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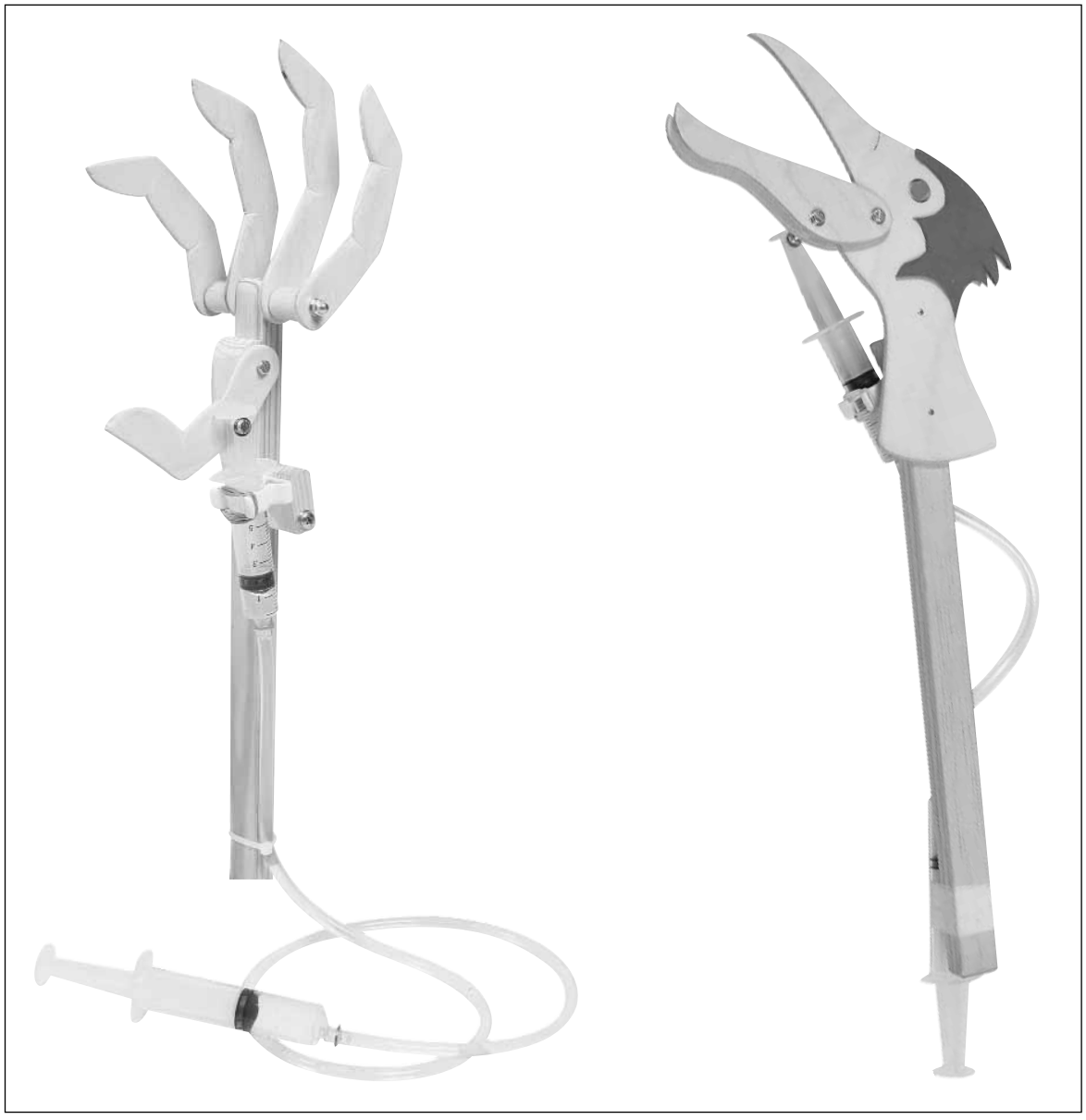
H y d r a u l i c / P n e u m a t i c
“G r i p a r m o r C o c k a t o o”



Please Note

The OPITEC range of projects is not primarily intended as toys for young children. It is for teaching, designing and making to ensure that pupils experience a range of tools and processes.

