

AN/UQN-1B Sonar Sounding Set

The AN/UQN-1B is one of the most modern types of sounding equipment being installed on ships today. In contrast with the old types of equipment, the AN/UQN-1B comprises only one small unit with its associated transducer. A photograph of the entire equipment is shown in figure 15-9. In spite of its small size, it gives very accurate readings, at a very wide range of depths, from about 5 feet to 6,000 fathoms.

The equipment is designed for installation on either submarines or surface vessels for the purpose of measuring and either indicating or recording water depths. Three recorder ranges are provided—0 to 600 feet, 0 to 600 fathoms, and 0 to 6,000 fathoms. Two indicator ranges are provided—0 to 100 feet and 0 to 100 fathoms. Means are provided for transmitting a single ping or for automatically keyed operation. The equipment operates by emitting a pulse of ultrasonic energy into the water and measuring the time required for the pulse to travel to the bottom and return.

When recording, a stylus starts across the recorder chart simultaneously with the emission of the pulse. The stylus moves at a constant velocity and marks the paper twice—once at the top of the chart when the pulse is transmitted and again when an echo returns. This procedure provides two points spaced in proportion to the depth of water beneath the transducer. Visual indication is provided by a circular sweep on the face of a cathode-ray tube (figure 15-10). The transmitted pulse and the returning echo radially modulate the trace. An engraved translucent shield in front of the CRT furnishes a scale. The transmitted pulse, which always occurs at zero on the scale, and the echo appear as small radial bars across a luminous circle. The uniform angular velocity of the trace provides the desired time-depth relationship.

The mode of operation is selected by use of the appropriate controls on the front panel of the equipment.

The transducer comprises an array of ammonium dihydrogen phosphate (ADP) crystals in a pressure-tight, flanged housing. It is designed for flush mounting in a standard hull ring of the bottom plating of a surface vessel or outside the pressure hull of a submarine. A tuning inductor is mounted inside the housing. This inductor, with the capacity of the crystals, forms a series-resonant circuit at 12 kc.

The dimensions and arrangement of the crystals and a monel backing plate produce maximum energy transfer at 12 kc.

There are no tuning controls on the equipment because all of the oscillators are crystal-controlled, and all frequencies are fixed. There are three oscillators that provide basic frequencies of 114, 130, and 142 kc. A fourth oscillator provides either a 4- or a 24-cps frequency to supply the circular sweep generator. These oscillators are shown in the block diagram in figure 15-11. From the three basic frequencies, the following resultant frequencies are obtained:

1. 12 kc (142-130 kc) for transmitter operation.
2. 118 kc (130-12 kc) for receiver i-f operation.
3. 4,000 cps (118-114 kc) for chart marking, CRT modulation, and listening.

The transmitter delivers 800 watts of pulsed 12-kc power through a transmission line to the transducer. The transmitter is a series of transformer-coupled amplifier stages consisting of a single-ended input amplifier (V203), a push-pull driver stage (V204 and V205), and a class B, push-pull, power-output stage (V206 and V207). Transmitter input voltage is constant; keying is accomplished mechanically for recording and with a triggered gas tube for indicating by completing the cathode circuit of the drive tubes, input amplifier, and 130-kc cathode follower.

The receiver takes its input from the 12-kc transmitter pulse, and mixes it with a signal from the 130-kc oscillator, V201A, and the resulting difference signal of 118 kc is used as the i-f frequency. This 118-kc signal is amplified and mixed with a 114-kc signal to produce the 4,000-cps audio frequency.

The recorder is conventional and has three ranges. An actual recording sheet of this equipment is shown in figure 15-12. This equipment will perform well at any depths encountered.

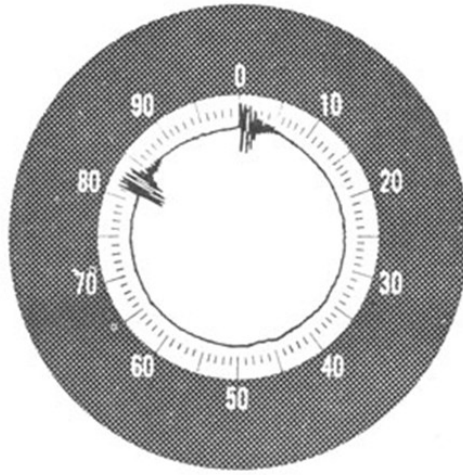


Figure 15-10. -Typical presentation on CRT indicator.

