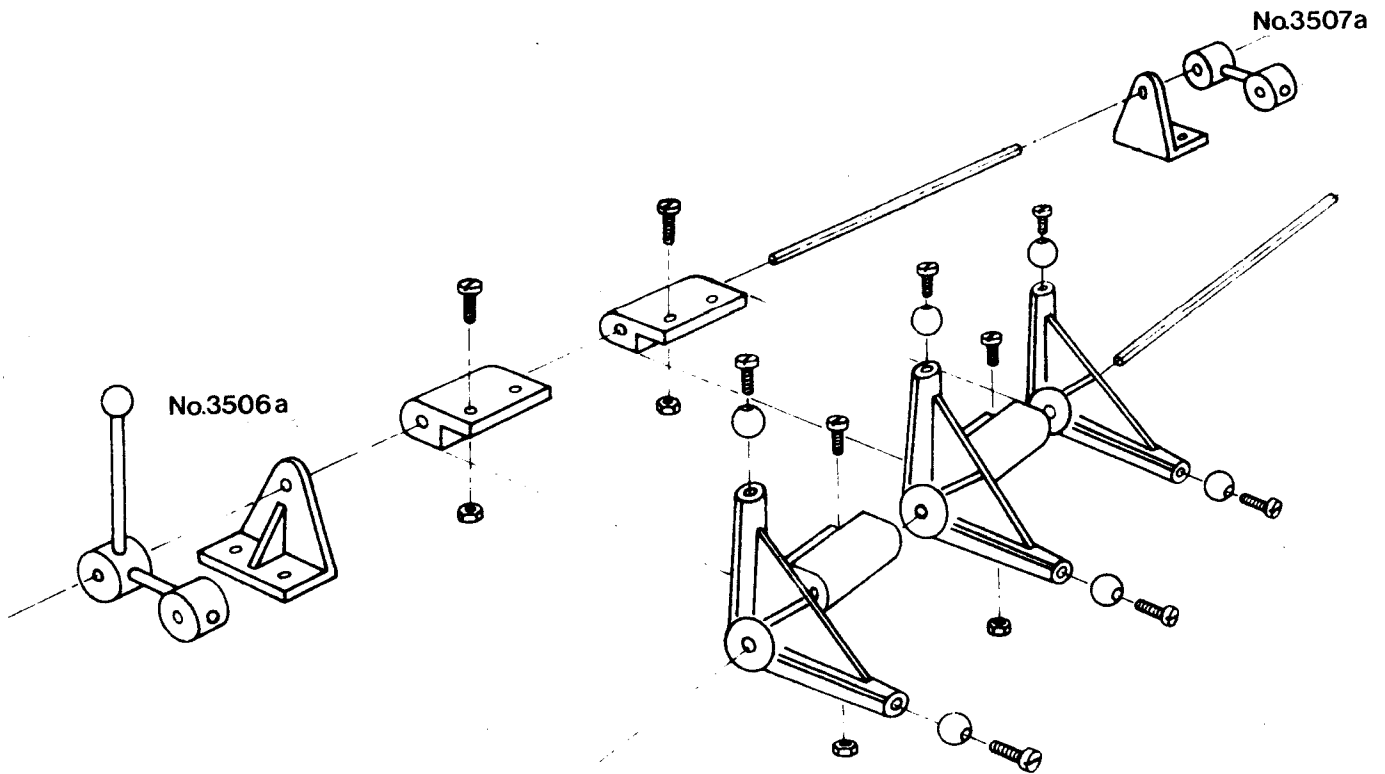
#### Delta-Link

Some of our customers swear by the so-called "delta-link" of the Jet Ranger tail rotor. The adjacent sketch shows how to modify the Hub, art.no. 3412 in order to obtain the seesaw tail rotor. Use a jewellers round file and widen the cylindrical bore for the shaft, to an oval shape, from the circular centre outward to both sides.