Parts list " Cockatoo"

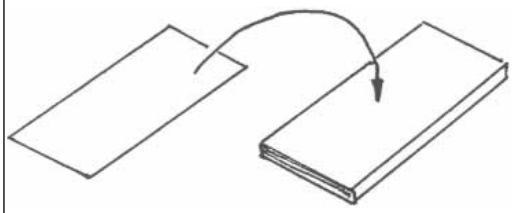
No.	Quantity	Deacription	Material	Size
1	1	Head	Plywood	200 x 70 x 5
2	2	Beak,lower part	Plywood	100 x 30 x 5
3	1	Head spring	Foam sheet	60 x 60 x 2
4				
5	1	Hand grip	Pine strip	300 x 20 x 10
6	1	Bearing block	Pine strip	25 x 20 x 10
7	1	Syringe	Plastic	5 ml
8	1	Syringe	Plastic	10 ml
9	1	Tube	PVC trans	1000 x 6 x 4
10	1	Holder	Spring clip	Ø 14 - 17 mm
Fixings				
11	2	Nails	Steel	15 mm
12	1	Domed screws	Steel	3 x 30
13	1	Domed screws	Steel	2,0 x12
14	1	Nuts	Steel	M4
15	1	Machine screws	Steel	M 3 x 40
16	1	Machine screws	Steel	M 3 x 20
17	6	Nuts	Steel	M3
18	2	Washer	Steel	M3
19	2	Washer	Steel	M5
20	1	Rubber ring		Ø 15

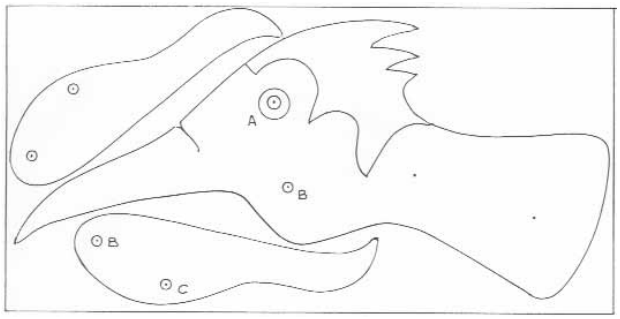
Note:

The pack contains different parts for the Cockatoo and Grip arm
For this reason the parts list for each model is different

Instructions

1. Transfer the stencil (page 12) on to the plywood sheet (1)



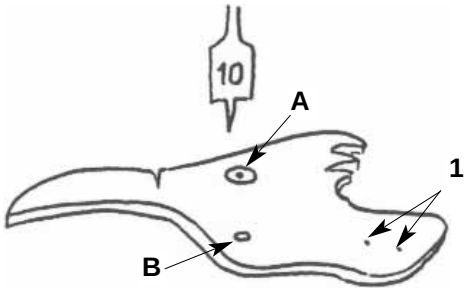


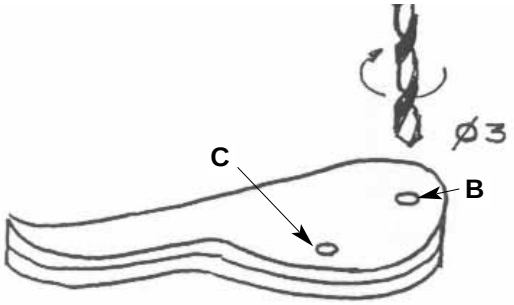
2. Saw around the shapes and sand the edges.

3 Drill the holes in the parts as follows:-

-Head	Eye	A:	10 and 5mm dia
	Pivot	B:	3mm da
-Beak (lower)	Pivot	B:	3mm dia
	Syringe pivot	C:	3mm dia

TIP: Tape the two lower beak parts together and drill holes B and C through both pieces of wood in one go.

