

DISAPPEARING PROPELLER BOAT

RESTORATION LOG

BUILT: PORT CARLING  
1926

STYLE: WATERFORD

SER NO.: 3757

Dennis Howchin  
June 1986

January 20, 1984

Disappearing Propeller Boat

Restoration

1. Strip paint/varnish, grease from all components. Spray/brush paint all parts with aluminum, black engine paint or 50/50 polyurethane/turpentine. All brass parts required tarnish removal with AL<sub>2</sub> cleaner or Brasso.
2. Piston pin bushing drilled out and replaced. Connecting rod bearing clearance reduced by flat emery sanding of the rod to cap mating faces. The top compression piston ring (one of three) was replaced with two half thickness rings. The piston bore was cross hatched to allow the new rings to seat. Ring gap was set at .015.
3. New shaft keys and coupling locking set screws were required.
4. The spark trip device was worn and gouged. The ceramic disc was machined flat. The spring loaded spark device was drilled out and a new bushing installed. A new insert was made and the spring replaced.
5. The carburetor was disassembled. The flow check valve seat was sanded smooth to prevent flooding. The float level was reset. A new set of gaskets were made and installed.
6. The muffler was stripped. All metal pipe connectors and all rubber hose was replaced. (The muffler drain was plugged.)
7. All engine gaskets were replaced (had to be made up).
8. Packing around the water pump plunger and the priming piston was replaced with new asbestos packing.

9. The main crank shaft grease lubrication system was modified to be done with local grease cups some time in the past. The original grease cups on the control panel were reconnected with copper tubing from the grease cups to the crankshaft lubrication ports (2).
10. The electrical wiring was replaced with #12 plastic coated. High voltage ignition wire was used from the coil to the spark plug. A 6V CTC battery is used as a power source.
11. The starter recoil mechanism was cleaned up. The clockwise and counter-clockwise impact pads were replaced with section of a hay bailer drive belt (reinforced rubber). The starter cable was replaced with steel airplane cable (1/4"). The handle was soldered to the cable.
12. The grease cups were cleaned out and the center pin removed. All control valves were cleaned up. The two electrical switches were disassembled and cleaned.
13. A stand was built to simulate the boat motor mount/control panel to test the motor. Extension hose was used to supply cooling water from a bucket to the water pump and back to the bucket from the muffler.

Note: The 'Butterfly valve' is a throttle on the engine intake from the carburetor. It is not normally adjusted. As such it should be tight. As a result no change was made to this valve.

THE ENGINE STARTS AND RUNS VERY WELL NOW

14. The drive shaft was removed, the prop taken off and the universal disassembled. The locking nuts on the prop had to be drilled out, the holes retapped and stainless steel bolts installed. The tightening bolt on the prop protector was drilled out and the hole tapped.

15. The actuator arm for the disappearing propeller and its associated hardware was cleaned up. New packing is required. The holding shoes appear to need new pads.
  
16. The drive shaft and universal need to be replaced with stainless steel.

Engine - Disappearing Propeller Boat Company

- Model E-1

- 3 HP

July 1, 1984

Disappearing Propeller Boat  
Restoration

1. Recently a book on Dispro's was located at the boat show. From that book, I was able to determine the boat was built at Port Carling during the last summer of 1926.

2. Considerable work was required on the Dispro mechanism. The housing was removed from the boat using a chain hoist to pull the housing free of hull. The housing was wirebrushed and stripped of scale and old paint.

The access cover to the propeller had been broken and replaced with an aluminum one. The pieces of the old cast cover were brazed together, ground and painted. The three gaskets on the access cover plates were replaced with rubber ones. A new gasket was required for the drive shaft seal housing.

3. The skeg was removed, cleaned up (it's all brass) and painted with 50% polyurethane, 50% turps. The bolt which tightens the skeg onto its actuating arm was rusted away. It was drilled out, tapped and replaced with a s.s. bolt.

