ACTIVATION OF U. S. BUREAU OF COMMERCIAL FISHERIES RESEARCH VESSEL GEORGE B. KELEZ

By Robert R. French*

ABSTRACT

The U. S. Bureau of Commercial Fisheries Biological Laboratory in Seattle acquired a Navy surplus vessel, T-AKL-30, and converted it to a fisheries research vessel during the spring and summer of 1962. The major conversion work consisted of installing bulwarks; replacing the existing gyrocompass, steering engine, and radio with new installations; and overhauling the machinery. The electrical and refrigeration systems were the most troublesome problems encountered during the reactivation. The conversion process took approximately $4\frac{1}{2}$ months, and cost about $100,000.

CONTENTS

	Page		Page
Summary and Conclusions	6	Navigational Installations	10
Background	7	Communications and Electronics Installations	10
Vessel Acquisition and Description	7	Engine Control	11
Vessel Reactivation and Conversion Details:	8	Refrigeration	11
Hull Structures, Fittings, and Auxiliaries	8	Miscellaneous Equipment and Supplies	11
Quarters and Accommodations	9	Research Equipment Installations	11
Machinery Installations	9	Cost of Reactivation	13
Electrical System	10	Performance	13

SUMMARY AND CONCLUSIONS

The Seattle Biological Laboratory acquired a Navy surplus vessel T-AKL-30 and converted it into a research vessel during the spring and summer of 1962. The activation and conversion process took some $4\frac{1}{2}$ months at a cost of about $100,000.

Most of the conversion work was accomplished by the ship's crew. New equipment was purchased and installed. Specialized work on the electrical and refrigeration systems was done by reputable business firms.

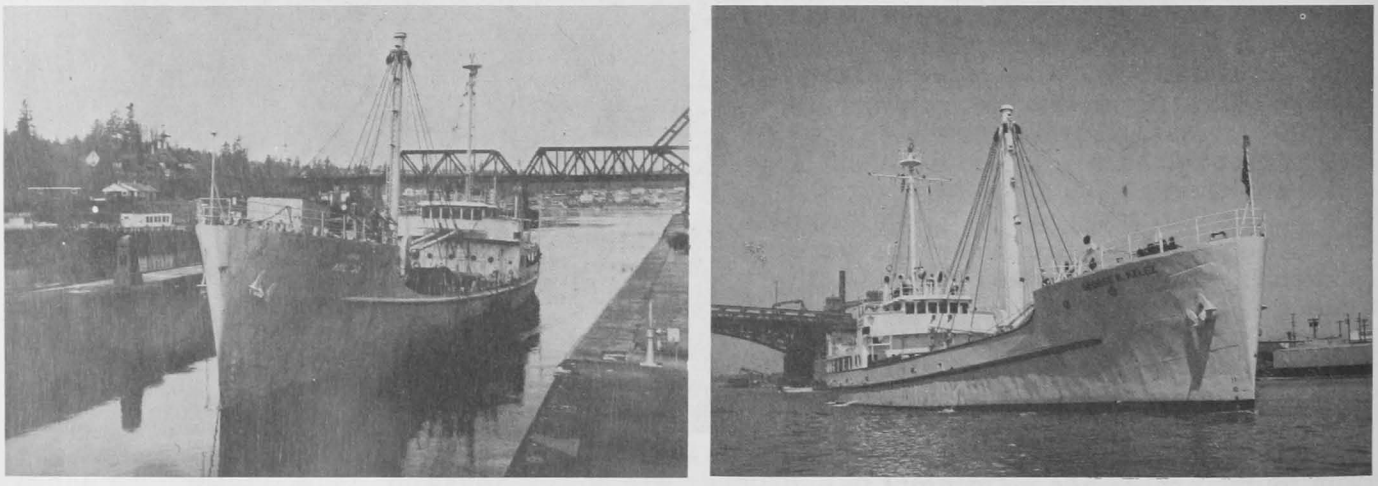

Fig. 1 - Bureau of Commercial Fisheries research vessel (George B. Kelez), before (left) and after conversion (right).

The most troublesome reactivation problems were in the electrical and refrigeration systems. Those systems were placed into operating condition for the first cruise but additional work will be required. Other factors were to rebuild the aft crew quarters, construct captain's quarters in the radio room, and a cook's room in the space previously allotted as the crew's wardroom. Finally, fishing and oceanographic equipment were installed on deck.

