FOOD AND DRUG ADMINISTRATION
WINCHESTER ENGINEERING AND ANALYTICAL CENTER

PROCEDURES FOR LABORATORY COMPLIANCE TESTING OF TELEVISION RECEIVERS

MAY 1, 1986

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INTRODUCTION

The purpose of this document is to establish procedures for laboratory compliance testing of television receivers that are certified by the manufacturer as in compliance with the HHS Performance Standards for Television Receivers published in 21 CFR 1010 and 21 CFR 1020. The procedures described in this document are applicable to both domestic and imported television receivers, video monitors, and video projectors. Definitions for terms used in this document are identical to the definitions published in 21 CFR Parts 1000-1020.

GENERAL INSTRUCTIONS

1. Laboratory control of television receivers shall be maintained as specified in the Regulatory Procedures Manual, the Analysts Operations Manual, Compliance Program 7382.006 "Compliance Testing of Electronic Products at WEAC", and Compliance Program Circular 7382.006B "Compliance Testing of Television Receivers at WEAC".

2. All test data shall be recorded on Analyst Worksheets (FD-431 and FD-431a) and on the special television receiver data sheets contained in Appendix B.

3. Upon notification of the assignment of a television sample for analysis, the Primary Analyst shall:

   a. Obtain copies of the service manual, circuit diagrams, and manufacturer's test data for the assigned sample (if not available, consult Supervisor). Manufacturer's information will be supplied by CDRH and will be located in the report folder when the Analyst receivers it. Most service manuals and/or schematics will also be supplied by CDRH or by the inspector and mailed to WEAC. However, there are times when a schematic will be included with the sample. In this case, it shall be noted in report on Page 1 of the FD-431, Item 7 (Description of Sample) and a copy shall be retained for the WEAC files. If the schematic accompanying the sample differs significantly from the schematic supplied by CDRH, a copy of the correct schematic shall be sent to CDRH as an attachment to the sample report.

   b. Obtain the sample from the Sample Custodian and transfer it to the testing laboratory.

4. Upon receipt of the sample and prior to breaking the seal and removing

the sample from its shipping carton, the Primary Analyst shall:

a. Initiate the appropriate worksheets. The sample number shall be obtained from the Collection Report (FD-464) and clearly printed on each worksheet.

b. Reconcile each record for the sample. Any discrepancies between the sample received and the Collection Report (FD-464) or Inspectors Seal (FD-415a) shall be immediately reported to the Supervisor. Missing seals and/or Collection Report shall be immediately reported to the Supervisor.

c. Carefully study the television receiver circuitry concentrating on the low voltage power supply and the high voltage circuits. Choose Phase III faults in order to maximize high voltage output. Determine if the receiver utilizes a hold-down circuit.

d. NOTE: Because of the particular construction of wire-wound resistors, their failure in a shorted mode is considered extremely unlikely. Therefore, the shorting of any wire-wound resistor will not be considered as a legitimate fault for Phase III analysis.

5. Extreme caution shall be taken in unpacking the sample. The original shipping carton and packing material shall be saved. The packing material shall be returned to the carton for later use in repacking the sample for storage or shipment.

6. All x-ray leakage measurements shall be carried out according to the procedures described in Appendix A, "Measurement of X-Radiation Leakage From Television Receivers".

7. All radiofrequency radiation measurements shall be carried out according to the procedures described in Appendix D, "Radiofrequency Radiation Survey Procedure".

8. Consult TV Project Leader or Senior TV Analyst if at any time during testing the sample becomes damaged.

9. X-ray and electrical hazards are inherent with these tests. Perform all operations with extreme care.

10. CAUTION: If at any time during the testing the measured x-ray leakage radiation becomes measurable above background, immediately notify the Project Leader or Senior Analyst. If the measured x-ray leakage radiation reaches 0.5 mR/hr, STOP and immediately notify the Supervisor.

TEST PROCEDURES

I. PHASE I - OPERATION AND LABELING CHECK

A. Operation

1. Unpack the sample and inspect for any visible damage. If no damage is found, connect sample to the appropriate line voltage and RF or Video input signals. Turn the set on and determine if it is operational. Notify the Project Leader or Supervisor if any set malfunctions or has significant external damage on receipt. The Project Leader or Supervisor shall contact OC/CDRH to determine disposition of the sample.

2. Scan all surfaces of the sample with the Stoms meter (or equivalent) while the sample is operating at normal viewing brightness.

