Facsimile Recorder--AN/UXH-2

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The use of facsimile technique by the military services to distribute weather information received its baptism during World War II. The pressing needs of the services for equipments and facilities brought wholesale adoption of commercial designs. Also facsimile equipment--already used by the military serv-

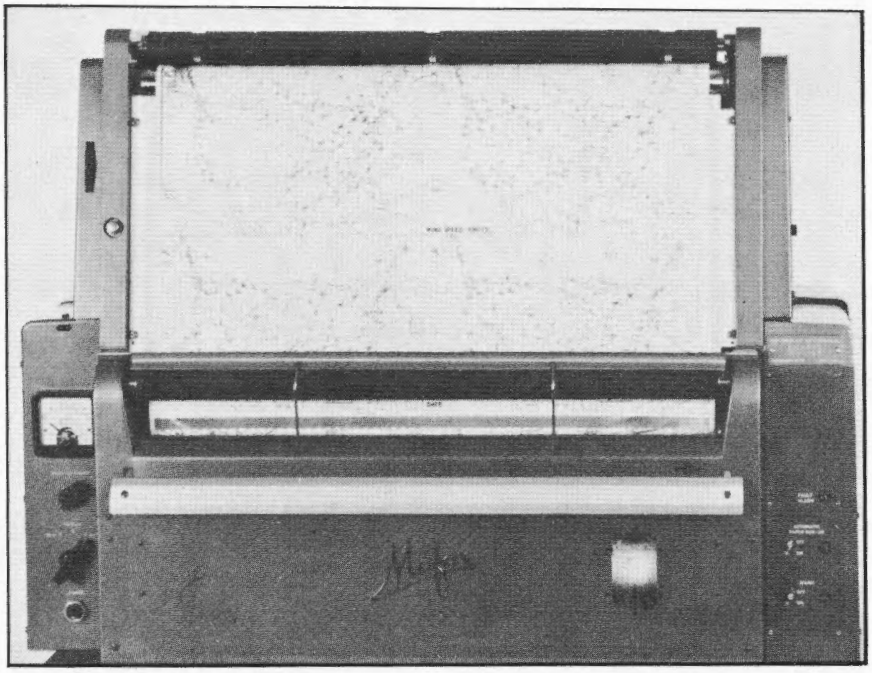
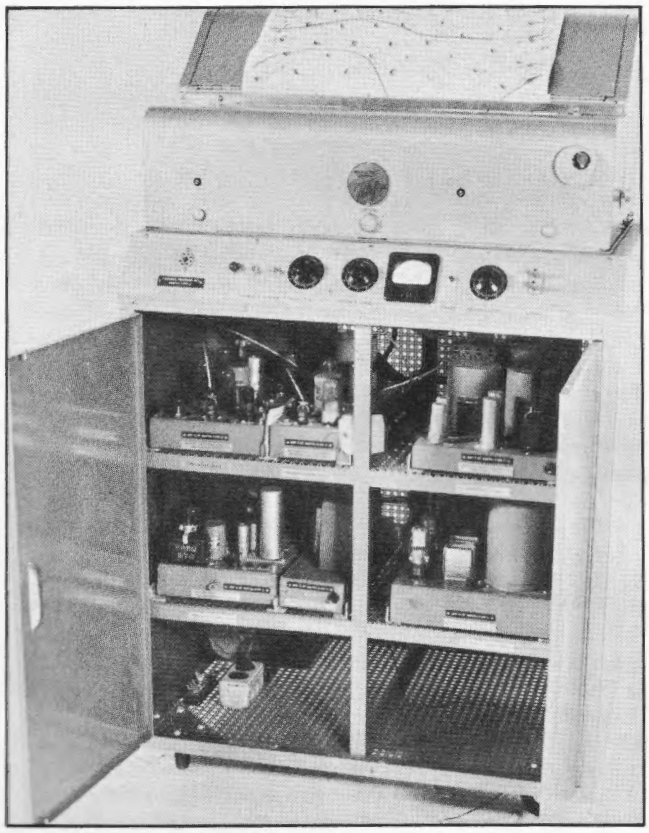


Figure 1 (lower left). Weather map facsimile recording machine showing arrangement in chassis.

Figure 2 (upper right). Weather map recording machine with helix and bar recording mechanism.

Figure 3 (lower right). Third type of weather map recording machine.



