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Materiel Test Procedure 6-2-186
Electronic Proving Ground

3817

U.S. ARMY TEST AND EVALUATION COMMAND
COMMODITY ENGINEERING TEST

METEOROLOGICAL EQUIPMENT METEOROLOGICAL STATIONS, MANUAL OR AUTOMATIC

1. OBJECTIVE

The objective of this materiel test procedure (MTP) is to outline a series of engineering subtests designed to determine the technical performance and safety aspects of a family of equipments relative to the criteria cited in applicable Qualitative Materiel Requirements (QMR's), Small Developement Requirements (SDR'S), Technical Characteristics (TC's), and other requirements and documentation.

2. BACKGROUND

The increasing requirements for meteorological information have fostered a growing demand for obtaining such data more rapidly and accurately. The production of more specialized meteorological devices and the increased use of these devices in station groups have led to the development of devices with increased mobility and automatic action. The further development of meteorological stations continues to advance as the state of the art is advanced in the area of meteorological equipment.

In QMR's and other documentation, the military services have indicated that they desire to have a meteorological station that is transportable and either manual or automatic in operation. Although such a station could be designed to perform its function in either mode, it is probable that the test item will be either manual 6r automatic. It is not probable that a meteorological station will be capable of both manual and automatic operation since the missions of the two will differ in siting, ease of access, and maintenance attention.

The Qualitative Materiel Requirement for an Integrated Meteorological System is basedon Combat Development Objectives Guide (CDOG), paragraph 1539c(32).

3. REQUIRED EQUIPMENT

a. Laboratory thermometer (0.1°c)
b. Stop watch
c. Voltmeter
d. Ammeter
e. Millivoltmeter
f. Frequency meter
g. Wattmeter
h. Standard light intensity meter
i. Standard meteorological sensors
j. Laboratory graduated cylinder
k. Measuring tape (inches)
l. Radiacmeter or scintillometer
m. Volt-Ohmmeter
n. Standard one-candlepower lamp
o. Hygrometer

p. Phsychrometer
q. Aneriod barometer
r. Mercury barometer
s. Gas flowmeter (low backpressure)
t. Oscilloscope
u. Oscillator
v. Digital converter (simulator)
w. Standard of length (English and/or metric units)
x. Standard transmissometer

4. REFERENCES

A. AR 115-12, U.S. Army Requirements for Air Weather Service, 1962.
B. SLGCCD 59-9, Meteorological Data Requirements for the Field Army 1965-70, 1961.
C. AR 115-10, Meteorological Support for the U. S. Army, 1962.
D. CDOG 1539c(44), Qualitative Materiel Requirement, 1966.
E. SB11-148, Meteorological Station Sets, 1961
F. TM11-422, Meteorological Stations, AN/PMQ-1, 1954
G. TM11-6660-201-12P, Meteorological Stations, 1959
H. TM 11-2412, Meteorological Stations, 1953
I. TM 11-2406, Meteorological Stations, AN/TMQ-1, 1944
J. TM 11-6660-218-15 Meteorological Stations, AN/TMQ-4, 1961.
K. SB 11-531, Meteorological Stations, AN/TMQ-5, 1962
L. TM 1-300, Meteorology for Army Aviations, 1963
M. MIL-M-27932, Meteorological Station, 1962.
N. Compendium of Meteorology, American Meteorological Society, 1951
O. Handbook of Meteorological Instruments, Air Ministry of Great Britain Meteorological Office, Great Britain, 1956.
P. Middleton and Spilhaus, Meteorological Instruments, 1960.
Q. MIL-STD-202C, Test Methods for Electrical Parts, 1963.
R. MTP 6-2-507, Safety.
S. MTP 6-2-189, Wind Measuring Equipment
T. MTP 6-2-183, Cloud Height Set
U. MTP 6-2-185, Met Sounding Systems
V. MTP 2-2-050, Semitrailers
W. MTP 6-2-242, Radio Recievers Transmitters, General
X. MTP 6-2-065, Data Transmission Equipment

5. SCOPE

5.1 SUMMARY

The scope of this MTP is limited to the engineering test of meteorological station groupings of essential components for information gathering and recording (or reporting). These components consist of state-of-the-art devices designed to sense and display ambient data on temperature, dew point (humidity), wind direction and speed, barometric pressure, cloud height (sky condition), visibility, rainfall, and snow depth in the environment of the station. Components of the system which have been standardized will not be

retested except as they influence the system.

a. Temperature Sensor - The objective of this subtest is to determine the technical performance characteristics of this component.