3. If the set is functioning correctly, has no damage, and emits no detectable X-radiation above background, mark the operational check as "adequate" on the worksheet.

4. Perform a Radiofrequency Radiation Survey of all surfaces of the sample following the procedure described in Appendix D.

B. Certification and Labeling

1. Visually examine the certification label or tag for (a) resence, (b) permanence, (c) legibility, and (d) viewability.

2. Visually examine the identification label or tag for (a) presence, (b) permanence, (c) legibility, and (d) viewability.

3. Visually examine the date of manufacture label or tag for (a) presence, (b) permanence, (c) legibility, and (d) viewability.

4. Photographically document the certification and identification tags or labels only if the information contained therein is not adequate for compliance with the labeling requirements of the Standard.

5. If any of the required labeling is not present open the sample, have this verified by another Analyst.

II. PHASE II - CONTROL ADJUSTMENT TEST

A. Test Set-Up - refer to Figure 1 for details.

1. Place the sample on the test bench and remove the back panel.

2. Following the manufacturer's instructions, ground all high voltage circuits to remove any residual charge.

3. Connect the high voltage and appropriate current meters into the second anode circuit. Refer to the manufacturer's information

and determine nominal and worst-case high voltage conditions and choose the appropriate scale on the high voltage meter. If at any point during the testing, scales have to be changed, it shall be noted in the report at that point.

4. Connect the test pattern generator to the appropriate input terminal of the sample. (Color bar signal for color sets, cross-hatch for black and white sets, or WEAC character display for any samples which will not accept a standard composite video signal.)

5. For AC operated sets, connect one end of the test line cord to set (verify that set is turned off), and then connect the other end of the test line cord to a variable auto-transformer, which is set to zero. For DC operated sets, connect test line cord from the set to a DC power supply with the power supply voltage adjust control set to minimum.

6. Connect the test stand multimeter to the B+ measurement point. The B+ is defined as the DC voltage internally supplied to the high-voltage-producing circuitry.

7. <u>CAUTION:</u> Verify that no individual or unnecessary pieces of equipment are near the high voltage components of the sample and test gear.

8. Turn the sample on at nominal input voltage and adjust the user controls (see Sec. II.C.7.a.) for a usable picture at a typical viewing brightness. Record the input voltage, B+, high voltage, and beam current for this one point on the worksheet.

9. <u>NOTE:</u> Some samples may require measurement of beam current in only one tube/gun at a time, special input signals, addition of user supplied control pots, or other unique set-up conditions to make the sample operational and/or to allow high voltage and beam current to be directly measurable. In these cases be sure the set-up and test equipment used are clearly described on the worksheet.

B. <u>Critical Component Labels</u>

1. The Performance Standard requires that a critical component warning label be affixed or inscribed on all television receivers which could product radiation exposure rates in excess of the Standard's requirements as a result of failure, improper adjustment, or improper placement or a circuit or component.

2. Determine if a critical component label is present and clearly legible under conditions of service and whether appropriate components are specified and/or a reference to the service manual has been made concerning X-radiation precaution.

3. If the labels found on the sample do not meet the criteria of a critical component warning label (as in B.2.), it shall be noted in the report as "not adequate". (The exact replacement label on

the picture tube is not considered as the "critical component label".)

4. For receivers that meet the exemption criteria*, a critical component warning label is not required, and the Analyst shall enter "N/A" for adequacy and comment that the receiver meets the requirements for exemption. The Analyst shall also record the presence or absence of the label.

   *Any receiver whose worst case Phase III power curve under any conditions does not exceed 20 kV at any beam current and does not exceed the 0.1 mR/hr isoexposure curve would qualify for an exemption under the provisions of 21 CFR 1002.50.

C. Phase II Chassis Power Curve

1. Center appropriate radiation monitor on the picture tube face.

2. Apply and gradually adjust input voltage to the sample to 110% of the manufacturer's stated maximum input voltage with the following exceptions:

   a. All sets with a nominal input voltage between 110 Vac AND 120 Vac will be tested up to 130 Vac.

   b. All sets designed for possible automobile DC power use (12 Vdc nominal input) will be tested up to 15 Vdc.

   IMPORTANT: In some cases it may be necessary to use a lower value of line voltage for this test if it has been determined that a lower voltage produces maximum x-ray radiation.

3. Adjust CRT anode current from minimum to maximum through various combinations of BOTH USER AND SERVICE CONTROL ADJUSTMENTS. For each value of CRT current the user and the service controls shall be adjusted to maximize the high voltage and/or the radiation from the picture tube while maintaining a usable picture.

