Experiment with holography and holographic interferometry
887476

Begin by pumping up the support inner-tubes so that the heavy table floats free. Close all double-window blackout curtains.

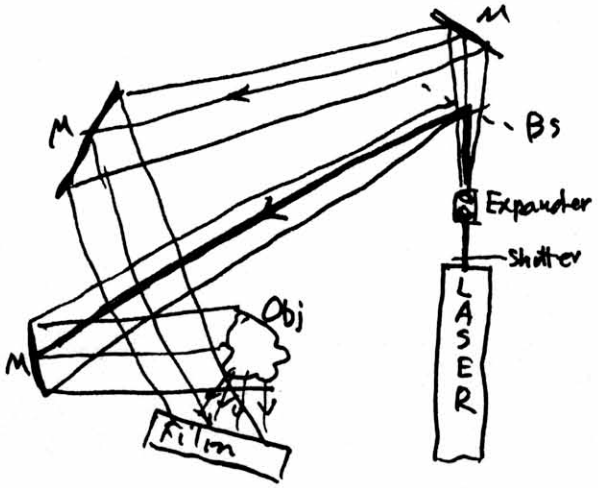
Remember you are basically doing interferometry where a $\lambda/4$ perturbation can "wash out" fringes. Let room air calm down, standing well back for a couple of minutes with your "100 watt body" before exposures. Don't lean on table or move about during exposure. (Think of the air currents you saw in the schlieren experiment.)

You need a box with four holographic plates packed in pairs with emulsion sides out in each pair. (First inspect an empty box and practice with it.) Remember where things are in order to find them later in the dark.

When all is ready to go, in complete darkness remove one at a time and immediately close box. Keep track of emulsion side in all this, and then mount on holo table for the exposure. Turn on 5 mw laser with the shutter closed; block beam with card (waving card avoids vibration of touching shutter); open shutter; wave card out of beam, then back, for chosen time -- 5 sec as a starter. Then turn off laser and take plate into dark room.

Your set-up should make the total reference path and object path to the screen alike within about one laser length (roughly the coherence length). Use a microscope objective to broaden the beam. The beamsplitter should transmit the reference, usually in the least-transmitting of the several beamsplitter choices. (Reflecting the reference, instead, the splitter in its least reflecting choice would have been just glass giving two equal reflections which will mess up the hologram).