#### Helicopter Aerobatics

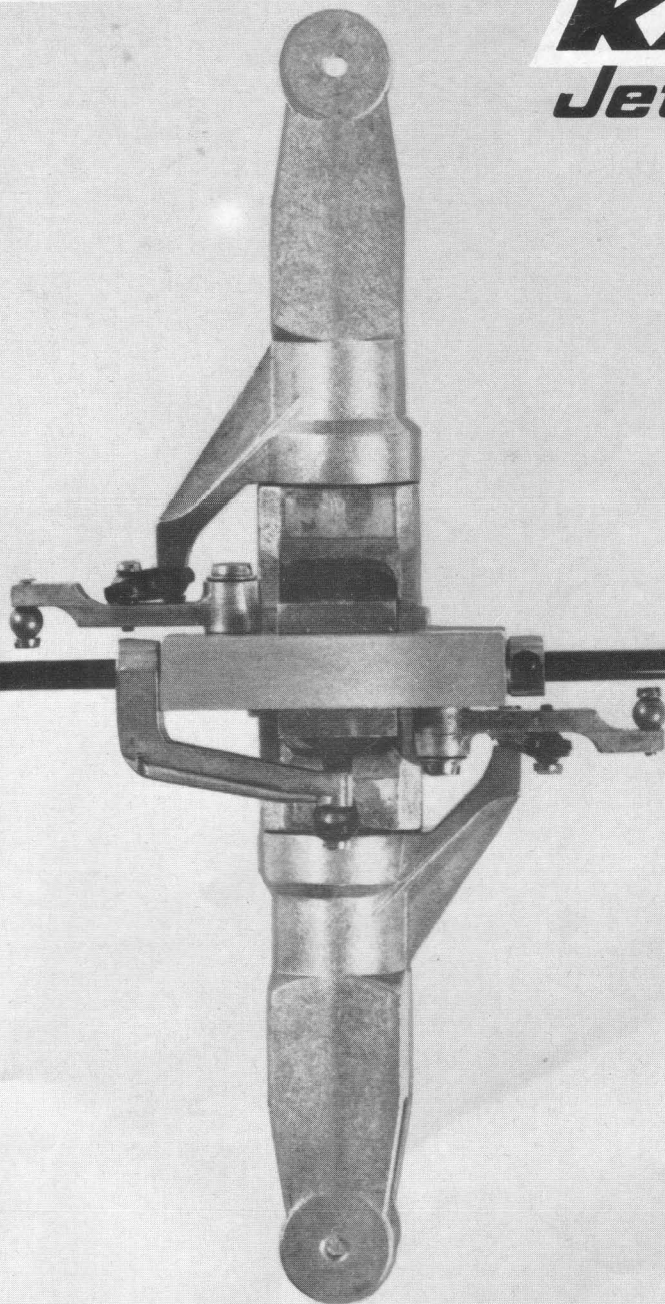
Enclosed you will find a detailed instruction introducing you to loops and rolls with your helicopter. For anyone interested, there is a super 8 mm coloured movie (60 m) available for DM 100.- which shows the Jet Ranger flying loops and rolls.