4. Measure and record values of CRT high voltage, beam current, and B+ voltage. Monitor radiation leakage from the picture tube at minimum, maximum, and several intermediate values of CRT high voltage and current by scanning the sample with the Stoms meter (or equivalent).

5. Compare the Phase II chassis power curve (kV vs. mA) with the CRT isoexposure curve and note if the 0.5 mR/hr curve is exceeded.

6. Perform a radiation survey if any radiation leakage is detected above background.

7. a. User controls are defined as any controls on any external surface of the receiver or remote control unit that can be adjusted without the use of a tool (i.e.: Brightness, Contrast, Color, Tint, and Volume). Monitors often have numerous controls available to the user. User controls for a monitor are defined as those controls which affect the brightness, contrast, and color of the display.

   b. Tint (sometimes called hue) control on color television receivers, monitors or projection systems will always be adjusted to produce a blue stripe in the center of the display when a gated rainbow input video signal is used.

   c. Volume controls on all television products tested will always be adjusted to minimum.

   d. Any other adjustable components anywhere on the set are considered sevice controls.

   e. Any controls that are found to be "factory sealed" are to be checked for the permanency and adequacy of the sealing method. Controls having a "seal" which can be readily broken without damaging the control are to be included in the adjustments for maximum radiation during testing. Phase II power curves with and without adjusting such controls are to be obtained. Such situations are to be fully explained in the report and all data appropriately identified.

   f. If service personnel are instructed in the service manual or on the set to remove or add components as an adjustment procedure, e.g. remove or add capacitors to increase or decrease high voltage, such components are considered service controls.

   g. If the sample employs a hold-down or X-radiation safety circuit, and it activates when performing service control testing, follow the procedure as outlined below. Disabling the hold-down circuit will be utilized as a Phase III fault. If the circuit does not activate during Phase II (Service Controls): 1) disabling this circuit will not be included as a Phase III fault; and 2) WEAC Service Control data will also serve as "WEAC data for Mfr. worst case" if the mfr. worst case was to disable the hold-down circuit. (This circuit should be investigated to determine if it is contained on a circuit board which can easily be removed without affecting the operation of the receiver. If so, check with Project Leader to determine if testing without the safety circuit is desired.)

D. <u>Generating Hold-Down Activation Curves</u>

1. Lower the B+ voltage either by utilizing a B+ adjust control or by reducing the input voltage to the set.

2. Adjust the user controls for maximum beam current.

3. Slowly raise the B+ voltage (via a B+ adjust control or adjustment of the input voltage) and record the beam current, high voltage, input voltage, and B+ voltage at the point closest to the activation of the safety circuit.

4. Repeat steps 1-3 above at several lower values of the beam current.

5. The collection of these safety circuit activation points (beam current, high voltage) will be referred to as a Hold-Down Activation Curve.

6. If the particular circuitry of a sample requires as different method of generating a hold-down activation curve, be sure to describe the method used on the worksheet.

E. Radiation Survey

This survey is performed at the CRT beam current value at which the difference between the 0.5 mR/hr isoexposure rate curve kilovoltage and the chassis power curve kilovoltage (KV_{iso}-$KV_{chassis}$) is minimum (or most negative).

1. Scan sample with Stoms meter (or equivalent) to determine location of maximum leakage radiation.

2. Measure and record value of maximum leakage with a Victoreen 440 RF/C (or equivalent). Procedures for measurement of leakage radiation are contained in Appendix A.

3. At the discretion of the Analyst, radiation surveys at other points on the chassis power curve may be performed.

4. Notify Supervisor immediately if at any time the x-ray levels reach 0.5 mR/hr at 5 cm from any surface of the sample.

III. PHASE III COMPLIANCE TEST

A. Test Set-Up

Phase III tests are performed utilizing the same equipment and test set-up used in Phase II testing.

B. Phase III Chassis Power Curve

1. Incorporate the fault in the television receiver. The manufacturer's worst case fault should be tested first when WEAC's circuit diagram analysis also shows this fault to be the most likely worst case fault. The fault most likely to cause set failure should be performed last even if it is the manufacturer's worst case fault.

2. Center appropriate radiation monitor on the picture tube face with the tint control (if sample is a color receiver) adjusted to produce as blue stripe at center screen.

3. Adjust the service controls to minimize the B+ voltage in the set.

4. With the auto-transformer or external power supply adjusted for minimum voltage, turn the power ON. Slowly increase the input voltage. When the raster first appears, observe the picture to insure proper operation and usable picture.