*Fishery Biologist (Research), Biological Laboratory, U. S. Bureau of Commercial Fisheries, Seattle, Wash.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 684

This program of acquiring and converting a Navy surplus vessel gave the Seattle Laboratory a serviceable research vessel for carrying on its marine research program in a comparatively short time and at comparatively low cost. Fishing stations were fished as scheduled during the summer of 1962 under the International North Pacific Fisheries Commission program, and in every respect the vessel matched or exceeded performances of chartered research vessels.

BACKGROUND

The key to a comprehensive marine research program is a well-equipped ocean-going research vessel. The Bureau's Fisheries Biological Laboratory, Seattle, Wash., since 1955 has engaged in high-seas research on salmon in North Pacific and Bering Sea waters. Having no research vessel, the Seattle Laboratory chartered commercial fishing vessels for fishing surveys and oceanographic sampling. Costs of those chartered vessels, with crews, in recent years ranged from $500 to $800 a day. Although chartered vessels served capably in the research program, they frequently were lacking in gear-carrying capacity and range. There also were some handicaps because of the lack of permanently installed research equipment and facilities. To meet increasing requirements in range and research capabilities, a surplus Navy T-AKL-30 was acquired and converted. The vessel was named the George B. Kelez in honor of a Bureau scientist long associated with the fisheries of Alaska and the Pacific Northwest.

This report describes the reactivation and conversion of the Navy surplus vessel to a research vessel (George B. Kelez) in the spring and summer of 1962. The vessel before and after conversion is shown in figure 1.

VESSEL ACQUISITION AND DESCRIPTION

During the summer of 1961, the Seattle Biological Laboratory seriously considered acquiring for marine research a Navy vessel declared excess property at Mare Island, Calif. Some years previously, similar surplus vessels were inspected but no action was taken to obtain one. Impetus was later given to obtaining a surplus vessel for reserarch because of the need to expand marine research and to provide specialized equipment and permanent facilities not available on chartered vessels. There was further encouragement in considering the Navy vessel for the Laboratory's needs following the chartering and successful fishing by the Bertha Ann, a 176-foot converted Navy surplus vessel, during the summer of 1961.

During September 1961, the T-AKL-30 (formerly FS 400) was declared excess property at Mare Island, Calif. This vessel was nearly identical to the Bertha Ann. Initial examination of the vessel was made by Laboratory personnel and later the vessel was moved from Mare Island to Oakland and drydocked for a more thorough inspection by marine surveyors engaged by the Laboratory. Following receipt of the marine survey report, which in effect stated that if recommended overhaul work was carried out the vessel would be a worthy asset to the Bureau, the Laboratory proceeded to acquire the vessel. This was accomplished late in December 1961. The vessel was then towed to Seattle in early February 1962 for reactivation.

The table gives the particulars of the vessel.

Particulars of the Vessel	
Name	T-AKL-30
Type	Army F.S., Interisland Supply Vessel.
Built	Ingalls Shipbuilding Corp., Alabama--1944.
Cost	$1,440,000 (exclusive of the cost of conversion and outfitting as a reefer vessel in 1945).
Construction	Steel
Gross Tons	550
Length	176 feet 6 inches
Beam	32 feet
Light draft	4 feet 6 inches forward; 8 feet 4 inches aft.
Loaded draft	8 feet 10 inches forward; 11 feet 8 inches aft.
General arrangement	Raised forecastle head, 2 cargo hatches amidship, superstructure and engine room aft
Main engines	Two 6-cylinder Model 6-278A General Motors Diesels driving two 4-bladed 6' x 6.53' propellers through reversible air-flex couplings and Falk 3.05 to 1 reduction gears. Total horsepower--1,000.
Auxiliary power	All auxiliary equipment, including windlass, 4 cargo winches, capstan, and refrigeration equipment, electrically driven. Electric power supplied by 2 100 kw. generators driven by 2 Model 3-267A General Motors Diesels.
Cruising speed	Light, 11.4 knots. Loaded, 10.2 knots.
Fuel capacity	595 barrels (24,990 gals.)
Fresh water capacity	108 long tons
Cruising radius	Approximately 3,000 statute miles.
Average daily fuel consumption	25.7 barrels (1,079 gals.)