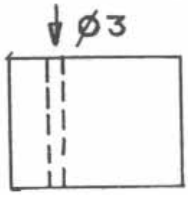


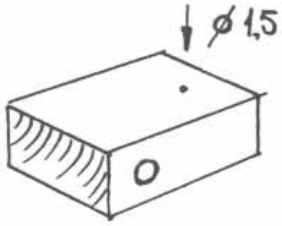


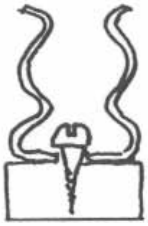
4. Glue and nail (11) the head on to the end of the hand grip arm (5)

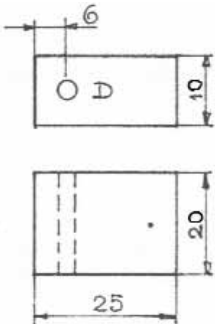
5. Cut a piece (6) for the bearing block , 25mm long, from the end of the pine strip (5) and sand the ends

6. Drill the bearing block as shown (3mm dia (hole D) and 1,5mm dia)
Fit the spring clip (10) using the screw (13) in the hole 1.5mm dia



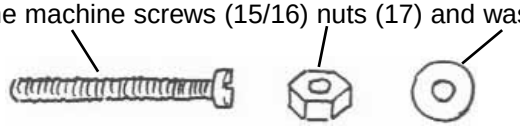


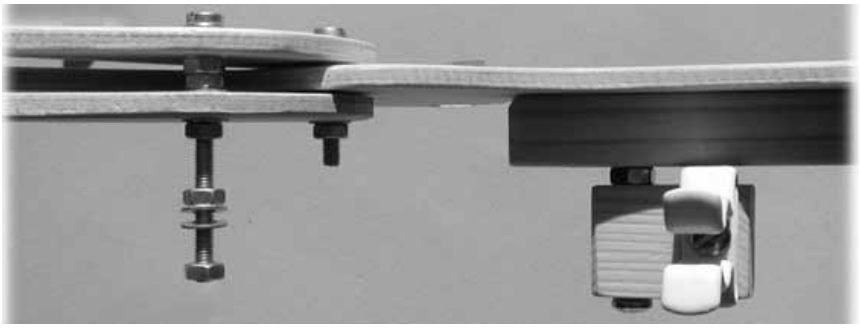




7. Colour /stain all the parts to your own design. The head feathers can be cut from coloured modelling foam (See stencil) and glued either side of the head.

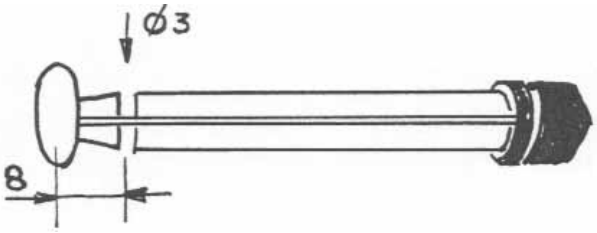
8. Attach the lower jaw to the head using the machine screws (15/16) nuts (17) and washers (18) as shown so that it can move freely.





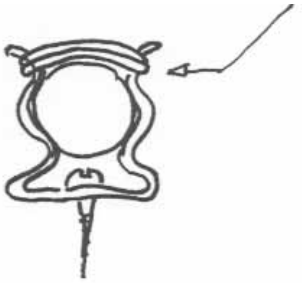
9. Fit the bearing block (6) using the screws (12) and nuts (14) (see page 3,under the handgrip behind the head)

10. Drill a 3mm hole through the plunger of the syringe (8mm down from the top)

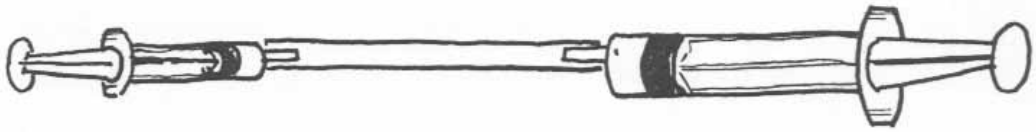


11. Re-assemble the syringe and place it in the holder (see page 3)

12. Hold the syringe in the holder with an elastic band over the hooks on the spring clip



13. Cut a 20cm length from the transparent PVC tube and connect the two syringes as shown

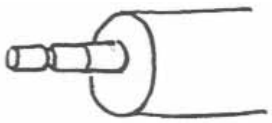


14. Tape the large syringe (8) to the bottom of the hand grip
The model will now work pneumatically

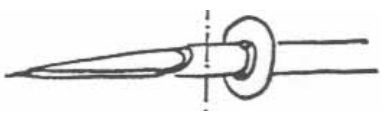
How can the system be made Hydraulic ?
How are the syringes and tubes filled with liquid ?