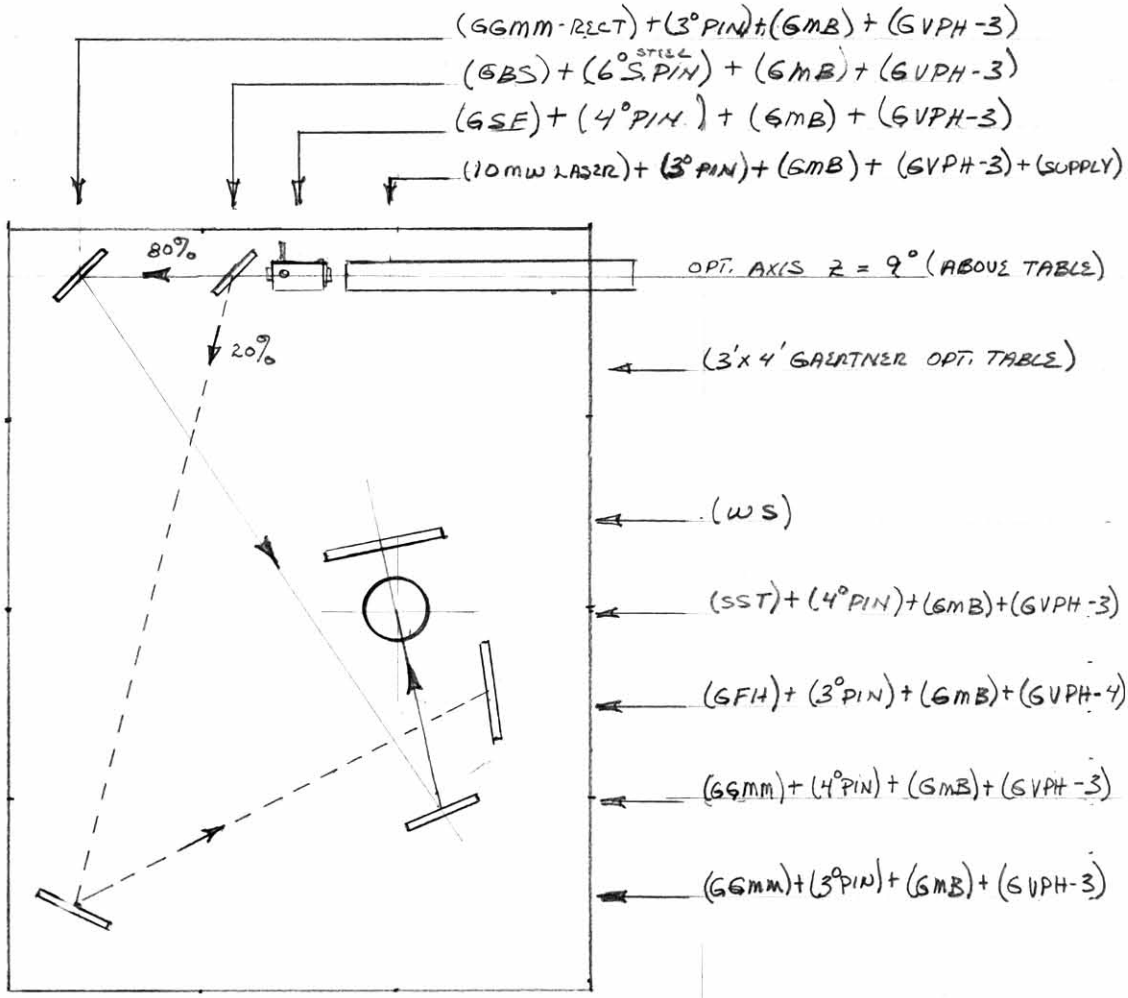
The most-reflecting choice will then go on to illuminate the object (which needs a lot more of the light).



SPRING 94

(5-11-94)

HOLOGRAPHY (3'x4' TABLE) [2-BEAM TRANSMISSION]



NOTES

1. (GMB) + (GVPH-3) = (GAERTNER MAGNETIC BASE) + (GAERTNER VERTICAL POST HOLDER - 3 7/16" HIGH)
2. (GBS) = (GAERTNER BEAM SPLITTER / ~3½" OD / VARIABLE 0-8 { 0 ≈ 100% T ; 0% R ; 8 ≈ 20% T ; 80% R })
3. (GSF) = (GAERTNER SPATIAL FILTER / CAN USE WITH OR WITHOUT (LESS DIFFICULT) PINHOLE
4. (GGMM) = (GAERTNER GIMBEL MOUNT MIRROR / 2 = 3" OD / 1 = 2"x3")
5. (SST) = (STAINLESS STEEL TABLE / 4" OD x ½" THICK)
6. (GFH) = (GAERTNER 0.060" x 4" x 5" GLASS HOLOGRAPHIC FILM HOLDER)
7. (WS) = (WHITE SCREEN - NEUTRAL BACKGROUND)

8. INFLATE TABLE TIRES (VIBRATION ISOLATION)
9. COULD REPLACE (GSF) W/ 60X OBJECTIVE W/ OBJ. RING MOUNT
10. BEAMSPLITTER SETING = #2 (⇒ 20% = REF. BEAM ; 80% = OBJECT BEAM)
11. EXPOSURE: 2-3 SEC W/ 10 MW LASER.
12. HOLOGRAPHIC PLATE: EMULSION SIDE NEAREST OBJECT
13. SHUTTER: 3x5 INDEX CARD / BLACK CLOTH COVER [BEFORE / AFTER EXPOSURE TRANSPORT TO DARKROOM]
14. TOTAL REFERENCE PATH = TOTAL OBJECT PATH ± (1) LASER LENGTH. [INSURES BOTH BEAMS COHERENT @ OBJECT]