4. The skeg actuating arm, which runs through the housing was removed, cleaned up, straightened and the threads 'chased'. Being brass the arm is very soft. It is the weakest point in the mechanism. In the old parts box two old bent arms were found. It appears the arm was replaced twice. If the skeg stuck or was tight, the arm would take the brunt of the punishment given to the actuating lever.

5. The two locking nuts were cleaned up by 'chasing' the threads. The shaft was an odd thread size and I was unable to locate that size tap or die. The steel pin on the packing holder had to be replaced.

July 1/84

6. New packing was installed on both sides of the actuating arm. The actuating level which has a wooden handle to operate the mechanism had been severely hammered at some point. The wooden handle was repaired and the actuating lever filed smooth.
7. The mechanism locking brake shoes had to be replaced. As brake shoes, 3/16" rubber sheet faced with cotton lantern wicks was used, it seems to work O.K.
8. On the hull all oarlocks and other fittings were removed. We have the wrong oars by the way. The oars are 7'-4" long and made of sitka spruce.
9. All seats and floor boards were removed. Two complete seat backs have been stripped including the engine cover. The rudder has been stripped. There are about 50 floor boards. Each was tagged for identification. Each floor board requires considerable work. It must be stripped then extensively sanded to remove rotted sections. On one section of floor boards, a group of 8 are not red cyprus. I haven't identified the wood yet. To date less than half of the floor boards are done. The floorboards take the worst punishment of all because people are always standing on them.

The wood is nearly all red cyprus. A supplier who carries red cyprus was located in Toronto. (There only appears to be one.)

10. A quick assessment was made of the hull. The hull appears basically solid, however, there is considerable surface rot on the keel and the runners. It does not appear to be too deep. Nowhere does the rot go right through. One plank is split and a 1/16" gap runs for a few feet three boards left of the keel near the motor. A few spots on the exterior of the hull have been stripped. It looks really good. It has the appearance similar to cedar.

Spar varnish has been purchased to paint the wood with. According to the book, 3 coats were originally applied.

July 1/84

Red cyprus is an oily wood and difficult to sand. The paper clogs up very quickly. The oil however is what impedes the rot and accounts for the wood lasting so long.

To strip the internal of the hull is impractical. It's not possible to get access to the hundreds of spaces between the ribs and the planks. I am looking into having the internal of the hull chemically stripped.

11. The bow light has been cleaned up. The red glass is missing and the brass divider between the red and green glass was broken. it was repaired using silver solder. This is the only way of fixing broken bronze castings. (Silver solder is \$75.00/lb.) 1926 was the first year this style of light was used on Dispro's. Apparently earlier 1926 boats had the old style Dispro light. This was also one of the first boats to use an aluminum rudder bar.
12. The book indicates these motors use a 7.5V battery. I am using a 6V battery and it seems to work well.

August 15, 1985

Disappearing Propeller Boat  
Restoration

1. All seats (4) and floor boards have been refinished and given 2 coats of Spar varnish. The seats and seat backs required varying degrees of refinishing. Many of the normal 'wear marks' were not removed. The floor boards ( 50) were individually finished. Because of the condition, it was necessary to use a planer to remove the top surface of each board 1/8". The reduction in thickness had a minimal weakening effect. Five floorboards were split and required repairing. (Each one was individually tagged to identify its location) one section appears to have a different type of wood, possibly spruce.
2. The hull exterior has been stripped by hand. Considerable sanding was required to remove pockets of rot and to smooth rough areas. All of the copper nail heads were individually polished with a small wire brush. Pieces of the lower oak keel are rotting and need replacing. Some of the reinforcing oak around the mechanism may need to be replaced. The stern skeg is in good shape. The bow skeg has rot. The rot was dug out, replaced with plastic wood and sanded down. I'm not satisfied with it, a piece of solid oak will be blended in instead.
3. The metal box strapping (like a canoe) requires replacing. It appears to be steel.
4. Internally, 1/3 of the boat was totally stripped by hand. A 'bulk' pass has been made, removed the majority of the varnish on rest of the boat. John Thompson's chemical bath method will be used for the rest of the boat. Internally, a number of ribs have rot. Some will have to be replaced at the split plank, a few of the ribs are broken. A suggestion by J. Thompson, below floorboards, uses only cuprenol (wood preservative) to protect the wood and do not varnish it.

