Test Assembly of the CAT

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A preliminary report on the Coudé Auxiliary Telescope for the 3.6 m telescope coudé spectrograph was given in Messenger *No. 10 by Dr. Torben Andersen, ESO engineer in Geneva. Good progress has been made and the following summary, also by Dr. Andersen, indicates that the CAT will start observations on La Silla in a little more than one year from now.*

The CAT telescope has been designed by ESO TP in Geneva, but the fabrication of the telescope is to a large extent carried out by European industry. The manufacturing stage is now nearing completion and the telescope is being test assembled in Geneva.

CAT Mechanics

The contract for the manufacture of the CAT mechanics was awarded to the German company MAN in January 1978. During the spring of 1978 detail drawings were elaborated by MAN. The large pieces were welded in the period July to September. In October the main mirror cell was finished and shipped to the optics contractor in England.

In November 1978 to January 1979 the large pieces were machined at MAN who has considerable experience in the machining of large telescope parts. This experience, combined with the availability of large and exact machine tools, made very precise machining possible. The bores of the main axes of the telescope were machined together without altering the setting of the machine or the part being machined. Figure 1 shows the machining of the pedestal.

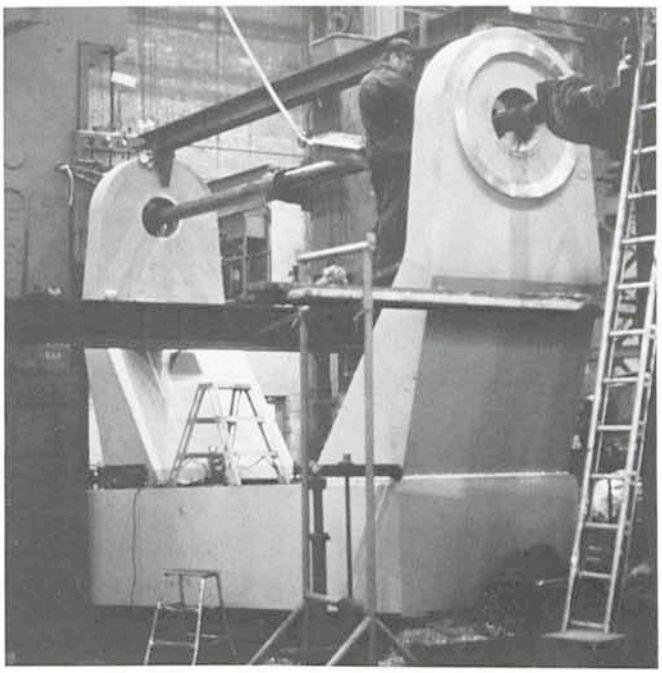

Fig. 1.

In January all pieces were finished at MAN and a partial assembly was made. The telescope was transported to Geneva by the end of January 1979.

The assembly began early in February, and in the middle of February (when this is being written) most of the telescope was assembled. Figure 2 shows the installation of the centre section. The assembly is expected to be finished according to schedule by the end of February.

Mirror Handling Equipment

Certain equipment is needed for the mirror handling and maintenance of the CAT telescope. This equipment was designed in the second half of 1978 and a contract for the manufacture awarded to the company F. G. Nielsens Eftf. in Denmark. The fabrication is reported to be making good progress and delivery will take place by the end of March 1979.

Optics

The optics contract was awarded to Grubb Parsons in March 1978, and the main mirror is nearing completion. The grind-