b. Hygrometers - The objective of this subtest is to determine the technical performance characteristics of this component.

c. Wind Measurement Sensor - The objective of this subtest is to determine the technical performance characteristics of this component.

d. Cloud Height Set - The objective of this subtest is to determine the technical performance characteristics of this component.

e. Rain Measurement Sensor - The objective of this subtest is to determine the technical performance characteristics of this component.

f. Snow Measurement Sensor - The objective of this subtest is to determine the technical performance characteristics of this component.

g. Visibility Sensor - The objective of this subtest is to determine the technical performance characteristics of this component.

h. Air Pressure Sensor - The objective of this subtest is to determine the technical performance characteristics of this component.

i. Aspirator System - The objective of this subtest is to determine capacity of the system to ensure adequate circulation of ambient atmosphere to yield optimum measurements.

j. Indicator-Recorder Test - The objective of this subtest is to determine the technical performance characteristics of these components.

k. Transducers - The objective of this subtest is to determine the degree of uniformity, accuracy, and validity of the interface between sensor and transmitter.

l. Transmitters - The objective of this subtest is to determine the degree of accuracy and responsiveness to impressed elements of data.

m. Decoder Test - The objective of this subtest is to determine the technical performance characteristics of these components.

n. Overall Testing - The objective of this subtest is to investigate the performance of the following:

1) Each sensor/transducer/transmitter/decoder/indicator combination as an operating entity
2) Each grouping of above systems using a common recorder or common transmitter (shared channel)
3) Any other distinctive combination of available elements which measures, transmits, and presents data

5.2 LIMITATIONS

Components for measurement of meteorological parameters are usually independent of each other and can be tested by themselves. Some may be tested under MTP's specifically applicable. Components peculiar to items designated meteorological stations and which in rare cases may be used alone must be tested. Automatic stations include their own power supplies, recording devices, transmitters, and suitable coverters to make the station compatible with Army communications systems. The nature of such converters is still in the concept stage and tests can not be prescribed. The subtests given in this MTP apply to a commodity class and appropriate selection by the test plan writer can be made as they apply to an assigned test item.

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Visual Inspection

Inspect the test item carefully for damage indicated by dents, bent handles, or broken connector receptacles. Perform inspection for inoperative blowers and controls, loose or broken components, and other obvious damage. Inspect fuzes to verify that ratings are in agreement with designated values. Check for Safety aspects in accordance with MTP 6-2-507 Safety.

6.1.2 Bench Preparation

Provide correct power source, necessary test instruments, and interconnecting cables. Calibrate and adjust all test instruments or verify validity of calibration certificate.

6.1.3 Personnel

Ensure that test personnel are familiar with the test item, its operation, and the test objectives. Manuals shall be used when available.

6.1.4 Records and Forms

Prepare necessary forms and a schedule for conduct and completion of engineering test.

6.1.5 Warmup

Prior to each test, allow a minimum warmup period of 15 minutes for test item and test equipment.

6.1.6 Components Tests

Dismount components which are essentially independent of each other for test, when practicable.

6.2 TEST CONDUCT

6.2.1 Temperature Sensor

a. This subtest shall be conducted under controlled temperature conditions by comparison with calibrated or laboratory standard (reference) accurate to ±0.1 degree Celsius (C). Thermometers shall be tested in accordance with MTP 10-2-130.

NOTE: Military Standards prescribe accuracy of ±0.1 degree Fahrenheit (F), and 01 degree C is approximately 0.2 degree F.

b. Recording or electrical indicating sensors shall be placed in a chamber capable of accurate temperature variation from -40 degrees to +60 degrees Celsuis.

1) The temperature sensor shall be connected by the shortest provided link to its associated indicator, transmitter, or transducer outside the chamber or to a suitable laboratory substitute.
2) The time lag of the reference shall be noted or determined if unknown. This factor can be ascertained by rapid transfer from one ambient temperature (chamber) to other ambient temperatures (chambers) and observing the time required to stabilize the reading. This action shall be repeated each 10 degrees over the necessary range as given in the criteria provided.
3) Temperatures shall be increased in 10-degree steps from -40 degrees to +60 degrees C. The time lag found in subparagraph d shall be allowed as a minimum for stabilization of chamber temperature. Readings shall be accepted as "stable" when two readings taken 1 minute apart are the same.
4) Indicated temperatures of the test item shall be taken simultaneously with those of the standard.
5) Response of test item compared to the standard shall be observed.