# KAVAN JetRanger

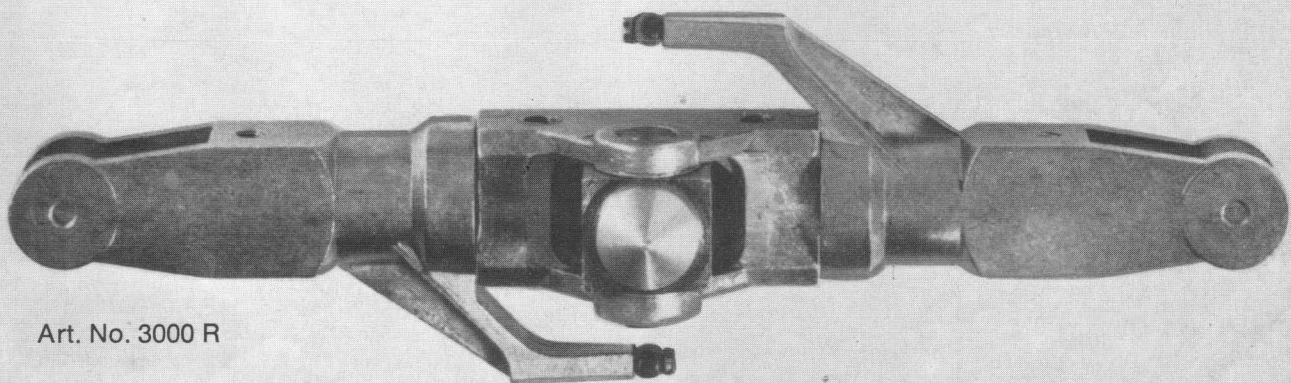


**KAVAN**  
*JetRanger*

Art. No. 3302 N



Art. No. 3000 R



# KAVAN

## INFORMATION SHEET

Enclosed you receive free of charge the now very famous Kavan-System, which will allow you a much better control on your Jet Ranger. If you have adjusted the parts according to the drawing, please turn on your transmitter and receiver and put the stick in your previous hovering position. In this state the aerodynamic damping blades (No.3318) have to be set in the horizontal position.

Further tests and experiments have shown that the following points are of utmost importance to observe before you take your Jet Ranger to the flying site:

### 1) Collective Pitch Setting

A safe and reliable means to correctly set the angle of incidence on the main rotor blades is to set the trim lever on the transmitter in such a manner that your engine throttle is at idle! We know that the collective pitch is coupled with the throttle and therefore in this position the angle of incidence on the main rotor blades must be 0 degree! To confirm this, place the spirit level supplied in the kit on the rotor blades and verify that the scale shows the blades to be perfectly level. This is a dependable method we highly recommend.

### 2) Additional Safety Measures

The push rod which leads from the swash plate through the bearing bracket into the hole of the plywood part No. 9 must be cut at such length that it cannot move back out of the hole in part No. 9 when full forward cyclic pitch is included! In fact, the rod should still rest well in the hole at this position and protrude approx. 2 - 3 mm. Be careful however, that the rod is also not too long, so it does not interfere with the mixing lever!

3) The phosphor bronze bearings (part No. 3315) are not to be cemented, but must be soldered. The two needle bearings (part No. 3304) are cemented to the seesaw by using Hobby Poxxy or Uhu plus and not Stabilite Express.

4) It is highly recommended that at least once a month the servos are disassembled and the potentiometer cleaned thoroughly.