VESSEL REACTIVATION AND CONVERSION DETAILS

To reactivate the vessel the Laboratory hired a permanent crew to do as much of the work as possible. Work that could not be done by the ship's crew was to be contracted. Accordingly, an initial crew of nine (master, mate, chief engineer, first assistant and second assistant engineers, cook-steward, and three skilled fishermen) were hired. Later a fourth skilled fisherman was hired to complete the crew. Additional temporary workers, such as a welder, carpenter, and engineers were hired for special jobs that the crew could not handle.

Initially, little modification of the vessel was planned. Other than reactivating the ship's machinery, it was planned to convert the radio room to the captain's quarters, install well-deck bulwarks, modify the existing aft crews' quarters for laboratory space, and refurbish various staterooms as necessary to accommodate the crew and scientific personnel. Special fishing and oceanographic equipment were to be installed on deck areas. As the reactivation work progressed, changes were made in the original plans and many additional modifications were accomplished during the vessel conversion.

HULL STRUCTURES, FITTINGS, AND AUXILIARIES: No major hull structure modifications were made on the vessel in preparing it for the initial fishing cruise. The vessel was drydocked for inspection and to clean and paint the bottom, remove coffer dams from sea suction and overboard discharges, and remove blanks from the fathometer. Rubber boots were removed from the tail shafts, and tail shaft clearances were checked. The tail shafts were not pulled during this drydocking, however. The stuffing boxes and rudder stock were repacked, and zincs were renewed.

A new slave-rudder system was installed to provide better vessel control at slow speeds. This system consisted of two auxiliary rudders attached parallel to the existing rudder. These two auxiliary rudders extended out from the main rudder so as to be in the edge of the slipstream from the ship's propellers. Because of its apparent successful adaptation on the Bertha Ann, a slave-rudder assembly was purchased.

The mast and four booms were left as they were and new rigging installed. To raise and lower the booms, four Olympic hoists of 5-ton capacity were installed. These hoists are operated either by hand (rotating a large wheel), or by using a one-half inch heavy-duty electric drill. The electric drill was modified with a special chuck designed to fit the spline of the hoist.

The vessel was equipped with four electric cargo winches which were left in place and used as originally installed after checking out and making repairs. Both cargo hatches, with minor exceptions, were left as they were. On the Number 1, or forward hatch, a booby hatch was installed to provide quick and easy access in and out of the hold. New canvas hatch covers were purchased and new metal strongbacks provided. Freezer plates were installed in the Number 1 hold.

It was initially decided that bulwarks along the well deck and around the stern of the vessel would be necessary to insure safer fishing and oceanographic operations. The new bulwarks were 42 inches high and were molded to the forecastle. They joined the existing bulwarks of the house area (fig. 1).

Other hull auxiliary equipment such as the anchor windlass, anchor chains, ground tackle, boat winch, capstan, etc., were retained as they were, after first checking them out and making minor repairs.

Two access ladders leading from the port and starboard passageways to the boat deck were installed to provide easy access from the boat deck to the weather deck.

A complete check-out of the fire-fighting equipment was made and equipment renewed as required.

A new motor launch was provided as a lifeboat in place of the vessel's oar-propelled boat. It was necessary to obtain boat davits for the new lifeboat, since davits were not on the vessel when acquired.

QUARTERS AND ACCOMMODATIONS: One of the first tasks in activating the vessel was to design and construct the captain's quarters on the bridge level aft of the wheelhouse, since quarters were not provided there in the original design of the vessel. It was believed necessary on a research vessel to have the captain readily available at all times. In order to construct the captain's quarters, the radio was dismantled and removed from the radio room, located aft of the wheelhouse on the port side, and a bunk, drawers, closet, desk, and sink were provided. This room opens directly into the wheelhouse and provides convenient and easily accessible quarters for the captain. Two of the 6 superstructure's staterooms were remodeled by building new bunks and installing sinks. These were for the mate and the chief engineer. A new stateroom for the cook was constructed in the former crew's mess area aft of the galley. The remaining staterooms were assigned as biologists' quarters and as laboratory space. Little was done to these other staterooms other than the necessary cleaning and painting. In addition to the staterooms located in the superstructure, there are crew's quarters located below deck aft of the engineroom and in the forecastle. Not wishing to utilize the forecastle for crew's quarters for the time being, this area was left as it was to be used for miscellaneous storage. The crew's quarters below deck were completely rebuilt. Two rooms, 1 with 4 bunks and 1 with 2 bunks, were constructed to provide quarters for 6 crewmen.