6.2.2 Hygrometer Accuracy

A hygrometer is an instrument which measures the water vapor content of the atmosphere. These are (1) the psychrometer, which utilized the thermodynamic method; (2) the class of instruments which depends upon a change of physical dimensions due to the absorption of moisture, such as hair hygrometer, torsion hygrometer, goldbeater's - shin hygrometer, and carbonfilm hygrometer element; (3) those which depend upon condensation of moisture such as the dewpoint hygrometer; (4) the class of instruments which depend upon the change of chemical or electrical properties due to the absorption of moisture such as the absorption hygrometer, electrical hygrometer, carbonfilm hygrometer element; (5) the class of instruments which depend upon the diffusion of water vapor through a porous membrane such as the diffusion hygrometer.

a. The accuracy of thermometers, which may be used in psychrometers, shall be tested in accordance with MTP 10-2-130.

b. Operate the hygrometers in a suitable chamber with controlled humidity and temperature. Calibrated laboratory humidity and temperature sensors shall be used to form comparison readings.

c. Starting with dry air (approximate) and with the temperature held constant at the highest stated operating temperature of the hygrometer, increase the moisture content of the air in the chamber in increments of about 10% relative humidity to approximately 100% relative humidity. Operate the hygrometer at each step and compare readings with the standard sensors.

d. Reduce the temperature in the chamber by 10°C, operate the hygrometer and standard sensors to obtain a humidity reading. Lower the relative humidity in steps of approximately 10% and obtain comparative reading at each step to the lowest humidity obtainable in the chamber.

e. Alternately repeat the increasing and decreasing humidity steps c and d above until the lowest specified operating temperature of the hygrometer is reached.

6.2.3 Aspirator System

a. When rate of flow is specified in criteria, attach a micro-meteorological vertical air flow sensor to the air outlet of the test item housing.

b. Operate the aspirator blower at normal speed and observe the rate of flow over a period of 30 minutes.

c. Place calibrated laboratory thermometers in the aspirator intake and exhaust and observe temperatures each minute for the 30 minutes of observation to determine the influence of the aspirator on the air temperature.

d. The adequacy of the aspirator system shall be tested by comparing the readings of the test items sensors (housed in the aspirator) with standard sensors exposed to the ambient conditions near the aspirator. Such comparisons shall be taken against specified elapsed times as may be expressly provided in the criteria.

6.2.4 Wind Measurement Sensor

This subtest shall be performed as directed in MTP 6-2-189.

6.2.5 Cloud Height Set

This subtest shall be performed as directed in MTP 6-2-183.

6.2.6 Rain Measurement Sensor

This test shall be made by comparison of measurement readings with a standard rain gauge when such a gauge is available, but it must have the same cross-section of collection area as does the test item.

a. Using a laboratory graduated cylinder, carefully pour water into the standard rain gauge until it registers one inch or more.

b. In the same manner, pour the identical quantity into the test item.

c. When no stamdard gauge is available, the amount required to register one inch of rainfall shall be calculated as follows: volume requires equal cross-section of collection area times depth.

Width x Length x Depth = Volume
Radius x Radius x π x Depth = Volume

NOTE: All dimensions in inches yield volume in cubic inches. The calculated volume shall be measured and transfered to the test item.

d. If the gauge is a cumulative-counter type, adding small, equal increments electrically by a tipping bucket, the addition of water shall be accomplished slowly, not to exceed the equivalent of six-tenths inch of rain per hour. The test shall be continued for 15 minutes.

e. The above test shall be repeated with addition of water at a rate of equivalent to two and four-tenths inches per hour. This requires four tips of the bucket per minute when the tip occurs at one one-hundredth inch content.

6.2.7 Snow Measurement Sensor

a. Scale accuracy of the measuring element (tape or rod) shall be determined. An engine-divided metal scale, standardized for laboratory use shall be the comparison standard.

b. The standard shall be accepted as accurate at 15 degrees C. It shall be stabilized at 0 degrees C and at -40 degrees C and the changes in length observed at each temperature.

c. The standard and the test item shall be mounted with zero indexes matched, then subjected to temperatures of 0 degrees C and -40 degrees C.

d. Rigidity or "stiffness" of the depth measuring scale shall be determined by application of pressure lengthwise until deformation (buckling) occurs.