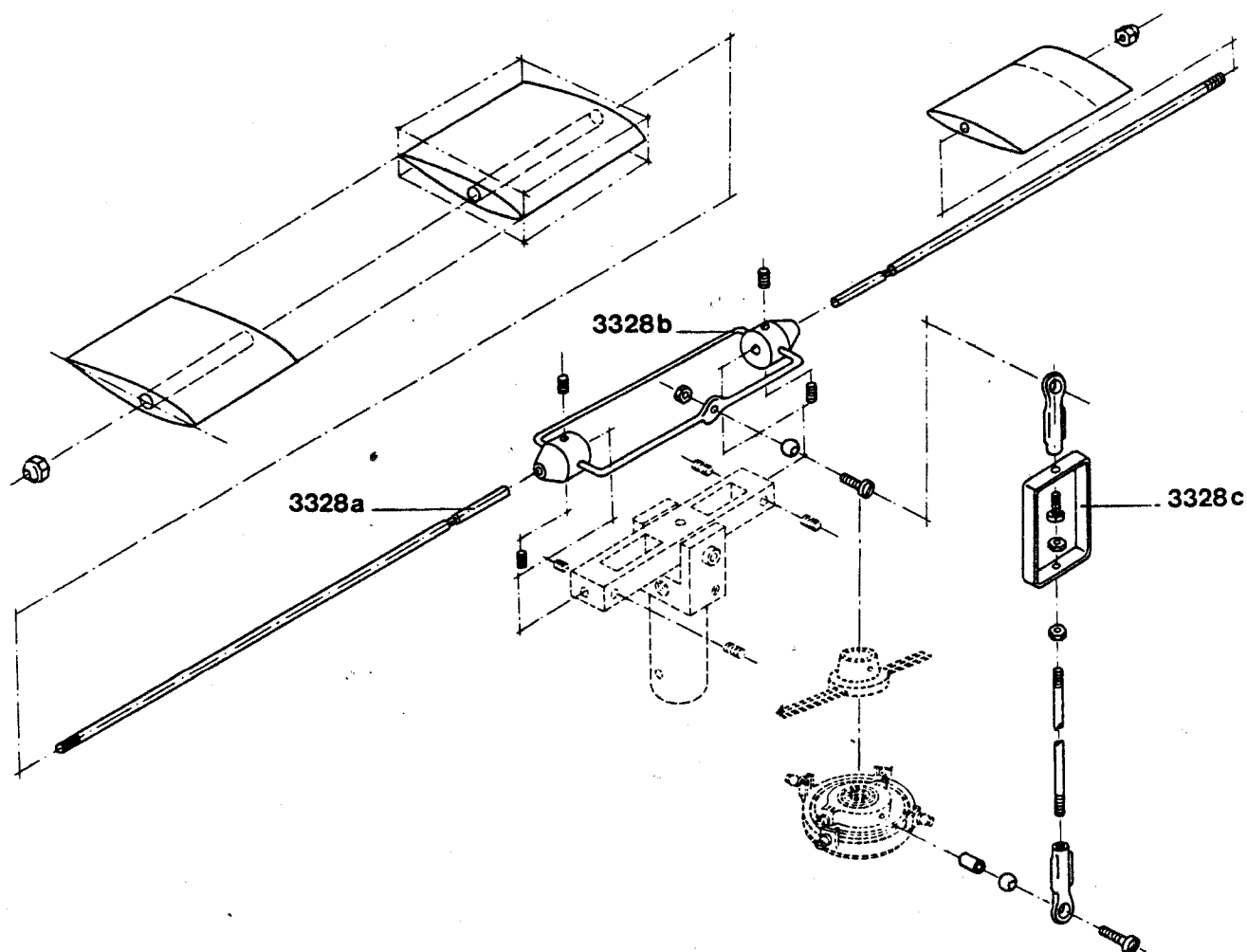
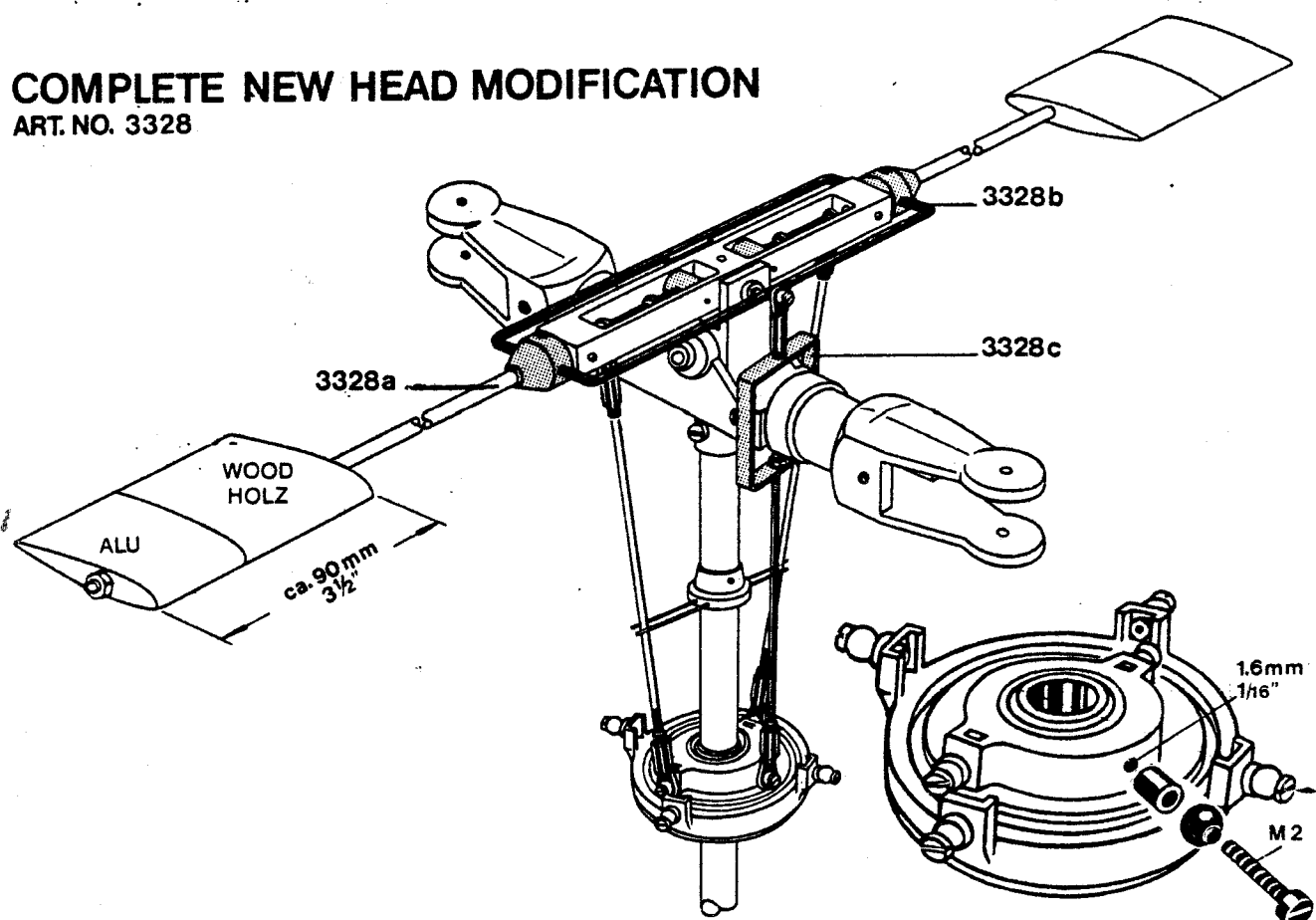
5) We recommend that you guide the tail rotor shaft No. 3422 into a brass tube or fiberglass tube of about 12" and mount same at the tail end of the fuselage.