MACHINERY INSTALLATIONS: From the general appearance of the engineroom and from information obtained in the pre-inactivation inspection report prepared by the U. S. Navy, it was anticipated that engineroom work would be confined mainly to cleaning the engines and other machinery. Much more work actually was necessary to activate the machinery in the engineroom, and a crew of 3 to 6 men spent the entire work period of about 4½ months overhauling the machinery. Tools were purchased for the engineroom and for other uses, since none were aboard the vessel upon acquisition.

The two main engines were completely torn down for cleaning and inspection. Upon reassembly, all seals, gaskets, and rings were renewed, and all bearings and clearances were checked. Liners were replaced where needed. Contracts were awarded for the overhaul of the blower assemblies of the 2 main engines and the 2 auxiliaries, and for the governors and injectors, as the engineering crew had neither the time nor facilities to do the work.

The two auxiliary engines were disassembled for complete cleaning. The seals, rings, liners, and gaskets were renewed. It was also found necessary to replace all main bearings on the starboard auxiliary engine. The ship's two air compressors were completely overhauled.

The heat exchangers in the main engines and auxiliaries were cleaned and tested. All pumps were checked and packing and gaskets renewed. All manifolds and valves were repacked, reground, and new gaskets installed. Blanks were removed and much of the piping was replaced. The salt-water return pipe from the port-engine cooling system was cracked and had to be replaced. The boiler system was cleaned and checked.

It was necessary to replace the alarm switches for the main engines and auxiliaries. Many motors and other electrical parts were in poor condition and were either repaired or replaced.

It was found necessary to replace flush valves in the sanitary system and to rebuild the sanitary pump. A new fresh-water pump was installed. A portable water tank located in the reefer compressor room was converted to a lube-oil storage tank. Piping and a pump were installed to bring the oil to the engineroom.

Most of this work was accomplished from March 15 to July 9, 1962. During July 16-20, the auxiliaries and main engines were tested and declared in operating condition.

ELECTRICAL SYSTEM: The check-out and repair of the electrical system was probably the most serious problem encountered in reactivating the vessel. The long lay-up period may have caused the deterioration of the electrical system. A complete check-out of the electrical system by a professional firm was necessary. Breakdowns of various equipment and delays in reactivating the machinery continually developed until the electrical system could be completely checked out and restored to operating condition. For example, it was necessary to check out all motors on the vessel and to replace many brushes and bearings. Many motors, such as the cargo winch motors, were found to be improperly tagged, and wiring had to be traced before it could be hooked up and the motors tested. It was also found that the fans to both the engineroom and reefer-compressor room were reversed, and had to be changed.

In summary, the electrical system was found to be in generally poor condition and a great deal of time and labor was necessary to repair it. Electrical problems in the steering, boiler, and navigational systems developed during the first fishing cruise, and additional work was found necessary.

NAVIGATIONAL INSTALLATIONS: Several navigational installations, both new and repaired, were accomplished while activating the vessel. Some, such as the gyrocompass and steering engine, were not anticipated at the time of the initial vessel inspection. Subsequent inspection of the equipment indicated that new equipment would be necessary. Following are summary accounts of navigational installations made aboard the George B. Kelez:

GYROCOMPASS: The vessel came equipped with a Mark XVIII Sperry gyrocompass. This instrument was not considered by the manufacturer's representatives to be a satisfactory model for our needs. It was replaced with a Sperry Mark XIV gyrocompass. Installation was made by an electrical firm under supervision of the Sperry Company.

STEERING ENGINE: The vessel was equipped with an electric steering engine for steering control. Marine experts stated that this particular model engine had a history of unsatisfactory operations on similar vessels. It was therefore believed advisable to replace it. The replacement was a Sperry No. 1 steering engine system. Installation was accomplished by a shipyard under supervision of the Sperry Company.