6.2.8 Visibility Sensor

6.2.8.1 Laboratory Tests

a. The light source of the test item shall be tested for brightness indoors, if space permits, or outside when necessary. Outside, ambient air shall be free of dust and mirage effect from heated surfaces.

b. Measure luminous intensity of the beam using a calibrated light meter at one meter, at the baseline distance to the sensor, and at the midpoint of the base length.

c. At the mid-point measure luminous intensity on a line perpendicular to the light to sensor line. By movement of the meter determine the perpendicular distance to a point where 50 percent of the center-line intensity exists, on each side of the center-line.

d. Place a flat pane of standard, colored, optical glass (smoked glass) in front of the source and measure the luminous intensity at the sensor. The density of glass used shall be that necessary to produce attenuation of transmitted light in various degrees as may be specified.

e. At each attenuation value, observe indicated visibility shown on test item.

6.2.8.2 Comparison Tests

a. Preparation for test shall consist of the selection of a clear range which can be covered by a uniform smoke cover. A time shall be selected when a uniform, minimum breeze exists. This is a fortuitous condition which must depend upon the general weather and must be taken advantage of when observed.

Smoke candles shall be prepared for activation upwind, at an appropriate distance and in such numbers that the smoke will disperse and drift, if low concentration, across the entire line of sight. It will be necessary to make several trials, beginning with lightest attainable smoke density. Targets shall be prepared for actual visibility tests at specific extended distances. Observations may be made in natural fog, if it occurs.

b. The test item shall be compared with a calibrated standard transmissometer (when available), sited for concurrent visibility observations. Smoke shall be caused to cover the line of sight to include the lamp component and the test item itself. Precaution shall be taken to prevent light from the second source being detected by the other transmissometer. This may be accomplished by use of hoods, partitions, or separation of the two devices.

c. Concurrent observations of the same line of sight will serve to average out uneven distribution of smoke. Not less than five pairs of observations with different smoke densities shall be made.

6.2.9 Air Pressure Sensor

a. Place the test item in an altitude chamber (low pressure) with a calibrated aneroid barometer.

b. Compare the two readings and adjust test item to the barometer reading.

c. Decrease pressure in chamber to 21.00 inches (525 millimeters) and observe readings on test item.

d. Increase pressure to atmospheric ambient then to the highest specified operating pressure and observe response.

e. Slowly decrease pressure in 1/2-inch (10-millimeter) steps to 21.00 inches (525 millimeters).

f. Slowly decrease pressure in one-inch (25-millimeters) steps to 18 inches (460 millimeters), or the lowest specified operating pressure of the test item.

g. The test item shall be installed in the laboratory beside a standard for a minimum of 72 hours. Observations shall be made hourly during this period.

6.2.10 Indicator-Recorder Test

Subtest items may include integral indicators or recorders or both. They may be associated with detached data presentation devices, or they may be connected directly to devices designed for transmission of data to remote indicating receivers.

a. In general, all indicators and recorders shall be tested in the same manner.

b. Set up the test item in the laboratory and apply the normal output of the sensor or an equivalent simulator.

c. Vary the above input to the test item over the full range of its scale.

d. Determine the conversion relationship between input and the corresponding reading.

e. As the input is varied, observe indicator response in time relation (lag).

f. Indicators and recorders (when both are used) shall be tested at the same time.

g. Recorders shall be set up and timed for smooth and regular action of pen and chart.

6.2.11 Transducers

These test items constitute the interface between sensors and transmission elements. They receive the data in its observed form, as do the associated indicators, and translate it into analog, digital, or other representation which can be transmitted accurately and retranslated to meaningful values.

a. The transducer test item shall be set up in the laboratory and be supplied with data input from either an actual sensor or from a simulator.

b. The above signal shall be varied continuously upward from lowest to highest parameter value.

c. The signal shall be varied continuously downward from the highest to lowest parameter values.

d. Dependent upon the type of transmitter, the test item output shall be observed with voltmeter, electronic receiver, or oscilloscope as appropriate.

e. Output of the test item shall be observed concurrently with specific value of input.

6.2.12 Transmitters

a. Transmitters may send signals of audio, interrupted continuous wave, digital, or analog content.

b. Each test item shall be set up and supplied with actual or simulated inputs appropriate to its type.

c. The inputs shall be of the type delivered from the appropriate transducer and shall vary over the transmitter's full range.

d. Test item output (transmission) shall be observed in correlation with input as varied between given limits.

e. Radio transmission units shall be tested as directed in MTP 6-2-242.

f. Data transmission units shall be considered transmitters and tested as directed in MTP 6-2-065.

g. Telemetering units shall be considered transmitters and tested as directed in MTP 6-2-065.