5. The input voltage to the set may be adjusted up to 110% of the manufacturer's stated maximum input voltage with the following exceptions:

   a. All sets with a nominal input voltage between 110 and 120 Vac will be tested up to 130 Vac.

   b. All sets designed for possible automobile DC power use (12 Vdc nominal) will be tested up to 15 Vdc.

6. Power curves may be taken with the input voltage to the set adjusted as low as 90% of the manufacturer's stated minimum input voltage with the following exception:

   a. All sets with a nominal input voltage between 110 and 120 Vac may be tested at voltages as low as 100 Vac.

7. Slowly increase the service controls to the point of maximum adjustment as determined during Phase II testing.

8. Measure and record values of CRT high voltage, beam current, and B+ voltage. Monitor the radiation leakage from the picture tube at minimum, maximum and several intermediate values of CRT high voltage and current by scanning the set with a Stoms meter (or equivalent).

9. If the hold-down or X-radiation safety circuit activates during the Phase III tesitng, a hold-down activation curve will be generated using the procedure described in Section II.D.

10. If any radiation leakage is detected above background, perform a radiation survey as described in Section II.E.

C. For AC/DC sets which can operate on either 110-120 Vac or 12-15 Vdc, some additional testing is required as follows:

   1. Those sets which have completely independent AC and DC power supplies shall have a complete AC analysis followed by a complete DC analysis.

   2. Some sets have tyhe DC input voltage applied at a point which is common to part of the AC power supply circuitry. In these cases, the voltage at the common point shall be monitored during the AC analysis. If this voltage, the "DC Injection Voltage" (DCIV), is less than 15 Vdc during any part of the AC analysis, that part of the analysis shall be repeated using an input voltage of 15 Vdc. If the DCIV remains above 15 Vdc throughout the AC analysis, no DC analysis is necessary.

D. If the set has an X-radiation safety circuit which monitors a voltage directly proportional to the CRT anode voltage and the introduction of a fault (other than in the low voltage power supply) activates this safety circuit, then a hold-down activation curve shall be generated and no further fault analysis shall be performed.

If this type of safety circuit activates during Phase II testing, the only fault introduced to the set shall be one selected to disasble the safety circuit. No further fault analysis shall be performed.

E. Compare the Phase III chassis power curve (kV vs. mA) with the CRT isoexposure cure and note if the 0.5 mR/hr curve is exceeded.

F. Photographs should be included in the report in order to describe a unique picture display, or when the presentation of a "usable picture" is questionable, especially when the power curve represents the manufacturer's worst-case fault condition; and/or is close to or higher than the isoexposure curve and/or radiation is detected above background.

G. If radiation leakage in excess of 0.5 mR/hr is detected, the following steps should be taken:

1. Have another analyst confirm the radiation measurement using a different instrument, if available.

2. Leave the set on and try to maintain the non-compliant radiation emission level for 30 minutes.

3. Determine if the set continues to emit excessive radiation when displaying an off-air signal (receivers only).

4. Determine if the set can be turned on at full nominal input voltage (no gradual increase) and continue to emit excessive radiation.

5. Do not strain the set any more than necessary. It is more important to be able to reproduce the violative leakage conditions at a later time than it is to further increase the exposure rate at the risk of damaging the set.

These steps may be helpful in assessing the radiation hazards present in typical user operation.

IV. FINAL OPERATION AND DISASSEMBLY

A. Final Operation Check

1. Return all service controls to their original position.

2. Turn the set on at norminal input voltage.

3. Adjust the user controls for a usable picture and as typical viewing brightness.

4. Record the input voltage, B+, high voltage and beam current for this one point on the worksheet.

B. Disassembly of Test Set-Up

1. Turn off sample and disconnect the input voltage test cord.

2. Following manufacturer's instructions, ground the picture tube and high voltage circuit to remove charge.

3. Disconnect all test equipment and re-install sample line cord and back panel or other coverings.

4. Reconnect sample line cord to normal line voltage, connect external signal source to antenna input leads, and turn sample ON.

5. Turn sample to local TV station or other test signal, adjust to obtain usable picture and normal viewing brightness, and leave sample on for one hour.

6. Return sample to its shipping carton and pack for shipment exactly as when received. Seal shipping carton and return it to the Sample Custodian.

V. REVIEW AND COMPLETION OF FINAL REPORT

After all Analyst Worksheets and data sheets have been completed, the sample report will be reviewed for completeness by a second Analyst assigned by the Project Leader. The completed test report will then be submitted to the Supervisor who will prepare the Laboratory Conclusions.