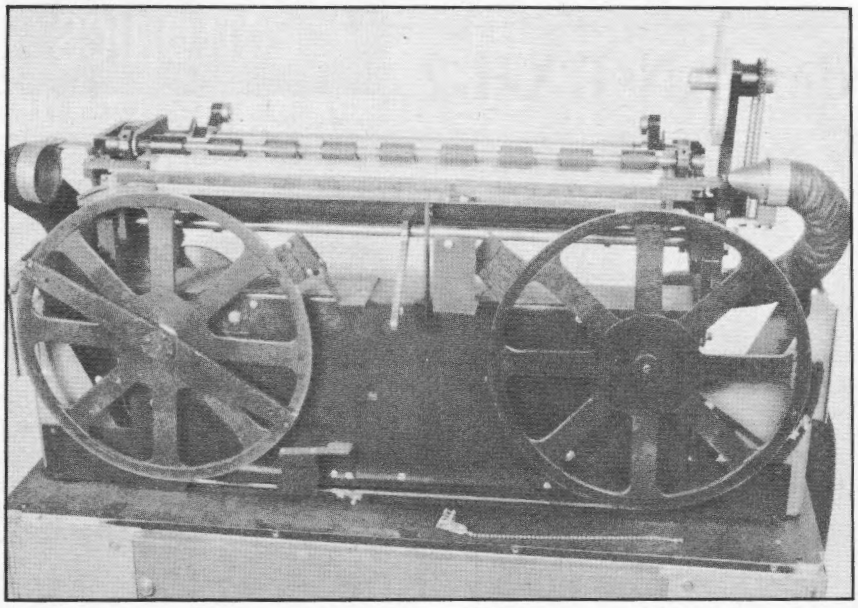


Figure 4. Mechanical assembly of machine shown in figure 3.

ices--was adapted to this specific application.

All of the machines were fundamentally of the same type. They had rotating drums on which to fasten the copy or recording sheets. The equipments were in many cases designed for general purpose use. The scanner and recorder were combined in one machine that could make both photographic and direct copy recordings.

The different machines worked with copy of many sizes. Much compromise was needed before a standard sized map--18.85 inches wide by 12 inches long--could be adopted.

The direction in which most significant improvement could be made for ease of operation and map accessibility became gradually apparent with operating experience; namely, the development of a continuous page recorder.

Contract Awarded

During 1950 and 1951 requirements for such a recorder that could be used by all the services were agreed on and a contract for a fully militarized recorder was awarded early in 1952.

While the experiments and studies were being made, three commercial continuous recorders in the 18.85-inch size were purchased by the Navy to be evaluated for potential contribution to the development program. Two machines were procured from each of three companies.

Figure 1 shows the general arrangement and appearance of one type. This machine has a mechanical assembly mounted on a cabinet in which various electronic chassis are placed. The copy on 400-foot rolls of teledeltos paper is directly visible. Recording is by styluses mounted on a sprocket-driven belt.

Figure 2 shows another machine that has a helix and bar recording method. An electrolytic recording paper is used with this machine.

Figure 3 shows the third recorder, and figure 4 is the same recorder with more details of the mechanical assembly. This machine has a continuous belt on which the styluses are mounted.

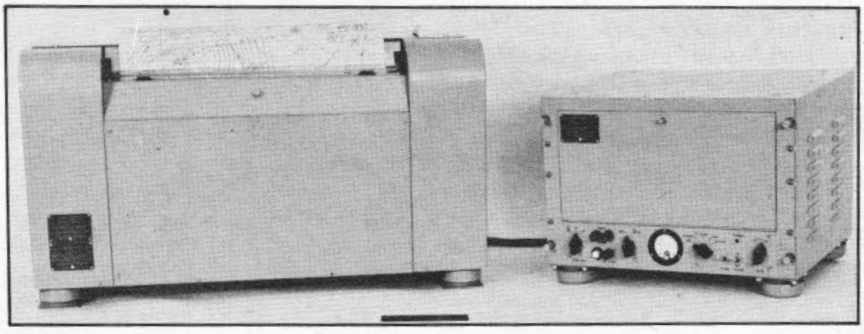
The machines shown in figures 1 and 3 are similar in size and weight. Both designs have heavy castings to give mechanical strength and stability. The mechanical assembly of the machine shown in figure 1 is much smaller than that of the third machine in which 12-inch diameter pulleys are used. However, that both machines are experimental is clearly apparent.

The Navy Electronics Laboratory evaluated all three types for the Bureau of Ships.

Mechanically, the least difficulty was experienced with the first machine, probably because it has the simplest design. Electronically, the second machine surpassed the other two.

However, because the first machine did not have automatic control circuitry, direct comparison on this could be made only between the second and third machines.

Figure 5. Model of first recording machine developed especially for the military services.



While the Navy Electronics Laboratory was evaluating the three machines, the development of a military version--the AN/UXH-2 equipment--was going forward.

Figure 5 gives a general view of the first model of the equipment developed for the military services--the AN/UXH-2(XN-1). In this model, the 12-inch diameter pulleys were retained. Some reduction in size and weight over the commercial equipment (figure 3) was attained, but both the contractor and the Bureau of Ships were convinced that only by reducing the pulley diameter could there be any great reduction in size and weight.

This first military model had approximately 45 tube elements in the electronic circuitry to provide the signal and control functions.