August 15, 1985

5. Oars - I'm still not sure if I have the originals. The rings on the oars are the right size but not brass. There is no Dispro decals. The paint looks original and is the wrong colour.
6. The engine was disassembled again. This time, the copper water jacket removed and the cylinder casting cleaned and painted with engine enamel. It had 60 years build up of rust and sand. The flange on the end of the main crank was machined square to improve drive shaft alignment as suggested by Paul Doddington.
7. The two part drive shaft and the universal were replaced. The stainless steel 3/4" shafting came from a Hydro supplier (free) in Ajax. The universal is a 1/2" size opened up to 3/4". It is mild steel. I did all the machining and fitting of the shafting in the Pickering machine shop during the May 1985 strike. All miscellaneous parts (roll pins, allen screws) are stainless steel.
8. Since the copper water jacket is off, John will lend me a mandrel to remove all dents. He suggests not painting the copper jacket with 50-50 polyurethane since the heat will peel it off.
9. The mechanism is not yet complete. The best way appears to be sand blasting and the coating with silver epoxy paint. Otherwise mechanism is O.K.
10. The gas tank was removed and appears to be in good shape. The inside requires sealing.
11. My garage is now fully insulated, heated in winter and cooled by a power roof vent in summer

#### Schedule

All the bits and pieces are nearly complete. By Christmas, I hope to have the hull completed with at least the first few coats of varnish. This will give the spring to do the assembly and finishing touches.

August 15, 1985

Barring something major, DISPR #3757 will be in the water in the Spring of 1986, 60 years from the date she was built (summer 1926). I hope it floats!!!.

March 10, 1986

## Disappearing Propeller Boat

### Restoration

1. The interior of the hull was stripped using John Thomson's flow technique. It was done in one day. The temperature was 60°F to 70°F. The boat was located inside the garage with all doors open and the roof vent full on. It was messy, but it did a very effective job. Ten gallons of Cromac flow stripper was used. Considerable work was still required to remove the stuck material from behind each rib at each plank. A week before the flow stripping, I went over the hull interior with normal paint stripper. The purpose was to remove the bulk of the old varnish and crud. This again was effective and likely improved effectiveness of the flow stripper by reducing the quantity of old varnish in the system. The most effective use of the flow stripper was to remove the worst of the old varnish, stop, clean the equipment and do a final cleaning with clean stripper.

The equipment consisted of a sheet metal tray approximately 3' x 4' x 8", a filter screen, a pump connected to the tray discharge and a plastic hose to direct the stripper flow.

As a 'by the way', the garage floor required repainting and about 4' x 6' of the front lawn required replacing where I dumped some slightly contaminated water.

2. Stripping the hull was the easy part. The outside of the hull was done first. A few weeks of sanding, scraping and sanding was required to remove rotting wood and bring up a reasonable finish. Each of the copper nail heads was individually power wire brushed to polish them and to remove crud lodged around them. The work was done by hand and with an orbital sander (until it burned out) the keels and the wear strips were removed. Considerable time was required to clean the areas at the bow and stern where the planks are nailed to the stems.

After adequate sanding, two sealer coats of Spar varnish were applied. An area of approximately 3' x 6' around the device hole in the centre of the boat was not done. This area required considerable rework and repair for structural reasons.

The area varnished was that portion of the hull exterior which is most visible when the boat is in the water.

3. A most laborious job was the cleaning up of the hull interior. Close to two months was spent doing this. Each 3½" x 3" section between the ribs on each plank had to be sanded, scraped and sanded again. The area under each rib was sanded using strips of sandpaper stretched over a putty knife with the end blunted with tape. Considerable effort was required to bring each section back to the correct wood colouring.