APPENDIX A

MEASUREMENT OF X-RADIATION LEAKAGE
FROM TELEVISION RECEIVERS

MAY 1, 1986

APPENDIX A

MEASUREMENT OF X-RADIATION LEAKAGE FROM TELEVISION RECEIVERS

WEAC Compliance Testing Procedure

I. Purpose

To obtain the X-radiation characteristics of television receivers in order to determine whether the receiver is in compliance with requirements of 21 CFR 1020.

II. Apparatus

A. Search Instrument

The search instrument shall be a rapid response instrument which will detect and locate the position of maximum radiation. (Examples - G-M tube instruments, such as the Stoms meter. See EIA Consumer Products Engineering Branch Bulletin No. 3, "Measurement Instrumentation for X-Radiation from Television Receivers".)

B. Radiation Monitor

A survey instrument capable of detecting low energy x-ray photons at intensities as low as background with a visual and/or audible output.

C. Exposure Rate Measuring Instrument

The measuring instrument shall comply with the requirements of 21 CFR Part 1020.10, Subparagraph (c)(2), of the Federal Performance Standard for Television Receivers.

The instrument shall provide X-radiation measurements (mR/hr) in the range of the applicable limit.

The radiation sensitive volume of the instrument shall have a cross-section parallel to the external surface of the cabinet with an area of ten square centimeters and no dimension larger than five centimeters.

Deviation of the measurement from "true" exposure rate due to energy dependent, instrument precision and other sources of error shall be commensurate with current instrument art.

An example of an instrument which fulfills these requirements is the Victoreen 440 RF/C.

Measurements with instruments having other areas must be corrected for spatial non-uniformity of the radiation field to obtain the exposure rate averaged over a ten square centimeter area.

Note 1: A larger area detector may be used only if the field is determined to be uniform over its aperture. Examples: Victoreen 440 RF/A, Victoreen 208A, Riverdale Precision TV-150.

D. Test Equipment

Test equipment must meet the following criteria to ensure stable electronic conditions for operation of the television receiver under test and to measure anode voltage and current:

1. Anode Voltage Metering System

Equipment for measurement of the anode voltage during test shall have an accuracy of at least ± 2.0% of full scale.

2. Anode Current Meter

The meter for measurement of the anode current during test shall have an accuracy of at least ± 5.0% of full scale.

3. Line Voltage Meter

The meter for measurement of the AC voltage applied to the receiver shall have an accuracy of at least ± 1.0% of full scale.

E. Calibration

The exposure measuring instrument shall be calibrated annually by exposure to an x-ray field having an exposure rate and energy representative of those to be measured. Calibration shall be traceable to the National Bureau of Standards. The search instrument shall be calibrated periodically against a source of low energy radiation and checked with such a source prior to use to assure that all GM tubes are responding to radiation with sufficient and uniform sensitivity. Electrical measuring instruments shall be calibrated at least once every six months.

III. Test Conditions

A. The television receiver under test shall be positioned relative to the test equipment so that measurements may be made as specified in Section II. Test Procedures. A warm-up period shall be provided for both the televi- and the test equipment in order to obtain stable operation conditions before proceeding with the measurements.

B. All measurements on the television receiver being tested shall be made with the receiver displaying a usable picture and with the power source operated at supply voltage up to the maximum test voltage of the receiver. Usable picture means a picture in synchronization and transmitting viewable intelligence. Questions on whether a picture is usable shall be discussed with BRH/DOC and determinations will be made on a case-by-case basis. The required chassis power curves are to be developed and the radiation measurements made with the receiver operating with a stable input signal or test pattern such as that produced by a color bar generator. Anode current shall not vary or drift more than ± 5% while measurements are being made.

IV. Test Procedures

CAUTION: Measuring instruments should be properly grounded to avoid shock hazard.