6) On that occasion I would like to ask you to tell your friends who own Jet Rangers to send us their cards as well.

# KAVAN

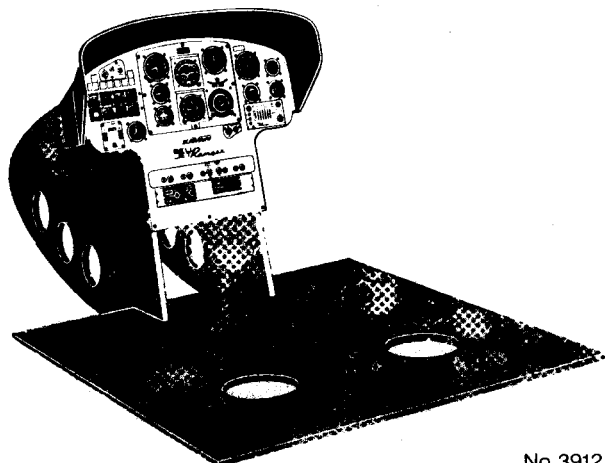
## COMPLETE NEW HEAD MODIFICATION

ART. NO. 3328



### Cockpit, Item No. 3912

The cockpit is highly recommended to make your model more life-like.



No.3912



### Assembly and Flying Instruction, 2nd Edition, item No. 3057

The new assembly and flying instruction was created in co-operation with many Jet Ranger owners. It contains many advices, modifications and indications and is recommended to all Jet Ranger owners. In other words it will widen your knowledge.

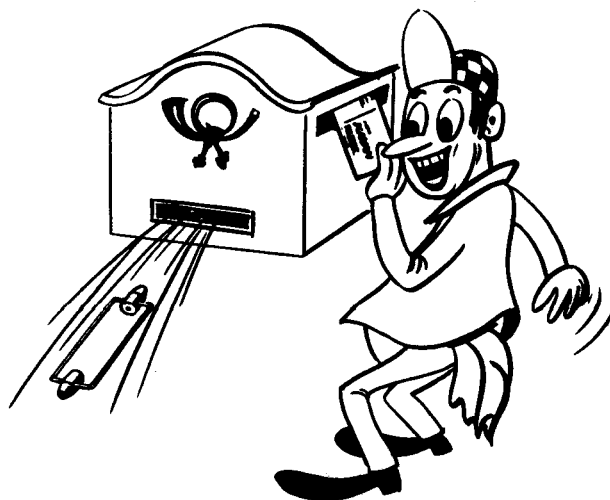


### Generally

During the last two years since the first Jet Ranger was delivered we have had contact with thousands of Jet Ranger owners and exchanged experiences. It has been noted again that those Jet Ranger owners who use a good engine, achieve the best results. We, in our plant are continuously testing all types and models of engines, not only in the torque stand but also in flying. It has been found that only engines with the wellknown Schnürle Port showed the best results.