AUTOPILOT: The vessel, when acquired, was not equipped with an autopilot. Since this feature was considered essential, much study was given to the question of an adequate autopilot system for the vessel. Marine surveyors, the marine industry, and vessel owners were consulted regarding the best system that should be installed. In the interest of availability, time for acquisition, and cost, it was decided to get an autopilot working through the magnetic compass. A Sperry autopilot system with this feature was obtained and installed by an electrical firm under supervision of the Sperry Company. A remote-control unit was also installed.

COMMUNICATIONS AND ELECTRONICS INSTALLATIONS: The following sections summarize the communications and electronic installations that were accomplished in activating the George B. Kelez:

RADAR: The vessel came equipped with an AN-STN-5 radar, also known as the commercial model CR-101-A manufactured by the Radiomarine Corporation of America. The radar consists of 4 units: transmitter-receiver, indicator, motor-generator, and antenna. This instrument was checked out and put into operating condition.

LORAN: The loran on the vessel was an AN/SP-7, manufactured by Sperry Gyroscope Company. This instrument was checked out and put into operating condition. A second loran was also acquired (the same model), and installed as a spare set.

RADIO: At the time of acquisition, the vessel was equipped with a MacKay model MRU-10-11-13 radio unit. This was primarily a CW set and required an operator with a first-class radio license. Since it was not planned to carry a first-class licensed radio operator aboard the vessel, and since it was planned to convert the radio room to captain's quarters,

the MacKay radio was removed and a new MW-3 HST marine radiotelephone was installed in the chartroom. A 65-watt auxiliary radio set was also placed in the pilot house.

RADIO DIRECTION FINDER: The existing Bludworth radio direction finder was replaced with a new Apelco radio direction-finder receiver. This was adapted for use with the existing loop antenna and indicator unit.

SONAR FACILITIES: The vessel came equipped with a model NJ-8 fathometer consisting of a receiver indicator and switching unit, and a receiver-recorder. These units were left intact and placed into operating condition during the reactivation period.

ENGINE CONTROL: Originally, engine control was accomplished by port and starboard engine order-telegraph. This system was retained and put into operating condition. The existing electric engine controls in the vessel were replaced with a Westinghouse air-control system. Controls were installed in the wheelhouse and on the port and starboard open bridges. The installation of the air-control system was accomplished by the vessel's crew under the supervision of air-control specialists.

REFRIGERATION: The vessel is equipped with two compressors of 25-ton capacity each, manufactured by Frick, for cargo refrigeration use. The plan for the vessel was to refrigerate the No. 1, or forward hold, for freezing and holding fish samples from high-seas fishing operations. A great deal of difficulty was experienced with both compressors and with the electrical controllers while reactivating the refrigeration system. It developed that there was insufficient time to get both units operating, therefore, for the first cruise, only one compressor unit was operated. This unit kept the No. 1 hold at a temperature between 0^{o} and -10^{o} F. during the entire cruise. Plans are to ultimately install a new refrigeration system for the No. 1 hold.

Two compressors of one-half ton capacity each, manufactured by York, were initially installed for ship's use--the chill room and freezer room. These two compressors were checked and put into operation. The refrigerator in the galley was checked out and put into operation.

MISCELLANEOUS EQUIPMENT AND SUPPLIES: As final preparations before sailing, and following reactivation of the machinery, it was necessary to purchase miscellaneous equipment and supplies. A partial list of the items included sextants, a chronometer, polaris, bedding and mattresses, galley and ward-room supplies, mooring lines, a lifeboat cover, and sheave blocks.

For ballast, about 60 tons of concrete blocks was obtained and placed in the No. 2 hold.

RESEARCH EQUIPMENT INSTALLATIONS: Because time was an important element in reactivating the vessel, a minimum amount of research equipment was installed for the first fishing cruise. The research equipment consisted of two categories--fishing and oceanographic equipment.