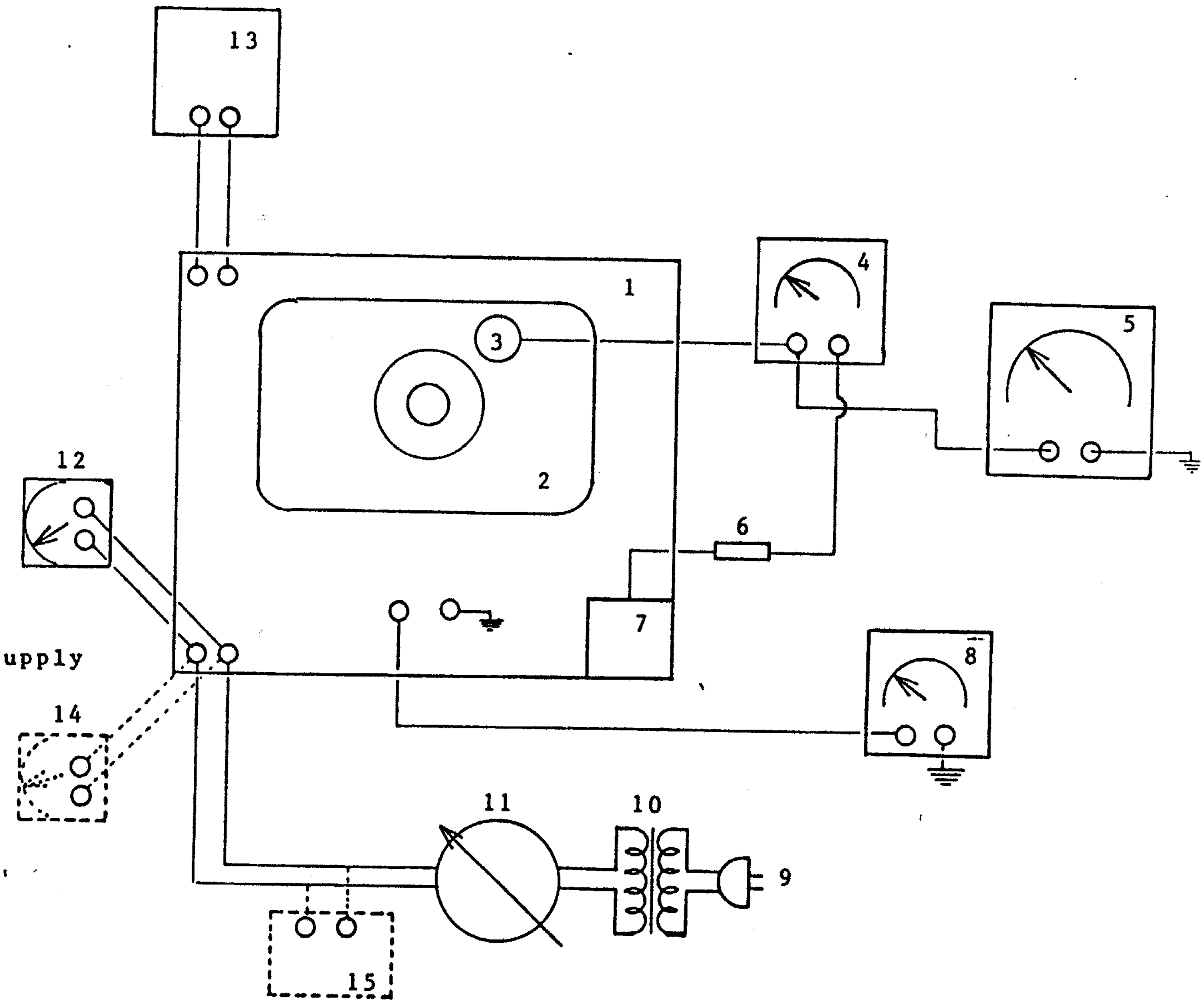
A. The X-radiation exposure rate shall be measured as described below at the location and direction of maximum intensity. The background radiation shall be verified at the test position and corrections applied to the observed data as required.

B. Radiation from all surfaces of the TV receiver shall be measured with the "effective center" of the detector 5 cm from each surface.

C. During any test exposure period the anode voltage and current shall be constantly monitored to insure conformance with Section III.B. The possibility of anode voltage or radiation levels drifting up or down as soon as the receiver is turned on to begin radiation testing shall be determined particularly under Phase III test conditions. If such a situation is noted it will be necessary to conduct a radiation survey as a function of operating time.

