

AD-A198 884

EQUIPMENT TO UPGRADE THE FACILITIES OF THE IIT  
(ILLINOIS INSTITUTE OF TEC. (U) ILLINOIS INST OF TECH  
CHICAGO FLUID DYNAMICS RESEARCH CENTER.

1/1

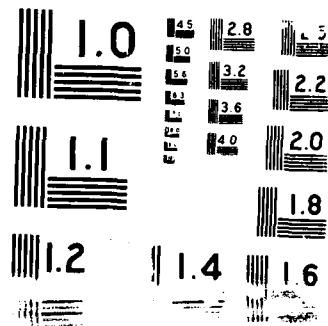
UNCLASSIFIED

J L WAY ET AL. JUN 88 AFOSR-TR-88-0742

F/G 14/2

NL





2

AFOSR-TR- 88 - 0742

TITLE: EQUIPMENT TO UPGRADE THE FACILITIES OF  
THE FLUID DYNAMICS RESEARCH CENTER

DTIC FILE COPY

FINAL TECHNICAL REPORT

AFOSR Grant 87-0038

PRINCIPAL INVESTIGATOR: John L. Way

INVESTIGATORS: David Williams, Thomas Corke

Hassan Nagib and Mukund Acharya

JUNE 1988

DTIC  
ELECTE  
AUG 15 1988  
S D  
E

Illinois Institute of Technology  
Mechanical and Aerospace Engineering Department  
Fluid Dynamics Research Center  
Chicago, Illinois

This document has been approved  
for public release and may be  
distributed in unlimited quantities.

88 2

AD-A198 084

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

## REPORT DOCUMENTATION PAGE

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |          |                                                                                                                |  |                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|----------------------------------------------------------------------------------------------------------------|--|--------------------------------|
| 1a. REPORT SECURITY CLASSIFICATION<br>Unclassified                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |          | 1b. RESTRICTIVE MARKINGS                                                                                       |  |                                |
| 2a. SECURITY CLASSIFICATION AUTHORITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |          | 3. DISTRIBUTION/AVAILABILITY OF REPORT<br><br>Approved for public release,<br>Unlimited distribution unlimited |  |                                |
| 2b. DECLASSIFICATION/DOWNGRADING SCHEDULE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |          | 4. PERFORMING ORGANIZATION REPORT NUMBER(S)                                                                    |  |                                |
| 5. MONITORING ORGANIZATION REPORT NUMBER(S)<br><b>AFOSR-TR- 88 - 0742</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |          | 6a. NAME OF PERFORMING ORGANIZATION<br>Illinois Institute of Technology                                        |  |                                |
| 6b. OFFICE SYMBOL<br>(If applicable)<br>IIT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |          | 7a. NAME OF MONITORING ORGANIZATION<br>AFOSR                                                                   |  |                                |
| 6c. ADDRESS (City, State and ZIP Code)<br>MAE Dept. and FDRC<br>10W. 32nd St.<br>Chicago, IL 60616                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |          | 7b. ADDRESS (City, State and ZIP Code)<br>AFOSR/NA<br>Bolling Air Force Base<br>Washington, D. C. 20332-6448   |  |                                |
| 8a. NAME OF FUNDING/SPONSORING ORGANIZATION<br>AFOSR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |          | 8b. OFFICE SYMBOL<br>(If applicable)<br>NA                                                                     |  |                                |
| 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER<br>AFOSR-87-0038                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |          | 10. SOURCE OF FUNDING NOS.                                                                                     |  |                                |
| 11. TITLE (Include Security Classification) Equipment to Upgrade the Facilities of the IIT Fluid Dynamics Research Center (Unclassified)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |          | 12. PERSONAL AUTHOR(S)<br>J. Way, D. Williams, T. Corke, H. Nagib, and M. Acharya                              |  |                                |
| 13a. TYPE OF REPORT<br>Final Technical                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |          | 13b. TIME COVERED<br>FROM Oct 86 To Oct 87                                                                     |  |                                |
| 14. DATE OF REPORT (Yr., Mo., Day)<br>1988 June                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |          | 15. PAGE COUNT<br>3                                                                                            |  |                                |
| 16. SUPPLEMENTARY NOTATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |          |                                                                                                                |  |                                |
| 17. COSATI CODES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |          | 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)                              |  |                                |
| FIELD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | GROUP | SUB. GR. | Laser Doppler Anemometry; Data Acquisition; etc.                                                               |  |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |          |                                                                                                                |  |                                |
| 19. ABSTRACT (Continue on reverse if necessary and identify by block number)<br>We are currently approaching the completion of the National Diagnostic Facility at IIT. The facility is based on a computer-controlled wind tunnel with a test section 4 ft. high, 5 ft. wide and 36 ft. long exhibiting very high quality flow conditions under both constant and oscillating free-stream velocity conditions. The funding of this facility was initiated under a 1983 DOD University Research Instrumentation Program (AFOSR-Grant-83-0339). A key aspect of the wind tunnel design is the manner in which heat energy produced by fan inefficiencies, is removed from the recirculating tunnel air. This involves the first use of turning vanes which also act as heat transfer elements. The system is sized to allow continuous operation of the wind tunnel at speeds of 250 fps, which is 2.5 times those of common university wind tunnels, and two hours of operation at the maximum tunnel velocity of 550 fps. This new and unique facility will be dedicated to basic research at near-flight Reynolds numbers, thereby, aiding in the design of the next generation of aircraft. The equipment acquired under this Grant has made many of these objectives become realities. |       |          |                                                                                                                |  |                                |
| 20. DISTRIBUTION/AVAILABILITY OF ABSTRACT<br>UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |          | 21. ABSTRACT SECURITY CLASSIFICATION<br>Unclassified                                                           |  |                                |
| 22a. NAME OF RESPONSIBLE INDIVIDUAL<br>Dr. James McMichael                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |          | 22b. TELEPHONE NUMBER<br>(Include Area Code)<br>(202) 767-4936                                                 |  | 22c. OFFICE SYMBOL<br>AFOSR/NA |

The purpose of this grant was the acquisition of equipment to upgrade the effectiveness of some of the facilities of the Fluid Dynamics Research Center at I.I.T. Equipment expenditures were requested and made in four categories:

- (1) Scanning LDA Components
- (2) General Laboratory Electronic Equipment
- (3) Data Acquisition, Processing, and Control Workstations
- (4) System Upgrade Components

Equipment to fulfill the upgrading in these four categories has been purchased and implemented in the various laboratories of the Center. Research results obtained with this upgrade equipment have been reported at two AFOSR workshops in Colorado Springs (July, 1987) and Los Angeles (June, 1988), and several national and international technical meetings as well as in a number of M.S. and Ph.D. theses.

The equipment purchased under upgrade categories (3) and (4) deserve special mention. This equipment, along with compatible components already existing at the Center, was reconfigured into an Ethernet system consisting of four Masscomp computers and one IBM PC/XT. The reconfiguration ideally distributed the special capabilities of the Masscomp computer components, and the network makes the total capabilities of the entire system available to all the Center's laboratories.

|                    |                                            |
|--------------------|--------------------------------------------|
| Accession For      |                                            |
| NTIS GRA&I         | <input checked="checked" type="checkbox"/> |
| DTIC TAB           | <input type="checkbox"/>                   |
| Unannounced        | <input type="checkbox"/>                   |
| Justification      |                                            |
| By                 |                                            |
| Distribution/      |                                            |
| Availability Codes |                                            |
| Dist               | Avail and/or<br>Special                    |
| A-1                |                                            |



END

DATE

FILMED

DTIC

10-88