6.2.3 Decoder Test

a. The test items shall be set up in the laboratory and supplied with a series of inputs derived from transmissions or from simulator sources.

b. For each input, the decoded data shall be observed.

6.2.4 Overall Test

a. The meteorological station consists of several measurements systems. In use, all systems operate in parallel and concurrently. The overall test shall test each measurement system separately in its overall configuration.

b. Set up each sensor-to-decoder system in its expected configuration.

c. Set up a calibrated measurement device beside the test sensor.

d. Expose both to the conditions to be measured.

e. Observe the data output.

f. The complete, assembled test item, with all components in place, shall be operated in such manner that each component, in turn, will be activated as the initial device and other components successively are placed in operation. The initial device, in each case, shall be observed for effects demonstrating inter-compatibility or lack thereof.

6.3 TEST DATA

6.3.1 Temperature Sensor

a. Time lag in seconds of the calibrated thermometer shall be recorded.

b. At each 10-degree "step", the time in seconds of entry into the new ambient shall be recorded; and at the end of the "lag" interval, the value shown on the "standard" shall be recorded. One minute later the value shall again be recorded.

c. Time readings shall be recorded at one-minute intervals until two consecutive readings are the same.

d. At the time determined subparagraph c above, the test item temperatures readings in degrees celsius shall be recorded.

e. The time lag in seconds of the sensor and of the standard shall be compared. If the test item does not attain 90 percent of the true value within 0.8 minute, this fact shall be recorded and the time in seconds actually required shall be shown.

6.3.2 Hygrometer Accuracy

a. Thermometer test data shall be recorded as indicated in MTP 10-2-130.

b. Record readings of test item and of the standard sensor at each stabilized level of relative humidity in percent.

c. Record concurrent readings in percent of test item and standard sensor at each 10 degree reduction of temperature for each stabilized level of humidity.

6.3.3 Aspirator System

a. Record rate of air flow in cubic inches per minute.
b. Record temperature in degrees C of input air.
c. Record temperature in degrees of output air.
d. Record times in seconds required for test item to produce the correct reading (as shown on the standard device).
e. Record readings before, during, and after observation period taken from sensors housed within the aspirator.
f. Record concurrent readings taken from standard sensors exposed to ambient conditions at the aspirator.

6.3.4 Wind Measurement Sensor

The data recorded shall be as directed in MTP 6-2-189.

6.3.5 Cloud Height Set

The data recorded shall be as directed in MTP 6-2-185.

6.3.6 Rain Measurement Sensor

a. Data recorded shall consist of comparison of the indicated rain in inches with the measured amount of water in inches.
b. The counter reading shall be recorded as a cumulative value in inches.

6.3.7 Snow Measurement Sensor

a. Record changes of length in millimeters at 0 degrees and -40 degrees C.
b. Record pressure in PSI required to produce bending of the measuring element.

6.3.8 Visibility Sensor

6.3.8.1 Laboratory Test

a. Record the brightness in lumens of the light source in lumens as determined at the prescribed points on the light-sensor line.
b. Record the measurements in lumens from the axial line to the 50 percent points observed.
c. Record the attenuations in lumens observed, for each class combination used, by reading the light intensity meter at the sensor.
d. Record concurrent readings in lumens of the sensor (test item).

6.3.8.2 Comparison Tests

a. Readings of test item in visibility units (normally in miles) shall be recorded in direct comparison with those of the standard for each increment of distance and atmospheric density.

b. Observations shall be terminated in each test whenever visibility on either standard or test device is indicated as zero.

c. Actual observation by human agency tends to be qualitative only and dependent upon the variable judgement of the individual. However, visibility judged by the human eye can be correlated with that of the standard transmissometer to evaluate the test item indications. Record visibility from the test item and from the standard at observed stages of obscuration of the target, such as as "loss of definition", at loss of identifiable outline, and at the time of complete loss of visual contact. The observer's estimate of visibility in miles or other units shall be recorded.

6.3.9 Air Pressure Sensor

a. Data shall consist of readings in inches of Hg taken as directed in paragraph 6.2.19 and shall include as a minimum two series: one from surface atmospheric pressure to that at approximately 3,000 meters; the other in the opposite sense from 3,000 meters to surface atmospheric pressure. Paragraph 6.2.19f carries the test to approximately 4,000 meters altitude.

b. Record pressures in inches of HG of test item and of standard barometer taken during the 72-hour comparison test.

6.3.10 Indicator-Recorder Test

a. Record input values.
b. Show conversion formula if appropriate.
c. Record test item readings in correlation with input data.
d. Record lag in seconds or sluggishness in operation.