15. To do this use the remaining PVC tube (5) and two washers (19)

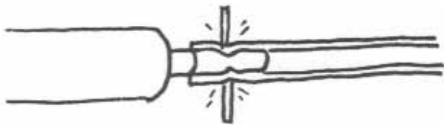
16. Use a needle fie to make a slot in either end of each syringe



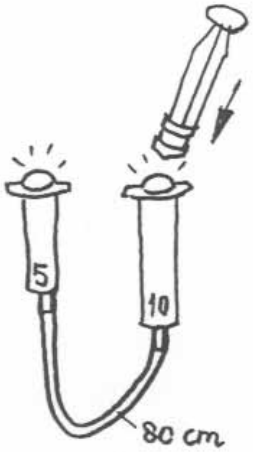
17. Cut each end of the PVC tube at a sharp angle and slide a washer on either end
This is not quite so easy but the point will help. Finally square off the ends of the tube



18. Now push the tube on the end of the syringe until the washer locates tin the slot



19 Fill up the syringes and tube with water until it forms a “raised “ droplet just over the top of each syringe. Firstly insert the plunger in the 10mm (larger) syringe halfway and then in the 5mm syringe, thus ensuring a system without air bubbles



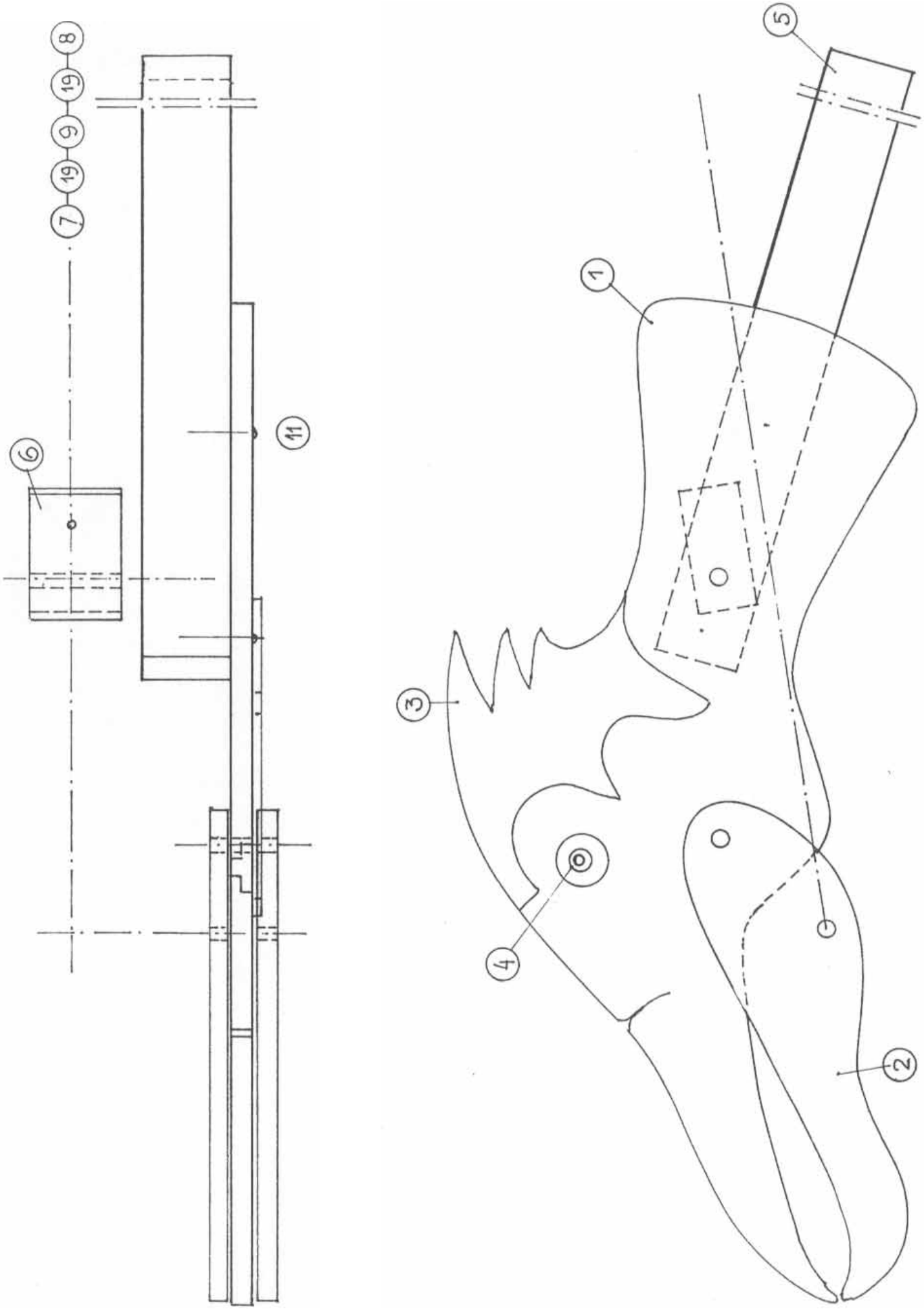
20 Fit the syringes as shown in steps11,12 and 14

