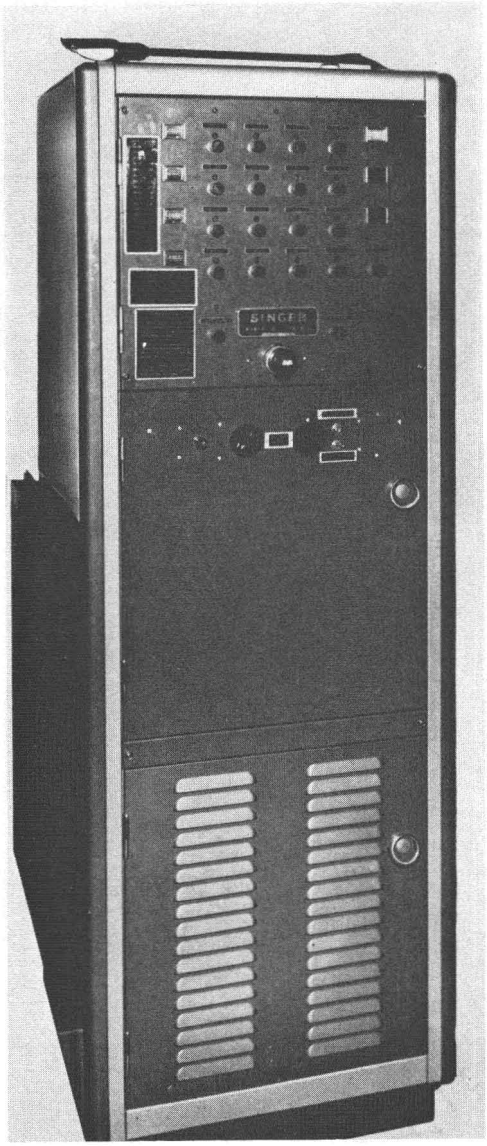

FIG. VI. Electronic control console for positioning printer. Rack on left contains glass grid.

side, (see Figure V) a sheet of photographic film is positioned, a glass grid is registered on the easel and exposed with a hand lamp. After removal of the glass grid, an overlay sheet of Diazo is placed on top of the photographic film. The easel is slid back into position, and the desired photograph selected at the negative stage. Orientation of the nadir point fiducial marks is made to the stage plate manually. X-coordinate, Y-coordinate, Z-coordinate and azimuth are introduced on the decade panel. An exposure time is set and the actuating buttons depressed.

The vacuum easel then slides to its correct X and Y position. The negative stage and mask automatically swing to the required azimuth. Autofocusing is maintained by the negative stage and lens as they move in Z to attain the required flight-height. All motions are operated by servo motors through amplified signals received from the control console. After the exposure is made, a chemical pad is passed over the mask opening. This blackens the Diazo overlay sheet thus preventing overlapping of the next exposure. This procedure is repeated for each exposure until the mosaic is completed. Provision is also made for printing marginal information.

V. SUMMARY

The Automatic Mosaicking System is designed to produce a standard scale gridded, controlled photomosaic from a series of aerial photographic negatives exposed in a six-inch focal-length mapping camera. Rectification procedures depend upon known orientation elements including X-tilt and Y-tilt angles in the first stage. Assembling the mosaic depends upon known grid coordinates of the nadir point, magnification and azimuth of each aerial photograph in the second stage. Devlopment has proceeded to the point where the first-stage is operational barring minor adjustments; the second stage needs adjustment and calibration.

Storm Damage Surveys

J. E. WAUGH,
Captain, USC&GS, Chief, Photogrammetry Div.

THE slow-moving extra-tropical storm along the East Coast of the United States on March 6–9, 1962, was one of the most severe storms in recent history. The resulting damage as reported at a Congressional hearing was approximately 192 million dollars. The storm caused 32 deaths and extensive changes to the coast line from the Carolinas to Cape Cod, Mass. Damage was experienced as far south as Florida and the storm was felt as far north as the Coast of Maine. It will require the entire summer for the U. S. Coast

and Geodetic Survey to investigate and resurvey the major inlets, harbor entrances, and adjacent waters affected by this storm.