FISHING EQUIPMENT: Equipment for salmon gill-net fishing was installed for the initial cruise. This consisted of a hydraulically-powered gurdy, a net roller, net box, and net chute. The gurdy and roller were of the design previously used in shark fishing, and were easily adapted for salmon fishing on this vessel (fig. 2). The motor and controller for the hydraulic system were placed

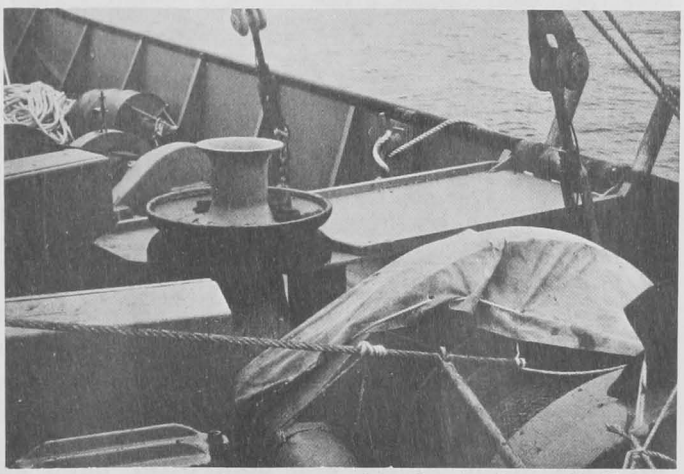

Fig. 2 - Gurdy and rail net roller as adapted on the George B. Kelez.

in the reefer compressor room, and the gurdy was located on deck between the two starboard cargo winches.

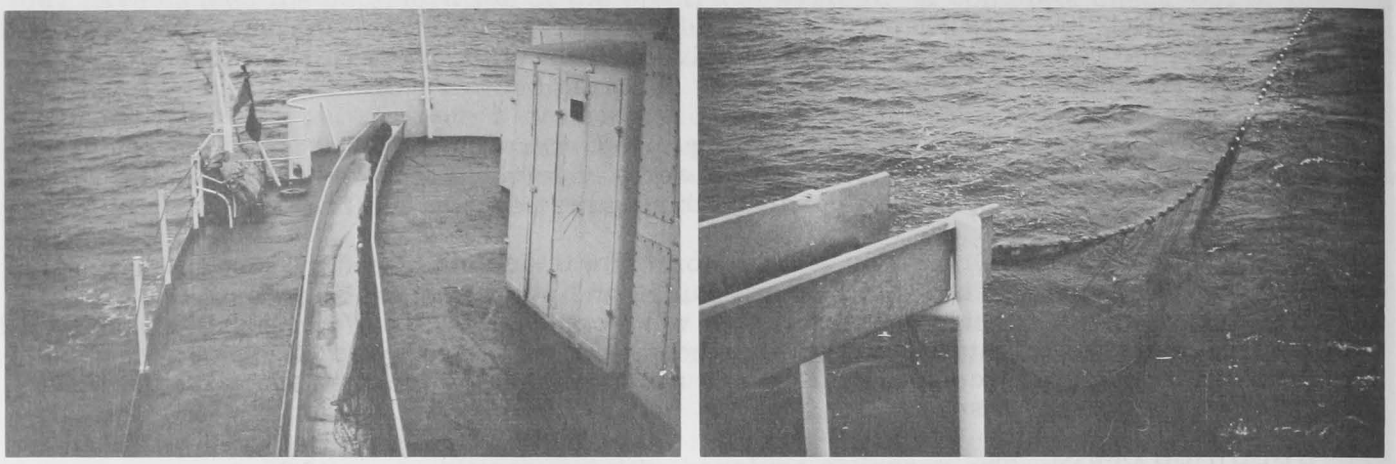

Fig. 3 - Setting gill nets from George B. Kelez. (Left--nets passing along net chute on boat deck; right--nets dropping off stern end of net chute.)

The net box was placed along the starboard bulwarks just aft of the gurdy. This offered a convenient arrangement for hauling and piling the nets and for laying out damaged nets on the No. 2 hatch cover for later repair. A net chute running the length of the boat deck to the stern was connected to the after end of the net box. By this arrangement, gill nets were set off the stern with a minimum of effort. Net setting and hauling operations are illustrated in figures 3 and 4, respectively.

Fig. 4 - Hauling nets aboard George B. Kelez.

OCEANOGRAPHIC EQUIPMENT: For the first cruise, oceanographic equipment installed consisted of a hydraulically-operated "A" frame and hydrographic winch (fig. 5). The same motor and controller used as the prime mover for the gurdy supplies the power for the "A" frame and winch.