It should be mentioned that we appreciate proposals for improvement. In case we adopt your suggestion after thorough verification we will of course honour you.

### Service



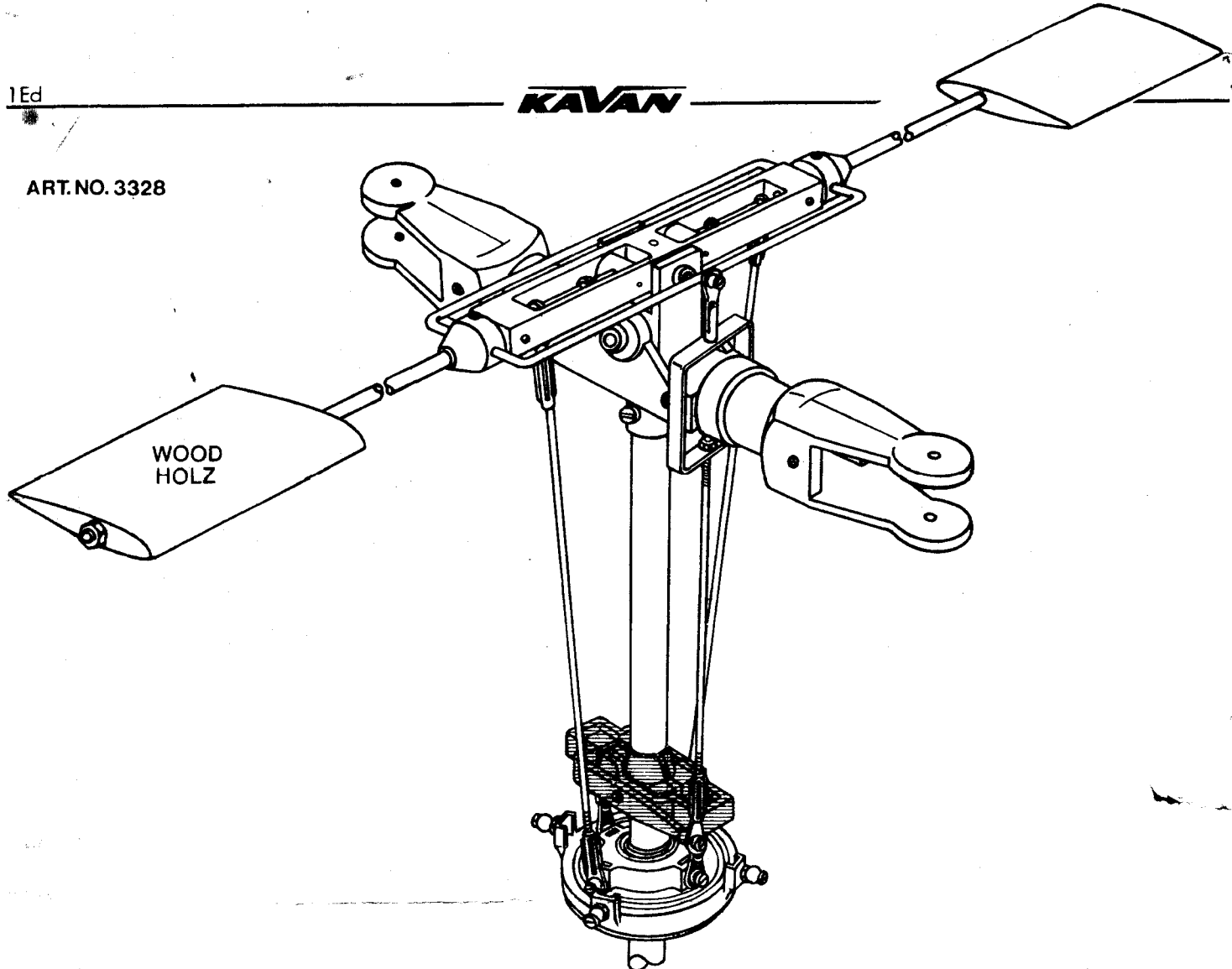
We receive many complaints from Jet Ranger owners who have difficulties getting spare parts through their local dealers, who very seldom have them in stock.