FIGURE I

TEST METER CONNECTIONS



1. Sample Under Test
2. Cathode Ray Tube
3. Anode Cap
4. DC Milliammeter
5. Kilovoltmeter
6. Insulated Connector
7. High Voltage Power Supply
8. DC Voltmeter (B+/DCIV)
9. AC Input Voltage
10. Isolation Transformer
11. Autotransformer
12. AC Voltmeter
13. Signal Generator

*14. DC Voltmeter (Input Voltage)

*15. Variable Regulated DC Power Supply

* = For DC Powered Sets Only

APPENDIX B

TELEVISION RECEIVER DATA SHEETS

FLAG

SRN

ANALYST WORKSHEET	1. PRODUCT VIDEO PRODUCT	2. SAMPLE NUMBER
3. SEALS ☐ NONE ☐ INTACT ☐ BROKEN	4. DATE REC'D / 5. RECEIVED FROM	6. DISTRICT OR LABORATORY WEAC

7. DESCRIPTION OF SAMPLE
One cardboard carton

8. NET CONTENTS	☒ NOT APPLICABLE ☐ NOT DETERMINED ___ UNITS EXAMINED	DECLARE/UNIT ___ AMOUNT FOUND ___ % OF DECLARED ___	9. LABELING	___ ORIGINAL(S) SUBMITTED ___ COPIES SUBMITTED (photographic) ☐ NONE

10. SUMMARY OF ANALYSIS

Labeling: See page 2

Code: Brand ___ Mfr. ___

Model No. ___ Serial No. ___

Chassis No. ___ Date of Mfr. ___

CRT No. ___ CRT Mfr. ___

(* = not found on sample; obtained from mfr. data)

Product: CRT-based video product

Screen Size: ___; Color ___/Monochrome ___

Input power specification: ___

Input Signal: RF ___/Comp. Video ___/RGB ___/Video ___

Comp. Sync ___/H. Sync ___/V. Sync ___

Scan Freq: NTSC ___ or Other: Horiz: ___ kHz, Vert: ___ Hz

Analysis:

1. Method: Procedures for Laboratory Compliance Testing of Television Receivers - May 1, 1986
2. Performance Standards:
   - Performance : 21 CFR 1020.10
   - Certification : 21 CFR 1010.2
   - Identification: 21 CFR 1010.3

11. RESERVE SAMPLE
Original cardboard carton

12. a. ANALYST SIGNATURE (Broke Seal ☐)	13. WORKSHEET CHECK	a. BY
b.		b. DATE
c.	14. DATE REPORTED	

FORM FD 431 (1/77) PREVIOUS EDITION IS OBSOLETE.

Rev. May 1, 1986

GENERAL CONTINUATION SHEET	PRODUCT VIDEO PRODUCT	SAMPLE NO.

3. Results:

a. Labeling & Operation Check:

	Adequate? Yes	No
1) Operation Check:	____	____
2) Certification label:	____	____
3) Identification label:	____	____
4) Crit. Comp. label:	____	____

	HV spec	HV ref	CC spec	CC ref
on CC label:	Y N	Y N	Y N	Y N
in manual:	Y N	Y N	Y N	Y N

Meets exemption criteria? Y N

Service manual received? Y N

b. Net X-radiation levels:

(max allowed by standard = 0.5 mR/hr

Test phase	max net mR/hr	see pgs	Meets std? Yes	No
I	____	____	____	____
II	____	____	____	____
III	____	____	____	____

c. Power curves (see figure I):

	No	Yes
Mfr. data exceed 0.5 mR/hr IRLC?	____	____
WEAC data exceed 0.5 mR/hr IRLC?	____	____
WEAC data exceed mfr's worst tol. data?	____	____
wc fault: WEAC ________; Mfr. ________		
WEAC wc fault different from mfr's wc fault?	____	____

Min. diff. mfr. - 0.5 mR/hr IRLC = ______ kV at ______ mA

Min. diff. WEAC - 0.5 mR/hr IRLC = ______ kV at ______ mA

d. Comments:

IRLC = Isoexposure Rate Limit Curve
ND = Not detectable above background
wc = worst case
* = Mfr's fault not allowed by WEAC procedures

ANALYST(S):	ANALYST NO.	PAGE ____ OF ____ PAGES

FD FORM 431a (3 71) REPLACES FORM FD 431-1 WHICH MAY BE USED UNTIL SUPPLY IS EXHAUSTED.

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DATE ________ SAMPLE NO. ____________

FIGURE 1: VIDEO PRODUCT POWER CURVES

(+)ISOEXPOSURE CURVE 0.5MR/HR (N/A)
(□)WORST CASE MFR-W. TOL COMP (N/A)
(*)WORST CASE MFR-NOM COMP (N/A)
(‡)WERC DATA-MFR WORST CASE (N/A)
(Ø)WERC WORST CASE DIFF.FROM MFR (N/A)
($)SERVICE CONTROLS (N/A)
HD=HOLD-DOWN ACTIVATION CURVE

KILOVOLTS

MILLIAMPERES

ANALYST ______________________ ANALYST NO.____ PAGE__OF__PAGES

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GENERAL CONTINUATION SHEET	PRODUCT VIDEO PRODUCT	SAMPLE NO.

