Application Of Long Run Equipment To Pumping Engines

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The term "long run equipment" is a flexible one and, of necessity, does not arbitrarily follow any steadfast set of specifications. This is readily understandable when consideration is given to the numerous problems involved in adapting a universal set of accessosries to slow or high speed and two or four cycle engines. Also, the equipment must adapt itself to those problems peculiar to the area in which it must serve and, of course, the operators have certain preferences in regards to manufacturer or model. In the following, we will deal primarily with the equipment generally accepted and attempt to touch upon the objectives and apparent results, as well as the maintenance involved.

Basically it seems a "long run" unit is equipped with an oil level regulating device, a clutch power take-off with extended greasing features, magneto of extra heavy duty construction, facilities for maintaining adequate coolant, and spark plugs with platinum electrodes. The foregoing is in addition to the customary low oil pressure and high water temperature shut down switches.

The oil level regulator comprises probably the most fundamental requirement of any long run equipment and consists of a float control and reservoir. The control operates in essentially the same manner as a float valve in a carburetor bowl. The float is set to arrest the flow of oil from a reservoir to the engine crankcase at such a time as the oil reaches the desired level. Once the crankcase oil reaches the desired plane the objective of the levelator is to maintain this level. As the unit consumes the crankcase oil, or otherwise requires replenishment thereof, the float valve alternately opens and closes in its function of maintaining that ultimate level. Multi-cylinder engines operating with a vacuum in the crankcase and/or 2-cycle engines which tend to build up pressure in the crankcase require pressure equalizing vent lines to balance this differential and insure accurate function of the regulator. This is also necessary on single cylinder pumping engines due to the extreme variations encountered in crankcase pressures.

These balance lines merely connect the top of the regulator to the crankcase above the oil line level, to offset the pressure or vacuum which would otherwise affect the function of the float valve in the lower portion of the regulator. The oil regulator devices in general usage have, in common, quite sturdy and dependable float valve arrangements in connection with reservoirs which range in capacity from two to fifty-five gallons. Visible sight gauges are also combined into these units thereby dispensing with the necessity of shutting the engine down to check the crankcase oil. Particularly in the larger capacities, the reservoir consists of a steel drum mounted on a structure independent of the engine, with sufficient height to provide a gravity feed of oil from the reservoir to the float valve. The bottom of the oil supply tank should be not less than 6 inches above the oil level regulator for the minimum head required. The top of the supply tank should not be more than 10 ft. above the regulator for head allowance.

The benefits to be derived by the usage of oil level regulators are multiple and obvious. It goes without saying that abrasives and impurities introduced into the engine lubricants by way of dirty containers or careless operators becomes destructive agents to the internal combustion engine. This is particularly true of the modern precision engine manufactured to extremely close tolerances. The regulator, with ample oil reservoir, holds this exposure to natures elements, as well as the human element, to a minimum through its incorporation of a closed system from main supply tank to the crankcase as well as through elimination of the necessity of daily replenishment by containers.

This can also have a very direct bearing on overall economy of operation, inasmuch as there are cases wherein operators, accustomed to an engine using oil, may add a quart or more without shutting the unit down to gauge the oil level in the crankcase. This can prove detrimental in either respect, by adding too much or too little oil to the crankcase. A note of caution should be injected in regards to filling the crankcase through the float control device after used oil has been drained. Due to the necessity of having a rather small orifice in the float valve for more effective regulation, and the following is particularly true in low temperatures, several minutes may be required for sufficient oil to flow into the crankcase to enable it to be picked up by the engine lubricating oil pump. Needless to say, a bearing failure can very easily result from starting the engine before an adequate supply of oil has been provided.

The cooling system encounterd in long run equipment vary to a greater degree than do the oil controls. While many installations employ ebullition and vapor phase type of cooling, this is not offered in a package unit and requires custom engineering in adaptation to a particular application. The exhaust condenser, which is offered in a package unit, is readily adaptable to standard radiator cooling system and is generally accepted. Considering its evident satisfactory performance, and the high percentage of installations incorporating the exhaust condenser, it would not be amiss to designate such a system as the standard of the long run equipment, if standard there is.