The storm moved very slowly and as a result the high winds were able to build up waves reported to be as high as 40 feet. The storm occurred during the period of spring tides and extended over a period of five high waters in most places. The wind tide on top of the spring tides caused unusually high waters to stand for long periods. In most places where there were seawalls, bulkheads and other protective works, the wind-driven waves overtopped these protective barriers; they in turn served to hold in the waters so that the resulting run-off was very slow. On the open coast, these waves had unbroken access to the coast line. They eroded the sand beaches, moving the sand inland. In the inlets, they washed out existing shoals, formed new shoals, and shifted the channels.

One of the primary functions of the U. S. Coast and Geodetic Survey is to gather information needed to publish and keep up-to-date accurate nautical charts and related nautical data for use of the mariner when navigating along the Coast of the United States; thereby promoting "Safety at Sea."

The U. S. Coast and Geodetic Survey began photography of the storm damaged coast line on March 13, 1962, after the waters had a chance to return to normal. During the next two weeks, 900 miles of shore line were photographed with panchromatic film. This photography extended from the Carolinas to Cape Cod. In addition, all major inlets, harbor entrances, major breaks through the outer or barrier islands, and towns and cities that suffered severe damage were photographed in color. The color photography is of inestimable value for a detailed investigation of the extent of damage, and the changes in the coast, particularly the changes in the shoals and channels of the inlets.

Examination of the photography clearly indicated that many of the charts had been rendered obsolete. The summer boating season along the damaged coast was approaching. To furnish new charts immediately for so large an area was impractical if not impossible. To bridge the gap between the time of the storm and the time when our regular charts could be brought completely up-to-date, we began, on March 14, 1962, the day after we received the first film from the field, to prepare correction "chartlets" at the scale of the existing charts. These "chartlets" were compiled directly from the new photography. The existing shoals and channels as seen on the color photography were indicated on the correction "chartlets." These were published at chart scale as overlays for the existing charts. They were issued through the Weekly Notice to Mariners, local Coast Guard Notice to Mariners, Chart Agents, and the U. S. Coast and Geodetic Survey District Offices. The first nine of the series were issued on March 28, 1962. There has been a total of 27 issued to the time of writing this paper. The entire coast line was compared to the photographs and over 60 major changes were investigated in detail in order to issue these "chartlets" and to make important corrections to the existing charts as they are reissued.

The photographs indicated that extensive changes had occurred in many of the major inlets. The U. S. Army Engineers, the U. S. Coast Guard, responsible state and local officials as well as the U. S. Coast and Geodetic Survey began immediately to investigate the extent of the damage and to move men and equipment into the areas to survey the changes and to repair the damage. The U. S. Coast and Geodetic Survey moved photogrammetric field parties into the area of the major inlets and harbor entrances to begin establishing control for hydrographic units. Reconaissance parties began the recovery of the basic control stations. Geodetic parties are being assigned to reestablish the horizontal and vertical network of control where this has been lost. Practically the entire capability of our East Coast fleet (six ships and two shore based hydrographic parties) has temporarily been diverted to this project. One additional ship is being recommissioned to cruise the affected areas and obtain coast pilot information. Existing geodetic, photogrammetric and hydrographic parties have been expanded in size to expedite the new surveys. New hydrographic surveys will be accomplished this summer in the areas where extensive changes have been indicated. The results of these surveys will be added to the preliminary "chartlets" as fast as the surveys are received from the field and our regular charts will be corrected in their entirety as fast as our capability permits.

The preliminary "chartlets" will be withdrawn as the new information is added to the regular issue of existing charts. It is expected that the major changes in the inlets and harbor entrances will be reflected on the "chartlets" and/or to new issues of the existing charts before the beginning of the boating season. But it will be months before all of the changes along the open coast can be added to the charts.