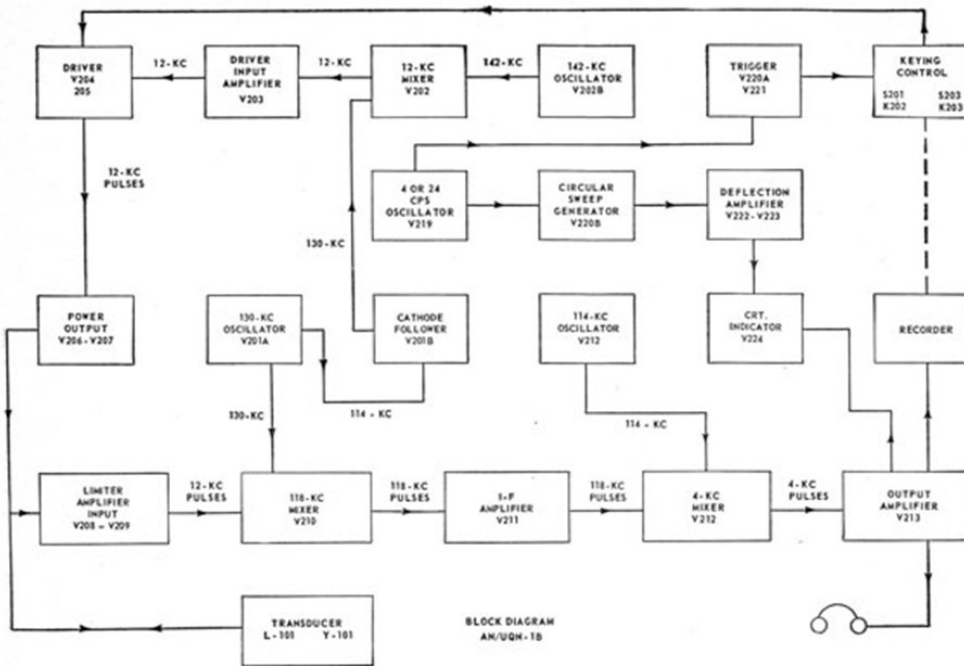


Figure 15-11. -Block diagram of AN/UQN-1B.

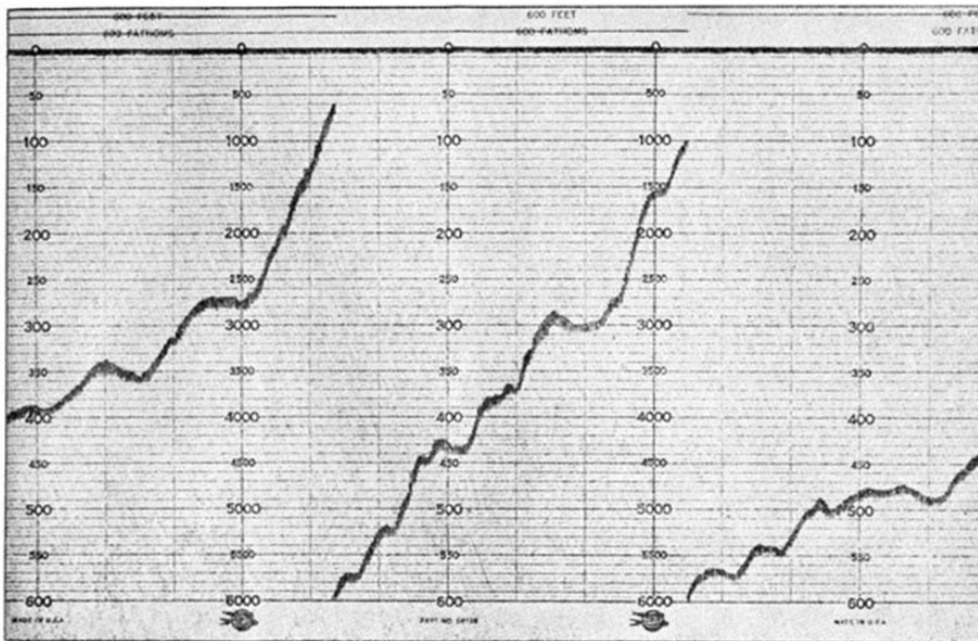


Figure 15-12. -Typical AN/UQN-1B depth recording.