To make the sanding easier, a Makita palm sander was used. Unfortunately any palm sander pad is too large for the area between the ribs. A new palm sander pad was purchased from the Makita factory in Whitby. The pad was cut down in size and adapted to the sander so it could be used between the ribs. A fair amount of time was spent cleaning the gunnels and the area around the gunnels.

After sanding, each area was scraped with a homemade furniture scraper to improve the finish. The area normally covered by floor boards was not done at this point. Only the area which shows was done. Putty filling most screw holes was chipped out, the screws tightened and the putty replaced.

Two 3" screws from the front seat support to the two motor supports were installed as suggested by P. Doddington. The splash rail, deck and gunnels were sanded and the rot removed. It was decided not to replace the outer gunnel runner even though it had a fair number of bumps and bruises. It was felt these gave the boat some character from the times it had been through.

Through this phase, I was continually faced with a decision on the amount of clean-up (60 yr. old condition vs new condition). What I ended up with was a compromise of restoring the original wood colouring along with maintaining some of wear marks indicative of the boat's 60 year age.

4. After putting sealing coat of Spar varnish on the hull interior above the floor board line, the under the floor board area was worked on. The area was scraped with a hand scraper. The objective was to remove any rot, get down to structurally sound wood. A number of ribs were found to be rotted, requiring replacement. After a good scraping, the area was soaked with two coats of wood preservative inside and outside the hull. This was in preparation for structural rebuilding.
5. The copper water jacket had been removed from the engine some time earlier. The brass dispro flash, which was soldered to the copper jacket was removed. Using a water jacket mandrel borrowed from J. Thomson, the water jacket was reconditioned. All dents were removed. This was a very arduous task requiring hours of tapping over a two week period. The lower flare is not back to its original condition because the mandrel was not 100% in this area.

The Dispro crest which is soldered to the copper jacket was originally raised brass with a black background. An attempt was made to repaint the black background but was unsuccessful. Eventually, black engine enamel was brushed over the crest and carefully wiped off. This does not return the crest to "as new" condition but does make the crest readable in a fashion commensurate with its age.

6. The motor was reassembled and placed on its stand. It was not run. The timing plunger was not sitting perpendicular to the spark wheel so the asbestos insulating washers were replaced to improve the plunger alignment. To keep the spark wheel lubricated, a felt swab soaked in oil was held in position against the wheel, using heavy copper wire.
7. After reassembly, the alignment of the drive shaft to the crankshaft was checked. During machining of the drive shaft, the flanges bolting the crankshaft to the drive shaft were machined square.

Three problems prevented the drive shaft from running true. To align the center lines of the two shafts, the flange locknuts had to be in the same orientation. Because of looseness in the flange holes, the flanges also had to be held concentric as the bolts were tightened.

The third problem was that even with the shaft centerlines lined up, the shaft still did not run true. The cause is that the flange on the end of the crankshaft is not perpendicular to the motor centerline. Likely what happened is that the crank is slightly bent. When the flange was machined it was therefore not square to the crank centerline. To correct for this, a .006" shim was placed between the flanges at the appropriate location. The drive shaft now runs true. No problem is anticipated from this slight bent in the crankshaft.

8. Wooden structural work was not required on the hull. Dried white oak was used from Unicorn specialty woods in Weston. Wood was for:
  - 1) Front stem insert
  - 2) Rear stem insert
  - 3) Split keel
  - 4) Two runners
  - 5) Device Bolt supports
  - 6) Ribs

The wood was approximately sized by cutting large planks.

The base of the front and rear stems had considerable rot, the stems were cut along the babbitt to minimize the appearance of an insert. Using a belt sander (with dust collection) the stem inserts were carved from a large piece of solid oak. The smaller rear stem insert took three tries because of odd angles required from the non-symmetrical original stem.

By the way, the boat serial number is stamped into the rear stem near the top of the stem. When it was stamped, the second number was inadvertently stamped upside down.

The large front stem insert only had to be done once.

