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NASA TECH BRIEF

Lewis Research Center

Automated Operation of an Instrumentation FM Tape Recorder

It was necessary to totally automate an instrumentation FM tape recorder used for the continuous recording of failure data in an endurance test facility. The previous procedure was to record the data at 38.1 cm/sec (15 in/sec) and then, every 96 minutes, manually remove the recorded tape and replace it with a degaussed roll. The recorded tape representing history of a failure was stored for several hours and then degaussed prior to being used again.

Total automation presented several problems. The particular instrumentation recorder in use did not possess an erase head nor was it capable of automatically rewinding a reel of tape for reuse when the end of the tape was reached. Tests were conducted to evaluate the not very well known or published fact that an FM carrier recording signal with sufficient intensity will by itself erase previously recorded data as new data are being recorded. The results showed that, with this method, new data could be rewritten over old data, without noticeable recorded signal deterioration or excessive noise, until tape wear occurred. Typically, the tape was replaced after 25 cycles.

To utilize this method of automatic FM erasure effectively, to still maintain an adequate history of data on the tape, and to reduce the ratio of rewind time to record time, it was desirable to slow the recording speed. The manufacturer's manual suggested using a recording speed of 38.1 cm/sec (15 in/sec) to give the required frequency response. But it was found that with the same electronics and FM center frequency, the recording speed could be reduced by 50% to 19.05 cm/sec (7.5 in/sec) without noticeable recorded signal deterioration. The result was an increase in total recording time from 1.6 to 3.2 hours while the rewind time remained the same (approximately 3 minutes).

Automatic rewinding was readily accomplished by adding conventional metal leaders and appropriate circuitry. Shortly after a failure occurs, a computer stops the tape recorder to maintain intact approximately three hours of history.

This modified FM tape recorder has been used continuously to automatically record failure data for over 10,000 hours without any problems.

Note:

No additional documentation is available. Specific questions, however, should be directed to:

Technology Utilization Officer
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Patent Status:

NASA has decided not to apply for a patent.

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