The Instrumentation Group was one of the smaller study groups in terms of manpower. The basic tasks of the group were initially defined as the installation and maintenance of the imported equipment, as well as training the operators. In practice, however, more than 75% of the Group's time was dedicated to:

(a) Adapting the equipment to the conditions of operation in Brazil. Almost every piece of imported equipment had to be adapted to some extent to work well in the PICR test environment.

(b) Design and manufacture of original equipment to cope with new requirements that arose during the project. Examples include the survey vehicle; the traffic flow data logger; the recorder box; the tone-to-digital converter; the digital output unit for the Maysmeter and the PELID.

(c) Development of so called commercial instruments which proved in practice to be only prototypes. This non-anticipated activity caused the expenditure of a high number of man-hours in work and in communications with equipment manufacturers overseas to solve design problems in apparatuses that were vital for the data collection system, like the Profilometer and the Weigh-In-Motion System.

The activities (a), (b) and (c), described above, brought difficulties, challenges and additional work that were not anticipated by the project managers at the beginning of the PICR.

It is recommended, based on the experience acquired by the Instrumentation Group, that in projects with time constraints, like the ICR Research, the purchase of instruments not completely developed and tested be avoided. If this proves impossible, it is recommended that sufficient time be allocated to testing the instruments in the environment where they are going to operate before effectively initiating the data collection process.

The Instrumentation Group documented all its work by means of technical and operational memos that contain the Group's accumulated experience during the ICR Research. These memos, together with this Volume, allow anyone interested to know which instruments are recommended and which are not, and why, for each type of measurement.
REFERENCES CITED

AIRGUIDE INSTRUMENT COMPANY, 2210 Wabansia Avenue, Chicago, Illinois 60647, USA.


ARGO INSTRUMENTS CORPORATION, 36-21 33rd Street, Long Island City, New York 11103, USA.


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This reference list includes the names and addresses of the manufacturers cited in the text, in alphabetical order.
178


COLUMBIA SYSTEMS COMPANY, 5805 S.E. Gladstone, P.O.Box 06298, Portland, Oregon, USA.

THE DATA GENERAL CORPORATION, Southboro, Massachusetts, USA.

DIE-A-MATIC, INC., York, Pennsylvania 17403, USA.

DIGITAL EQUIPMENT CORPORATION, Maynard, Massachusetts, USA.


FLUIDYNE INSTRUMENTATION, 1531 San Pablo Avenue, Oakland, California 94612, USA.

GENERAL ELECTRODYNAMICS, 4430 Forest Lane, Garland, Texas 75040, USA.


K. J. LAW ENGINEERS INC., 23660 Research Drive, Farmington Hills, Michigan 48024, USA.


KUSTOM SIGNALS, 1010 West Chestnut, Charute, Kansas, USA.


NU-METRICS, P.O.BOX 800, 2714 Memorial Blvd. Connellsville, PA 15425, USA.


RAINHART COMPANY, P.O.BOX 4533, 604 Williams Street, Austin, Texas 78765, USA.


SANGAMO ELECTRIC COMPANY, P.O.BOX 3347, Springfield, Illinois 62714, USA.

SIE, INC., Rt. 5, Box 214, Forth Worth, Texas 76126, USA.

TEXAS ELECTRONICS INC., Box 7225, Inwood Station, Dallas, Texas 75029, USA.

TEXAS MICROSYSTEMS INC., 3320 Bering Drive, Houston, Texas, USA.

UNITECH INC., Austin, Texas, USA.