At this time we have to advise you that we are bound to the dealer. We cannot afford to annoy them. On the other hand we are worried that you often have to wait 2 - 3 weeks until the spare parts are delivered and the repair can be accomplished.

In cases of emergency, when you are not able to receive the required parts through your dealer, we are willing to help you. However, before you contact us, we suggest that you contact one of our agents who is closest to your area. The complete addresses of our agents are listed on the last page. This however concerns only Jet Ranger spare parts and their accessories.

You will hear from us again!

ART.NO. 3328



- England: Irvine Engines, Unit 8, Alston Works, Alston Road, High Barnet, Herts, Tel. (01)440-0923, ATTN: Mr. Irvine:
- Belgium: Comptoir Commercial & Industriel, Tenco Division, 358-262 Av. de La Couronne, 1050 Bruxelles, Tel: 02/49 91 40, ATTN: Mr. Cohen
- France: Scientific France, 272bis, Av Henri-Barbusse, 59770 Marlylez-Valenciennes, Tel.: 46 45 92, ATTN: Mr. Fontaine
- Swede/Norway: B. Beckman, Wollmar Yxkullsgatan 1, 11650 Stockholm, Tel: 08/442 323, ATTN: Mr. Beckman
- Finland: Raffinol Produkt, Ruskontie 112, 20360 Turku 36, Tel: 921-382 43, ATTN: Mr. Wiklund
- Denmark: Vestergard, Bøssemagervej 11, 8800 Viborg, Tel: (06) 62 43 87, ATTN: Mr. Vestergard
- Austria: G. Kirchert, Linzerstr 61, A-1140 Wien 14, Tel: 222 - 921 51 44, ATTN: Mr Kirchert
- Hong Kong: Champion Trading Co. Ltd., P.O. Box 993, Tel: 5 - 22 78 09, ATTN: Mr. Kwok Wai Chiu
- Japan: Kyowa Balsa Boeki Co., Ltd., 15, 12-ban, 1-chome, Ryogoku, Sumida-ku, Tokyo, Tel: (634) 2871-3, ATTN: Mr. Yamada
- Australia: Ronald G. de Chastel 793, Gympie Road, Chermiside, Queensland 4032, Tel: 59 73 46, ATTN: Mr. Chastel
- New Zealand: Dynamic Displays Ltd., P.O. Box 7, Bombay, South Auckland, Tel: Bombay 719, ATTN: Mr. Fahey
- South Africa: Redipak Pty. Ltd. P.O. Box 11445, Johannesburg, Tel: 21-1513, ATTN: Mr. Immelman
- Lebanon: Khairallah Modelcraft, Achrafieh 2300, Beirut, Tel: 32 66 81, ATTN: Mr. Khairallah
- Singapore: Metro Group, Beach Road, Singapore 7, Tel: 25 89 255. ATTN: Mr. Seah
- Israel: Nisso Dekalo, 19 Helsinky Street, Tel Aviv, Tel: 56 - 280, ATTN: Mr. Dekalo
- Cyprus: Nick's Model and Hobby Centre, P.O. Box 178, Limassol, Tel: 2978, ATTN: Mr. Iossephakis
- Spain: Aerotecnic, Apartado de Correos 35, La Junquera (Gerona), ATTN: Mr. Imbert
- Mexico: Eindorf, Apartado 12-651, Mexico 12, D. F. Tel: 5-39-17-22 ATTN: Mr. Heinz Eindorf
- Canada: Udisco Ltd., 4660 Decarie Blvd, Montreal H3X 2H5, Tel: 481-8109, ATTN: Mr. Kunin
- USA: Kavan Model Aircraft Inc., 1424 E. Borchard Ave., Santa Ana, California, Tel: (714) 835-7788, ATTN: Miss Blum
- GERMANY: KAVAN, 85 NÜRNBERG, Lindenaststr. 56, Tel (0911/35 39 70) Telex 622 312, Mrs. ZURTH