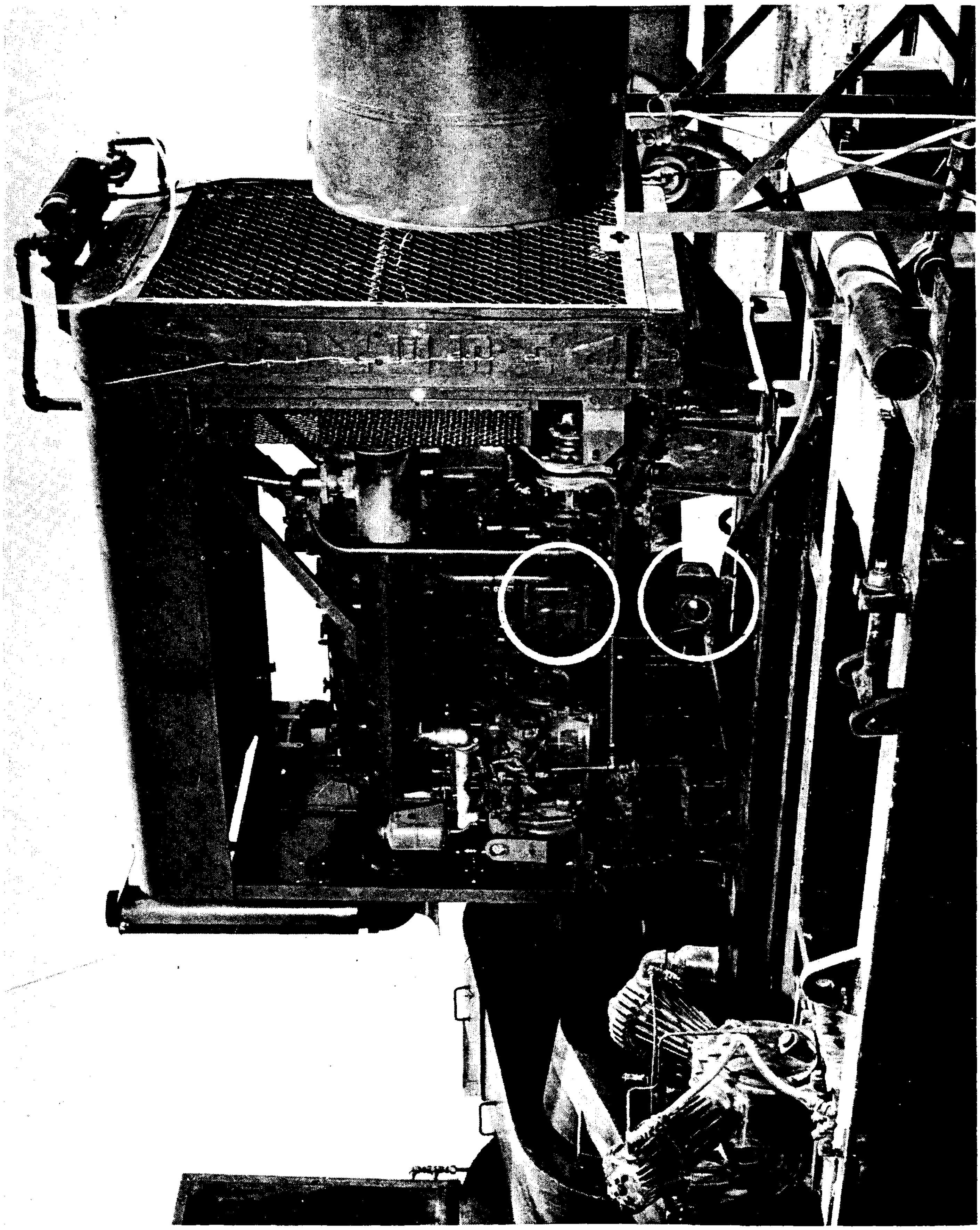
Relatively simple in construction, the exhaust condenser provides 6 to 8 quarts of water per day during the course of extreme summer temperatures and three or four times as much during the cold winter days. The restrictions on fuels are moderate, natural gas being tolerated with sulphur content up to one grain per cubic foot. The construction of the condenser unit consists of two sections of condenser mounted in parellel and on a horizontal by means of a flexible connection to a scoop insert in the exhaust pipe. This first condenser scrubs the exhaust gases and the water made therein is discharged through an overflow tube. As an integral part of the union connecting the outlet of the initial condenser to the inlet of the final condenser, a thermostat limits the exhaust gases to temperatures of 140 degrees F entering the final stage condenser. The water from the final stage condenser, through a float arrangement, maintains the engine coolant to a pre-determined level. The water in excess of engine requirements is also discharged through the overflow tube. Analyzed specimens of water from these condensers have indicated no harmful agents conducive to deterioration of the cooling system. However, its is readily apparent that an engine which exhausts an excessive amount of lube oil will of certainty introduce a limited amount of this unburned oil into the coolant over a period of time. In those cooling systems equipped with pressure caps, it is necessary to relieve the pressure by drilling a small hole in the cap or otherwise venting the highest practical point in the system to the atmosphere. Without such provision, the float control will not function since it is not designed to overcome a pressure within the system.