Parts list “Grip arm hand”

No.	Quantity	Deacription	Material	Size
1	1	Finger	Plywood	200 x 100 x 5
2	2	Distance tube	Dowel	Ø 15 x 18
3	1	Finger nails	Foam	60 x 60 x 2
4	1	Grip handle	Pine strip	300 x 20 x 10
5	1	Thumb bearing	Pine strip	60 x 20 x 10
6	1	Bearing block	Pine strip	25 x 20 x10
7	1	Syringe	Plastic	5 ml
8	1	Syringe	Plastic	10 ml
9	1	Tube	PVC transp	1000 x 6 x 4
10	1	Holder	Spring steel	Ø 14 - 17 mm
Fixings				
11	1	Threaded rod	Steel	M 3 x 80
12	1	Screws	Steel	3 x 30
13	1	Screws	Steel	2 x12
14	2	Nuts	Steel	M4
15	1	Machine screw	Steel	M 3 x 40
16	1	Machine screw	Steel	M 3 x 20
17	2	Nuts	Steel	M3
18	2	Domed nut	Steel	M3
19	2	Washer	Steel	M4
20	2	Washer	Steel	M5
21	1	Elastic band		Ø 15

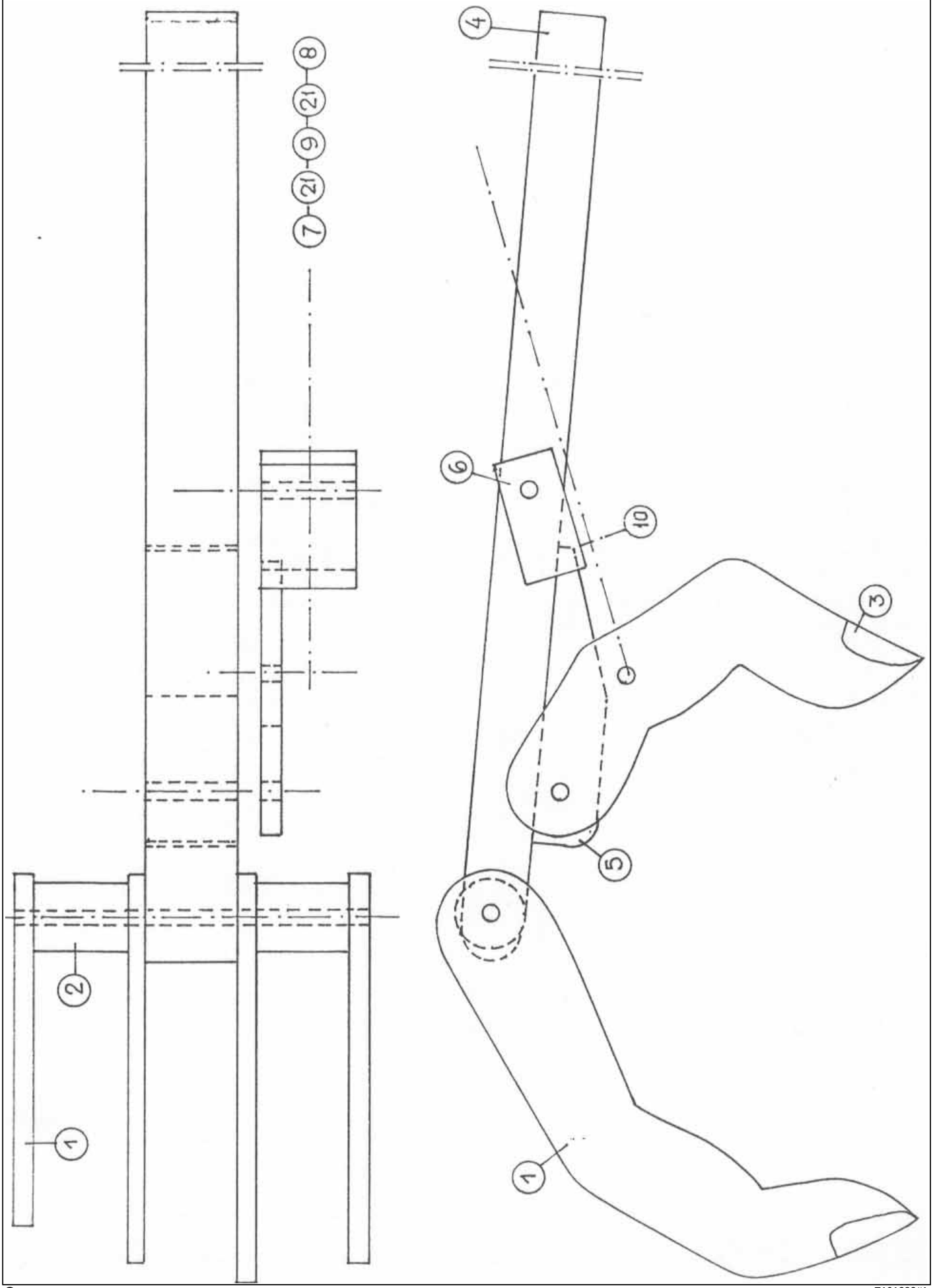
Cockatoo

Scale 1: 1



Grip arm hand

Scale 1: 1



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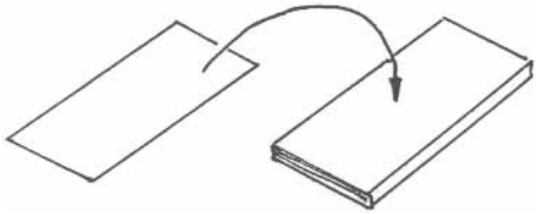
Instructions

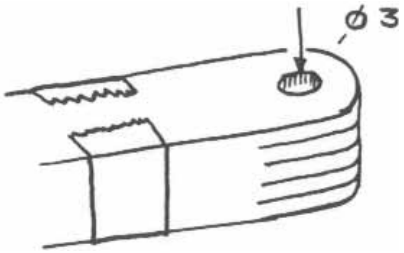
1 Trace the stencil (page 11) on to the plywood (1)



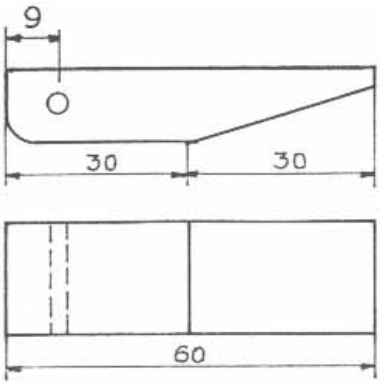
2 Saw out the parts and sand the edges

3 Drill the 3mm holes in the rounded ends of the fingers (see stencil 1)

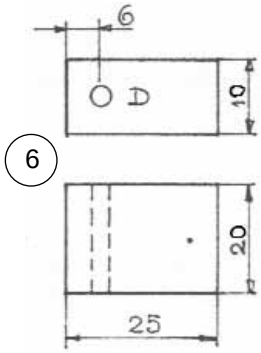
Tip: The best way is to lay the fingers on top of each (taped together) and drill them all in one go