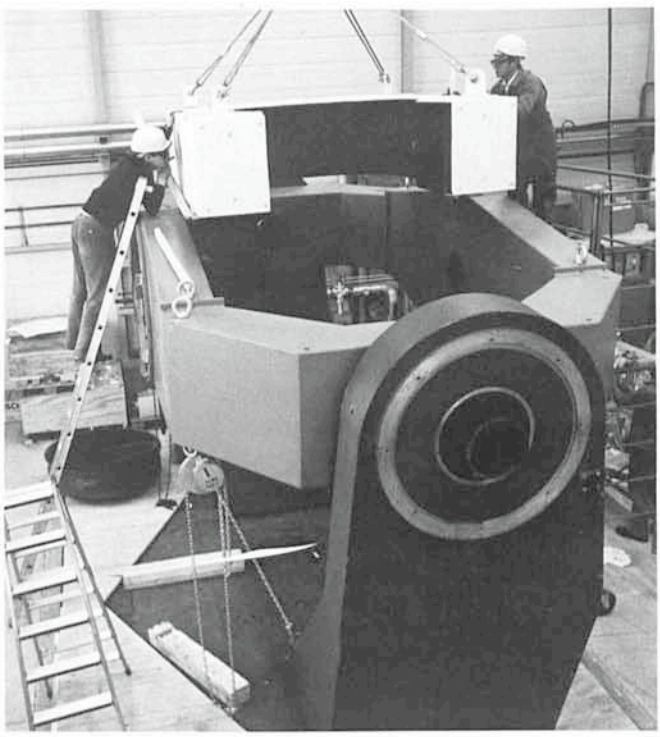

Fig. 2.

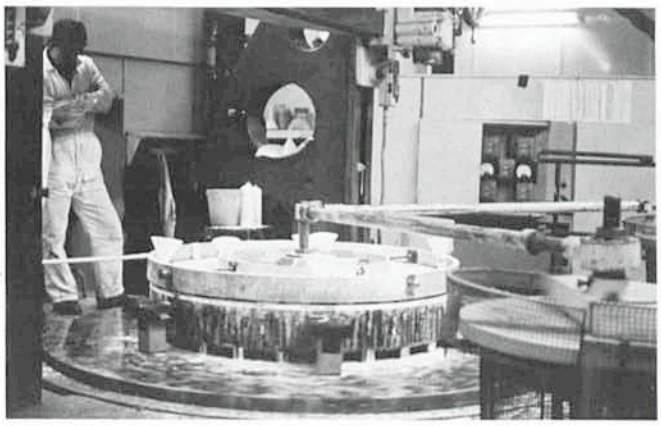

Fig. 3.

ing phase of aspherizing was finished in January and figuring is now proceeding (fig. 3). Acceptance tests will be carried out this spring.

Electronics and Software

The design work is complete. All major rack units have been manufactured and are currently being tested and installed. Only the telescope console requires further work but will be ready for the final installation in Chile. Preparation of the cables is now complete and the running of the telescope cables is expected to be finished by the end of March 1979.

The software is currently being written and all software necessary to implement the servoloops and to move the telescope will be ready for the tests this spring.

Time Schedule

It is foreseen that tests in Geneva will end in June and the telescope will thereafter be shipped to La Silla. Erection and installation is planned for the end of the year with a considerable part of the auxiliary mechanics having been installed by ESO-Chile during the summer of 1979. Optical alignment and tests will take place early in 1980 and regular operation could start around April 1980.

Probable Optical Identification of LMC X-2

During the last year enormous progress has been achieved in the optical identification of X-ray sources. With the X-ray satellites SAS-3 and HEAO-1 positions with an accuracy of 10″ have been determined, and even more precise results will be obtained with the recently launched Einstein-Observatory (HEAO-B).

Accordingly, astronomers have been pointing the "big" telescopes of the 3–5 m class towards the unidentified X-ray sources and in many cases only a few faint stars remain to be investigated as possible optical counterparts.

Accurate positions for the X-ray sources in the Large Magellanic Cloud (LMC) have recently been measured by Johnston *et. al.* (1978, *Astrophys. J.*, L 59) with HEAO-1. So far, only LMC X-4 has been optically identified (cf. *Messenger* No. 9, p. 4). Two early-type stars, R 148 and a 17-mag B star, have been proposed earlier to be the optical counterparts for LMC X-1 and LMC X-3, respectively, from the less precise positions obtained from the UHURU and COPERNICUS satellites. The recent HEAO-1 results confirm their association with the corresponding X-ray sources.