9. In the area where the stem inserts were cut out, some rot was found. It was removed. The stem was still solid enough to support the nails holding the ends of the planks to the stems. Before the stem inserts were glued into place, this area was filled with teak coloured marine bedding compound to act as a filler. The stem inserts were glued into place using a marine epoxy - EP-88 held by brass screws. On the front stem at its thickest point, a 4" deep hole was required to install a brass holding screw. This required a special long drill bit. After drying, the stems were given their final shape.
10. The keels were cut to size, shaped and given two coats of wood preservative. Similarly the wear straps were cut, shaped and given two coats of wood preservative. They cannot be installed until replacement ribs have been installed.

The two device bolt support strips were removed and the area cleaned. Two new strips were shaped and installed. The strips were set in bedding compound to ensure a water tight seal in the area.

11. Airplane gas tank sealer was purchased from Levan Aircraft supplies to seal crud into the gas tank.

12. As reassembly begins, the importance of keeping track of all the bits and pieces becomes apparent.

### Schedule

By June/July 1986, the boat should be ready to go into the water. Some of the miscellaneous items will not be ready (eg, oars) however.

JUNE 86

DISAPPEARING PROPELLER BOAT RESTORATION

1. Ribs requiring replacing were located under floor boards and behind seats. The second rib from the stern was replaced. In the center section pieces of 10 ribs were added. In the motor compartment, two ribs were replaced to support the split plank. All ribs were boiled on the stove in the roasting pan and then clamped into the correct shape. The rib sections removed were quite rotten. The replacement ribs were scarfed to the original rib.
2. Ribs were installed originally using copper clout nails. As they were removed the nails were saved but some did break. I searched the province (by phone) but could not find copper clout nails. At a boat repair shop in Pickering, I got 30 square copper nails which could be used to replace the long copper clout nails. I also obtained some copper canoe nails but the heads were quite small. I ended up with just enough copper nails.
3. Three planks were split. One had a 3/16" gap under the motor. The splits were repaired using T-88 epoxy. For wide gaps, the T-88 was mixed with cyprus sawdust from the floor board sanding.
4. The device was painted with two coats of silver epoxy. This epoxy paint was only available from hobby shops. It is mainly used for models.

To bolt the device into the hull, iron carriage bolts were originally used. These were replaced (36) with stainless steel round head bolts.

For bedding compound, 'boat life' was used. Installing the device was a messy job.

5. A second coat of varnish was applied inside the hull to act as a filler. The inside was then resanded in preparation for final varnishing. This was a laborious job because of all the small areas of plank accessible between the ribs.
6. At this point, all the floor boards were re-installed. The bolts surrounding the device were individually removed and cut down. Brass screws 3/4" #8 were used. The original screws were #6. The larger size screws give better gripping in the old holes.

When removed, all floor boards were numbered. A few of the floor boards were in the wrong place from previous work. To clean up the old floor boards, material had to be removed. Consequently the gap between floor boards is wider than it was originally. Six of the floor boards in the rear section were belt sanded down to remove excessive marks. These floor boards were not cleaned up using the planner when the floor boards were done.

7. A few of the floor boards cracked during installation and had to be repaired. It is obvious the wood is all very dry. Final hull varnishing was done with the floor boards installed.
8. Upon installation in the boat, considerable motor to drive shaft misalignment was apparent. To correct the alignment, the following was done: 1) .009" shim in coupling flange, 2) washers under the motor and 3) filing the hole size in the main motor mount. Components were installed using CTC gasket sealer and teflon tape. The exhaust hose was a section of 1" rubber re-enforced hose held with an old style hose clamp.
9. <sup>ONLY</sup> One link of the old gas cap chain <sup>WAS THERE.</sup> I called a chain manufacturer who still makes it. He sent me a piece in the mail.
10. The floor boards did not look right, they were all taken out, rearranged and reinstalled much closer together. The engine seatback and hatch cover were stripped and resanded to remove extensive markings on the wood. These were the first two parts to be refinished two years ago. The front and back bow seat and back locks were repositioned to make all the parts fit tight.
11. A spring for the dashboard starting cord came from Paul Doddington. 5 Dispro decals came from P. Gockel. The long wooden paddle was sanded and varnished. It is still intact but has a weathered look. The following parts were painted black: dash spring, muffler bracket, brake shoes, pulleys, rudder rod.
12. The gas tank was cleaned-up, washed and sealed with two coats of sloss sealer. This product is normally used for sealing the inside of airplane gas tanks. The filter and pipework were cleaned up and reassembled. A new filter gasket had to be made up. New 1/4" copper tube was purchased for the long run. It was buffed and coated with polyurethane.
13. It was apparent the brass parts were not as shiny as they should be. All brass parts were disassembled and cleaned of the polyurethane coating (with acetone and wire bursh) buffing wheels and two grades of buffing compound were purchased from a supplier to jewellery stores (for buffing jewellery). Everything comes up well but it does need periodic buffing.
14. The boat was turned over and a 1/16" slot was made between each plank below the water line. Each joint was masked, then filled with a sealing compound (231). A final coat of varnish was then applied to the outside of the hull. Brass half round was drilled and installed around the bow. The original brass piece was re-installed at the stern.