4. The thumb bearing block (5) and bearing (6) are sawn from the pine strip 10 x 20 x 100mm

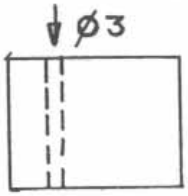


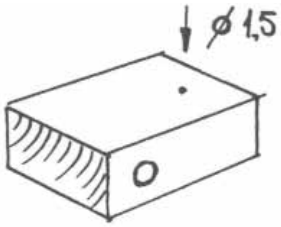
5



6

5. Angle the thumb holder (5) as shown round the ends and drill (3mm dia) Finally glue the thumb (5) on one end of the grip 25mm from the end (see page 8)



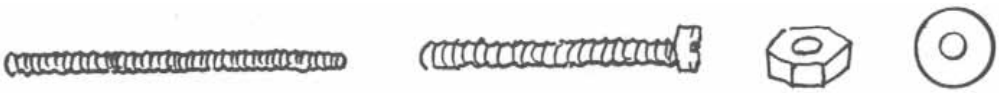


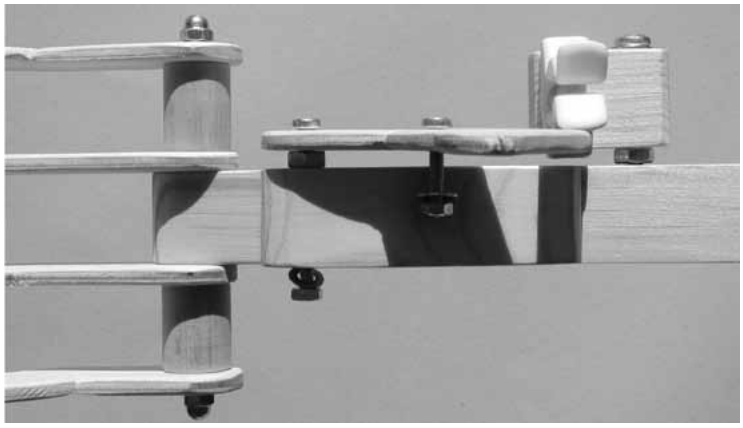
6. 6. Drill the bearing block holes (3mm dia and 1.5mm) fix the spring clip (10) using the screw (13) in the 1.5mm hole

7. Saw two pieces each 18 long from the dowel (2) sand the ends. Drill these distance pieces (2) 3mm dia through the middle (see diagram 8)

8. Make the finger nails out of foam modelling sheet
Finish by colouring the parts

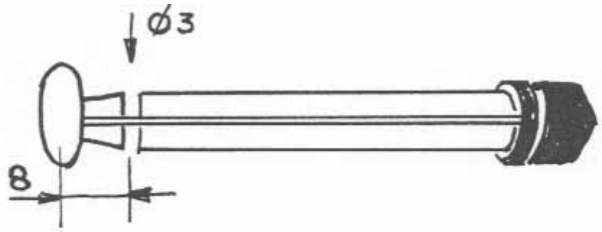
9 Follow the diagram (page 8) to make up spacers on the fingers using the threaded rod and fix with domed nuts.





10 Fit bearing block (6) with the machine screw (12) and nut (14) (see diagram 8) to the handle 5mm from the end

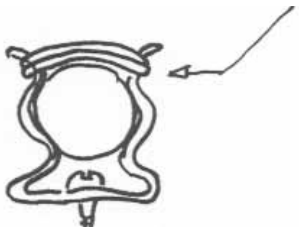
11 Drill a 3mm dia hole in the plunger of the syringe , 8mm from the end



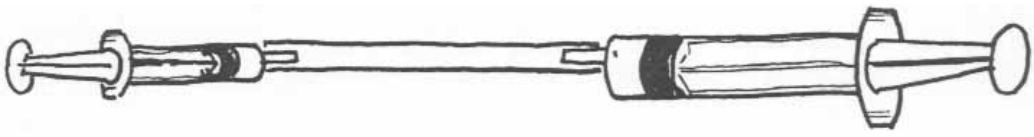
12 Cut across the head of the plunger at 90 degrees to the hole