6.3.11 Transducers

a. Record input values.
b. Show formula of transformation.
c. Record output values.

6.3.12 Transmitters

a. Record input values.
b. Record transmitter output values.
c. Data for radio transmission equipment shall be recorded as directed in MTP 6-2-242 or MTP 6-2-065 as appropriate.

6.3.13 Decoder Test

a. Record inputs.
b. Record outputs.

6.3.14 Overall Testing

a. This subtest, applied to each measuring system, shall consist of tests conducted separately, by system, but as an integrated whole for each measured parameter.

b. Record inputs in the terms the sensor accepts.
c. Record outputs at indicator, at recorder, or at receiver output.
d. Record observed aberrations as additional components are activated.

6.4 DATA REDUCTION AND PRESENTATION

6.4.1 Temperature Sensor

a. Data shall be presented to show correlation between the test item and the standard.
b. Time required by test item to attain 90 percent of the true value shall be presented.

6.4.2 Hygrometer Accuracy

a. Test points, readings, and variations shall be presented in tabular form, as follows:

Table I. Comparative Observations at Constant Temperature of ___ °*

Nominal Humidity	Test Item Reading	Control Sensor Reading
Minimum		
10% 10% steps to		
maximum		
10% steps		
to Minimum		

* Maximum specified operating temperature

b. The above data may be presented in chart form but shall also be presented by graphical plots on rectangular axes for comparison throughout the ranges of temperature and humidity.

Table II. Comparative Observations at Constant Temperature of _____°*

Nominal Humidity	Test Item Readings	Control Sensor Reading
Minimum	–	
Then 10% steps to		
Maximum and back		
to Minimum		

* Repeat this tabulation at each temperature

6.4.3 Aspirator System

a. Reduce data by simple subtraction as shown in Table III.

Table III. Aspirator Test Data

Temperature			Elapsed Time to Reach
Input	Output	Difference	a Correct Reading

b. Present comparison data as follows:

Table IV. Comparative Readings

	Inside Aspirator	Standard Sensor Outside Aspirator
Test Item A		
Test Item B		
Test Item C		

6.4.4 Wind Measurement Sensor

Data acquired in this subtest shall be reduced and presented as directed in MTP 6-2-189.

6.4.5 Cloud Height Set

Data acquired in this subtest shall be reduced and presented as directed in MTP 6-2-183.

6.4.6 Rain Measurement Sensor

a. These data shall be reduced by comparison of indicated volume required to trip versus the measured volume.

b. Sum of trip actions shall be presented in comparison with counter total.

6.4.7 Snow Measurement Sensor

These data shall be presented as comparison of test item readings versus true values.

6.4.8 Visibility Sensor

a. Present the brightness of the light as measured at the three designated points.

b. Compare the values above with the squares of the distances, to demonstrate uniformity of light path.

c. Plot the angular divergence of the light beam using one-half the baseline versus the measured distance from the axis to the 50 percent point.

d. Tabulate the glass combinations used. Opposite each, list the meter readings.

e. Compute and list the ratio of each attenuated reading to the maximum shown in a above. Thus the lesser reading divided by the maximum will equal proportional light transmission.

f. List sensor readings.

Table V. Light Transmission

Glass Combinations	Attenuated Meter Value	From a, Max Value	Ratio of a/m	Visibility Value from Sensor

g. Compare specified visibility-attenuation values with those exhibited in paragraph d.

6.4.9 Air Pressure Sensor

a. These data shall be presented in tabular form displaying test item data versus standard data.

b. Deviations from the standard shall be averaged for presentation.

c. The mean shall be determined and presented.

d. Differences shall be computed. Average and mean shall be determined and presented.

6.4.10 Indicator-Recorder Test

a. Tabulate input values versus output values.
b. Lag measured shall be reduced to an average, and where outputs differ from computed values, the plots shall be adjusted in real time for factual comparison.

6.4.11 Transducers

a. Plot inputs
b. Show numerical reduction
c. Plot outputs

6.4.12 Transmitters

a. Plot input
b. Plot output
c. Comparison of above data displays the straight line quality of transmission.
d. Engineering data on the transmitter itself shall be reduced and presented as directed in MTP 6-2-242 and MTP 6-2-065.

6.4.13 Decoder Test

True inputs shall be tabulated versus the indicated output.

6.4.14 Overall Testing

a. Real data or simulated data of suitable values shall be tabulated as inputs to each system.
b. Output from the final element shall be tabulated in correlation with inputs.