A second model, the AN/UXH-2 (XN-2), based on the use of 6-inch pulleys, was started immediately after evaluation of the first military model. In this design, a drastic revision of the electronics of the machine was undertaken.

One of the toughest problems in the whole program was that of providing multispeed operation without resorting to gear changes.

Mechanical Shock

The basic difficulty was caused by the mechanical shock transmitted from the pulley driving motor to the synchronous motor that is used as a drag on the pulley system. The size of the shock varied with the driving speed. Also, in a similar manner, the effective torque of the synchronous motor varied with the speed.

A method of voltage control of the induction motor speed for a given gear train was being used, but no satisfactory combination of type of motor and voltage was discovered.

The final solution incorporated a flywheel damper and impulse shock absorber that, together with voltage control, provided three switch-selected speeds of operation under all conditions of line voltage and frequency variation imposed by the specification.

The physical appearance of the second military model, AN/UXH-2 (XN-2), was similar to that of the final model shown in figure 6, the AN/UXH-2(XN-3). Only 16 tube elements are required in the electronics of the AN/UXH-2(XN-2) and the AN/UXH-2(XN-3) models.

Models of the AN/UXH-2(XN-3), figure 6, are being evaluated by each of the services--the Army, the Navy, and the Air Force.

Unattended Operation

The AN/UXH-2 machine is expected to operate completely unattended on either wire or radio circuits. In the automatic position, the machine upon receiving a 300-cycle tone adjusts recording level to the proper value, phases to the incoming signal, and starts recording.

At the end of a transmission, when the machine receives a tone of 450 cycles, it stops recording and reverts to a ready condition in which only the electrical circuitry is actuated.

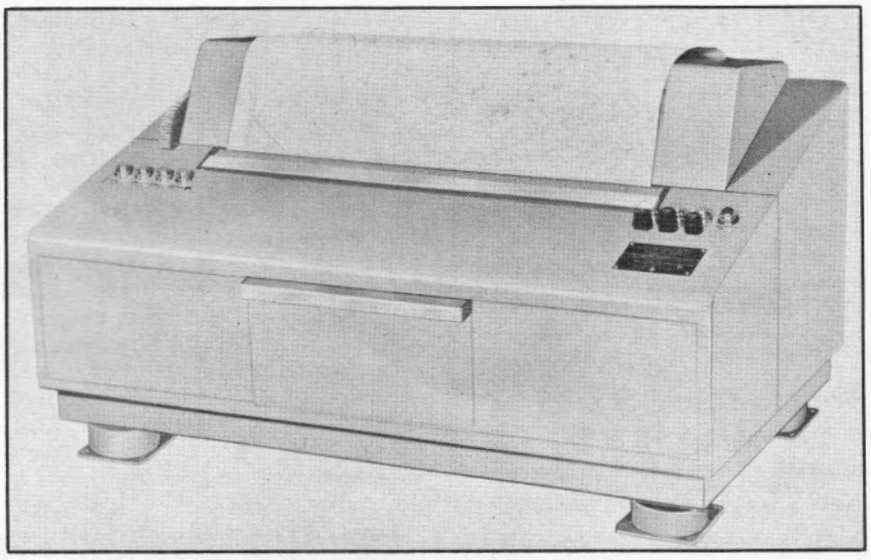


Figure 6. Model of machine now being evaluated for use by the military services.

The control signals appear as modulation on either an 1800-cycle or a 2400-cycle carrier. The modulating signals are accurately recoverable even if the facsimile signals undergo several frequency translations, including frequency shift keying.

During the development program, a prime objective has been to insure 100 percent compatibility with the equipment now in use in facsimile communications networks. This objective has been attained.

The recorder accepts signals from the AN/TXC-1 transceiver, yet it is not affected by the control signals that, until recently, were the standard on the national weather network (WBAN).

Gradual Introduction

Except for the significantly greater ease of operation of the new equipment, no noticeable effect on WBAN or other facsimile network will appear if single page or continuous page installations are interconnected.

As soon as production equipments are available, they will be gradually introduced into Fleet units.

Field Strength Indicator Attachment For Test Set TS-352/U

By Robert E. Jones
Phlco Field Engineer

A field-strength indicator is often needed by personnel responsible for maintaining vehicular and aircraft radio sets in tactical units. Such a device is invaluable for making transmitter and antenna tuning adjustments, as well as for routine trouble shooting....

With a minimum of materials it is possible to construct a simple device that, when used with test set TS-352/U (or equivalent multimeter), will give a relative indication of transmitter field strength.

The device to be described has been used as a field-strength indicator in making tests with radio transmitters having power outputs ranging from 0.25 to 600 watts and frequency ranges from 1.8 to 150 megacycles. No tuning or adjustment of the attachment is required. The device can be constructed by personnel having a limited knowledge of radio maintenance. No modification of test set TS-352/U is necessary.