15. The spark control lever required a sliding pin. This was made using 1/4" brass rod held with a ball point spring. Decals were installed on the front deck and the two oarlock blocks. Cotton rope is used at the bow. Cotton sashcord (30') is used for the steering rope.
16. Two dippy oars were purchased for the boat at the 1986 Gravenhurst Opera House auction. The oars are 5" too long but are quite suitable.
17. A 6V Duracell battery along with the old coil were installed. Temporary wire was installed since original replacement wire was not available. The light is not wired yet.
18. The green lens for the bow light is broken. A plaster mould was made of the red lens. Green tinted epoxy was used to form a new green lens.
19. The trailer required all new wheel bearings, lights and special support yokes. The yokes are located to support the boat at the main bulk heads.
20. May 30, 1986 the boat was launched at the cottage for water proving. The wooden trailer yokes caused the trailer to float causing difficulty launching. After trouble starting, we went for a 1/2 hour ride at half throttle. The boat would not run continuously after that. A new set of rings were purchased from P. Doddington and a number of suggestions received. For the weekend, we rowed around with the new oars. They are great!. Upon disassembly of the engine, the following deficiencies were found:
  - 1) The wrist pin had been installed on an angle.
  - 2) The babbitt on the connecting rod bushing had been worn uneven.
  - 3) The connecting rod was backwards.
  - 4) The thrust bearing and flange were incorrectly installed.
  - 5) The carerator leaked and the float looked 'gas-logged'. Coat float in urethane
  - 6) The spark disc was not properly shimmed on the flywheel to minimize plunger motion.
  - 7) The battery (Duracell 6V lantern) would give out after a few hours running. Larger size required.
  - 8) The vibrator coil capacitors were likely dried out and drawing excess current damaging the ignition system. It must be checked.
  - 9) The flange positioning the thrust bearing needs to be dimpled to the shaft.
  - 10) The starting ratched needs to be dimpled to the shaft.
  - 11) Oil to gas ratio to be increased for engine break-in

21. A visit to P. Doddington on June 3 identified a number of the previous items. He straightened the wrist pin by plugging the hole with bronze and reboring the wrist pin hole. He is also installing and pinning the four new piston rings.

A rear deck cleat, 4 bumper hangers and a flag was purchased from Paul. The AL<sub>2</sub> casting on the rudder used to hold the flag pole requires bushing to hold the flag pole correctly in line with the rear stem post. Epoxy or resin in the casting should give the correct pole support. Flag poles are individually made by turning oak on a lathe to the correct shape. Poles are 14½" long. The flag is the red ensign 9" x 18". The flag is lashed to the pole.

22. Upon reassembly the engine was found to be 100%. The boat was water tested at Lake Scugog and Lake Ontario and found to be GREAT. The only minor problem was leakage around the rear stem post with excess weight in the rear. The problem is not serious however.
23. Excess drive train vibration was corrected by alignment with two dial indicators and a general tightening of all mechanical components.
24. A new flag pole was turned on a wood lathe from white oak used for the keel.