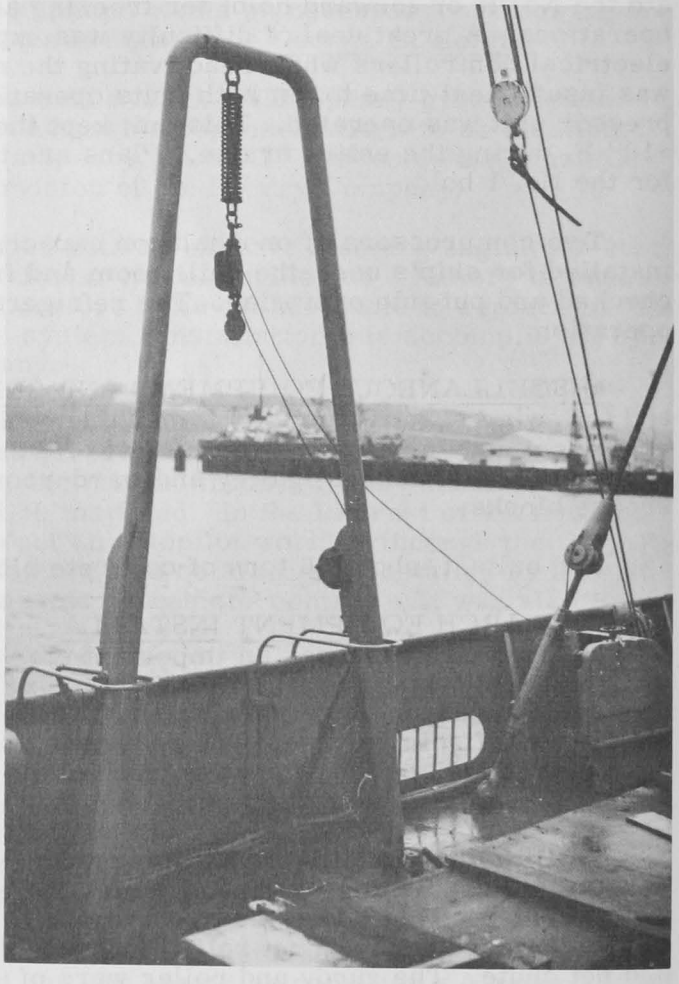

Fig. 5 - Winch and "A" frame arrangement used for oceanographic sampling on the George B. Kelez.

COST OF REACTIVATION

The cost for the reactivation and conversion of the George B. Kelez amounted to approximately $100,000. That amount included the cost of drydocking and inspection in Oakland, the cost of towing the vessel from Oakland to Seattle, and the crew's salary up to the time the vessel was ready to depart. The cost was fairly close to the original estimate of about $85,000. The increase was due primarily to the necessity for replacement of the steering engine and gyrocompass and large expenses in refurbishing the electrical and refrigeration systems, all of which had not been anticipated. The unanticipated costs resulted from the poor condition of that equipment and involved unexpected labor and material costs.

It is believed that the acquisition and activation of a research vessel of the size and capabilities of the George B. Kelez for $100,000 is well worth the money spent, bearing in mind that the vessel cost $1,440,000 to build in 1944, exclusive of refrigeration costs, and that similar vessels cost considerably more today.

PERFORMANCE

A shake-down cruise prior to embarking on a research cruise in northern waters was originally planned, but time was not available if the fishing survey schedule was to be met. The vessel, therefore, departed Seattle for the fishing grounds the day it was ready. The route to the fishing area in the western part of the Gulf of Alaska was via Ketchikan and Kodiak, where stops were made to make necessary adjustments.

The over-all performance of the vessel was up to expectations. Some mechanical trouble developed in the electrical and navigational systems and in the fresh-water pumping system during the cruise. These were not serious enough to hinder the research operations.

During the first cruise, 23 fishing stations were occupied in the western Gulf of Alaska. The vessel performed very capably during the fishing operations. Setting and hauling the gear was easily handled with the large vessel. The large deck and hold areas provided ample room for the repair and storage of gill nets. Damaged sections of gear were laid aside on the deck during net hauling for later repair. The vessel's cruising speed of about 11.5 knots per hour was an asset in reducing running time to and from ports and between fishing stations.

On the whole, the vessel performed very satisfactorily during the initial cruise and is an asset to the Bureau's marine research program.

Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.