Upon receipt of the grant I attempted to recruit Earll Murman from Boeing, Seattle, to work on the analysis of transonic airfoils. Unfortunately, after a short negotiation I was unable to persuade him to come. Thereafter Dr. James Howard was hired to work on our design program, and Korn turned his attention to the analysis problem. Meanwhile, Frances Bauer has developed a boundary layer correction based on the NASA version of the standard method of Nash and MacDonald. Two graduate students, Eldon McIntyre and Octavio Betancourt, are assisting with the work.

A box of cards containing a good version of the design program was delivered to Jerry South at Langley Research Center in December. This is now being debugged for operation in the NASA computer system. A similar version is being used successfully by Grumman and may also be tried out by McDonnell-Douglas. The principal difficulty still remaining with the design program is to formulate rules for choosing the many input parameters so that they can easily be applied by the uninitiated to obtain interesting airfoils.

Here at N.Y.U. we are now developing several new examples. One of these, at $M = 0.79$, $C_L = 0.68$ and $T/C = 0.10$, is in the final stages of preparation for delivery to Langley.
in the hope that it can be tested in the new transonic wind tunnel. We have included the boundary layer correction, which shows that separation is about to occur at approximately 80% of chord on the lower surface. The maximum value of the shape factor $H$ does not exceed 2.7 there. It is to be noted, however, that we have patched a small error in the NASA boundary layer routine, which seems to predict an erroneous maximum of $H = 2.4$. These results are stated for Reynolds number $R = 20 \times 10^6$. For the lower Reynolds number $R = 3 \times 10^6$ of the transonic tunnel it is not yet completely clear to me how to correct the $x, y$ coordinates for the experimental work. Meanwhile, Dr. J. J. Kacprzynski of the National Aeronautics Establishment in Ottawa has tested one of our older airfoils at $R = 23 \times 10^6$. The agreement is reasonable, and the discrepancies that do appear can be explained by a loss of lift due to our failure to correct for the boundary layer in the original model.

Our main effort has gone into developing a satisfactory method for analysis at off-design conditions. To that end, we have under development a program which combines a transonic finite difference scheme due to Murman with a conformal coordinate system introduced by Sells. A preliminary version of the program gives reasonable results for a lifting ellipse in several minutes of CDC 6600 computer time. A sketch of the pressure distribution for such a run is given in the figure included.

P. R. Garabedian
Principal Investigator
$M = 0.75 \quad T/C = 0.15 \quad CL = 0.48 \quad ALP = 2.00$