13 Re-assemble the syringe (see page 8) and fix the it to the thumb (so that it can move)

14 Place the syringe in a spring clip and hold with an elastic band (20)



15 Cut a 20cm length from the PVC tube and join the syringes together

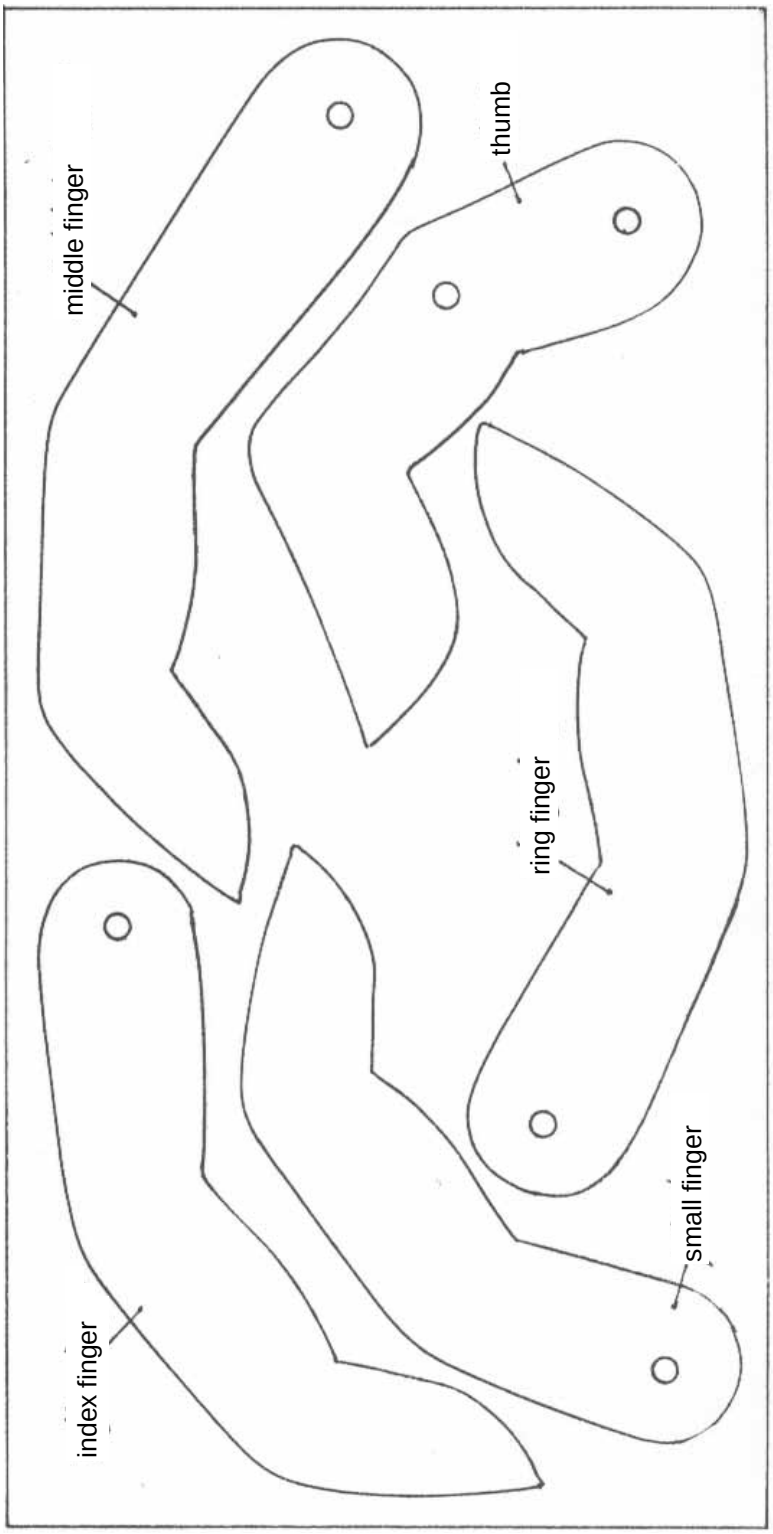


16 Tape the larger syringe (8) to the end to the end of the handle

Now you have a functional pneumatic model
If you want an hydraulic version repeat steps 15-20 in the other model (Cockatoo)

Grip arm hand

Scale 1: 1



Cockatoo

Scale 1: 1