Maintenance of the exhaust condenser is relatively uninvolved. At six month intervals, it is recommended the condenser be disassembled and cleaned. It is also suggested, as a precautionary measure of preventive maintenance, that a rust inhibitor be used in the coolant. A radiator treating concentrate is available to provide effective control of oxidation and corrosion for prolonged periods of time in low pH water. This can be used in conjunction with anti-freeze or soluble oil as required.

There are several makes of clutch power take-off assemblies available for "long run" applications. Although the fundamental outline is essentially reproduced in various makes of clutches, there may be exceptions to the following modifications marking the divergence of the clutch with extended greasing features from the standard power take-off in common usage.

To all outward appearances the special clutch does not differentiate from standard. The tolerance and load or side-pull allowance governing normal clutch installation would be applicable to the extended greasing type clutch of comparable size. This also pertains to the adjustment of the clutch, inasmuch as the driving plates and manner of take up remain the same. Basically, a clutch power take-off has three bearings which would be affected by prolongation of periods between greasing. These are the pilot bearing, throwout bearing, and main bearing. The clutch with extended greasing is equipped with seals at either end of the main bearing to retain the grease for a longer period of time. The addition of a ball bearing, at the throwout collar position, effectively replaces the standard type bronze collar and eliminates the necessity of daily greasing. Also, a double shielded type pilot bearing replaces the standard single shield type.

All of these bearings should be lub-



A typical Long Run Unit. Circled are the heavy duty magneto, the exhaust condenser for the radiator, and the oil level regulator controlling the flow of lubricating oil from the reservoir. Not indicated, are the platinum electrode spark plugs and power take-off with extended greasing features.

ricated every six months. It would appear that the two shields on the pilot bearing would not allow grease to enter. However, the greasing may be accomplished through the shaft, as in the standard power take-off, since the grease can be forced into the pilot bearing but held by the seals for longer periods of time. The throwout bearings are lubricated in like manner. In lubricating the main bearing, a pipe plug is removed from beneath the bearing during the greasing process. Through this opening, new grease forces the old grease from the bearing carrier. This is most effective with the shaft turning. After clean grease appears at the outlet, the unit should be run one half hour or until the excess grease drains out. These bearings will run hot if too much grease is used, therefore the aforementioned care should be taken to assure removal of excess grease before the drain plug is replaced.

Prolonging the life of the ignition system of the internal combustion engine is an ever existent and very real problem confronting any engine manufacturer or operator. The numerous approaches to this important phase of the long run unit offer considerable fuel for controversy.

The increased life inherent in the use of platinum electrode type spark plugs has proven a dominant factor in the increased usage of these plugs. However, platinum electrode spark plugs fail to provide a universal solution to the numerous problems and conditions encountered. Fouling is probably the most prevalent condition affecting the otherwise satisfactory performance of these spark plugs in many installations. No doubt this can be attributed, in the majority of cases, to mis-application of various types and heat ranges of the plugs. In other installations, the fouling can be attributed to the condition of the engine. The platinum electrodes do offer the nearest approach to a suitable spark plug for the long run unit and, properly applied, have proven a worthy component of the long run unit.

The magneto is subject to the customer's preference and may be high or low tension. Indeed, many units, otherwise 'loaded' with long run accessories, are found equipped with medium duty high tension magnetos. Numerous other units are equipped with standard magnetos converted to low tension. The majority of long run units, however, utilize a high tension magneto of extra heavy duty construction. Primarily, the heavy duty construction affects the coil, magnet, and breaker points. These heavy duty magnetos have giiven good account of themselves, generally speaking.

The foregoing equipment has been in general use for several years and, consequently, the stigma of being in the experimental stage has been removed. Although the ultimate has by no means been reached in this field, very great strides have been taken in the right direction as the acceptance by oil producers will bear out.

From an economy standpoint, the soundness of an investment in this type equipment is readily apparent when consideration is given to man hours saved in elimination of daily checking and filling both radiator and crankcase, as well as daily servicing of the clutch. Also, it becomes evident that long run equipment alleviates the effects of nature's assaults as well as the human element of neglect. The automatic float controls unquestionably maintain the oil and water to the proper level with a uniformity unattainable when serviced on a twenty-four schedule. Not only does this equipment tend to extend the operating life of the engine, it also cuts daily operating costs. This is reflected in restricting field mechanic's time to preventive maintenance rather than regular servicing.

The long run unit is proving itself advantageous, to large and small operators alike, and will carve for itself an increasingly important niche in the oil industry.