Thus, we are left with LMC X-2, the second of the bright X-ray emitters in the LMC. Shortly after its discovery the B3 supergiant R 96 was proposed as the most likely counterpart. Since then various astronomers, including the author, have searched for ellipsoidal variability as seen in most massive X-ray binaries. However, HEAO-1 now tells us to forget about R 96 as the optical counterpart of LMC X-2. The new error box only includes a few inconspicuous stars fainter than about 18 mag. Fortunately, several ESO Schmidt plates in the U, B and V bands, covering the LMC X-2 field, were available in Geneva.

As can be readily seen from figures 1 and 2 the star marked E appears quite faint in the visual; on the ultraviolet plate, however, it looks rather conspicuous. Inspection of several U-plates taken a few weeks apart also suggest that star E is slightly variable.

In January the author was scheduled on the 3.6 m telescope equipped with the Image Dissector Scanner (IDS). In collaboration with ESO astronomers Drs. J. Lub, H. Pedersen, J. P. Swings and M. Tarenghi several spectra could be secured, which turned out to be not an easy task as the nearby star just to the east of star E had to be excluded. Integration times of two hours were necessary to obtain a reasonable signal-to-noise ratio. However, our efforts were rewarded as the spectra revealed the presence of Hα, He II λ 4686 and possibly C III-N III λλ 4640-4650 emission lines, the hallmarks of optical counterparts of X-ray binaries!

The Nature of LMC X-2

The faintness of star E ($V \approx 18.5$) rules out a massive X-ray binary system with an OB giant or supergiant optical primary as we observe for LMC X-4.

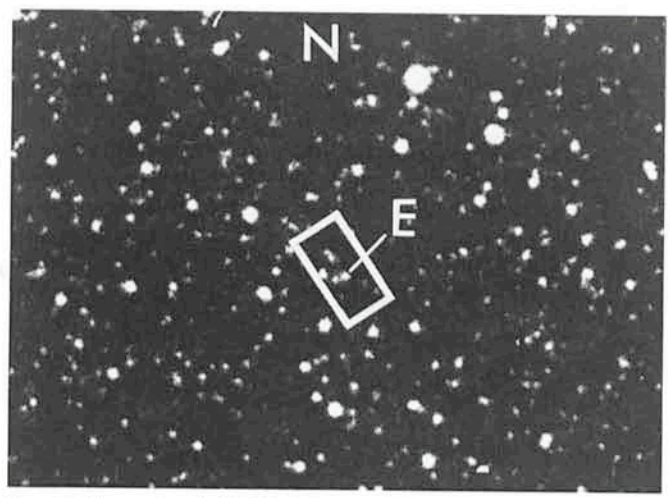

Fig. 1: *The refined HEAO-1 error box (24″ x 36″) for LMC X-2 superimposed on a print of a visual (V-band) ESO Schmidt plate. Star E is the proposed optical counterpart.*

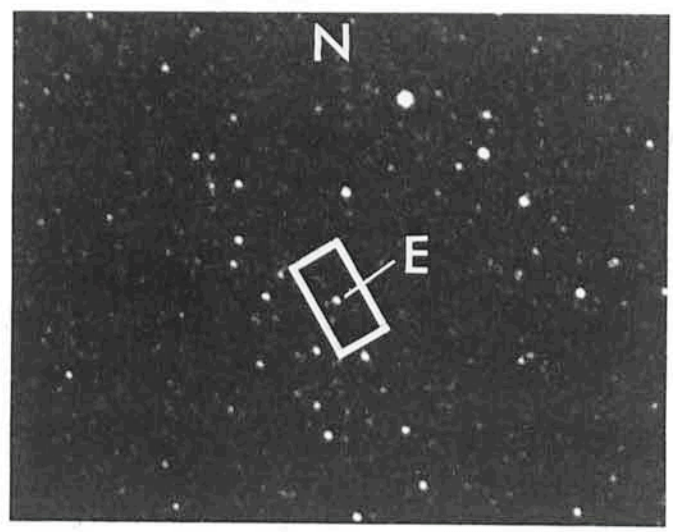

Fig. 2: *Print of an ultraviolet (U-band) ESO Schmidt plate.*