SUMMARY SHEET
PHASE II & III TEST RESULTS
CRT POWER CURVE DATA

1.		2.		3.		4.		5.		6.	
0.5 mR/hr IRLC											
Tube type		MFR WORST CASE - WORST TOL. COMP.* EXT. SUPPLY (volts)		MFR. WORST CASE - NOMINAL COMP.* EXT. SUPPLY (volts)		WEAC DATA FOR MFR. WORST CASE EXT. SUPPLY (volts)		WEAC WORST CASE (IF. DIFF. FROM MFR.) EXT. SUPPLY (volts)		PHASE II SERVICE CONTROLS EXT. SUPPLY (volts)	
Source of IRLC		B+ RANGE AVAIL. (volts)		B+ RANGE AVAIL. (volts)		B+ RANGE AVAIL. (volts)		B+ RANGE AVAIL. (volts)		B+ RANGE AVAIL. (volts)	
	kV		kV		kV		kV		kV		kV
		Max net mR/hr _____		Max net mR/hr _____		Max net mR/hr _____		Max net mR/hr _____		Max net mR/hr _____	

* = Mfr's data
HD = Holddown activation curve
ND = Not detectable above background

ANALYST(S)	ANALYST NO.	PAGE _____ OF _____ PAGES

FD FORM 431a (3 71) REPLACES FORM FD 431-1 WHICH MAY BE USED UNTIL SUPPLY IS EXHAUSTED.

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GENERAL CONTINUATION SHEET	PRODUCT VIDEO PRODUCT	SAMPLE NO.

SERVICE AND USER CONTROL ADJUSTMENT - SUMMARY

USER CONTROLS	ADJUSTED? YES	NO

SUGGESTED SERVICE CONTROLS NOT RAISING OR EXTENDING THE POWER CURVE

____

____

____

Test Condition	Service Control Adjustments					
Phase II						

COMMENTS:

* = Adjusted as needed to vary CRT beam current.

ANALYSTS	ANALYST NO.	PAGE ____ OF ____ PAGES

FD FORM 431o (3 71) REPLACES FORM FD 431-1 WHICH MAY BE USED UNTIL SUPPLY IS EXHAUSTED.

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GENERAL CONTINUATION SHEET	PRODUCT VIDEO PRODUCT	SAMPLE NO.

DATA SHEET

TEST STAND NO. _____

Condition	Initial Operation Check Point			PHASE II Service Controls			Final Operation Check Point*		
External Supply (volts)									
Date		kV	B+ Volts		kV	B+ Volts		kV	B+ Volts
		Max. mR/hr							

N.D. = Not detectable above background. Determined with GM Survey Device #_____

* = This data point was recorded after completion of all Phase III faults.

ANALYST(S)	ANALYST NO.	PAGE _____ OF _____ PAGES

FD FORM 431a (3 71) REPLACES FORM FD 431-1 WHICH MAY BE USED UNTIL SUPPLY IS EXHAUSTED.

Rev. May 1, 1986

GENERAL CONTINUATION SHEET	PRODUCT VIDEO PRODUCT	SAMPLE NO.

DATA SHEET

TEST STAND # _____

PHASE III DATA

Condition									
External Supply (volts)									
Date			B+			B+			B+
		kV	Volts		kV	Volts		kV	Volts
Max. mR/hr									

N.D. = Not detectable above background. Determined with GM Survey Device #_____

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Rev. May 1, 1986

GENERAL CONTINUATION SHEET	PRODUCT VIDEO PRODUCT	SAMPLE NO.

DATA SHEET

TEST STAND # ______

PHASE III DATA

Condition									
External Supply (volts)									
Date									
		kV	B+ Volts		kV	B+ Volts		kV	B+ Volts
Max. mR/hr									

N.D. = Not detectable above background. Determined with GM Survey Device #______

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GENERAL CONTINUATION SHEET	PRODUCT VIDEO PRODUCT	SAMPLE NO.

DATE ORIGINATED ____________

FAULTS SELECTED BY ____________

TIME INVOLVED ____________

PHASE II & III TESTING GUIDELINES

Phase II - Suggested Service Controls that might raise or extend the power curve.

____

____

____

____

____

____

* = use this control to extend the power curves

Point of B+ measurement: ____________

Phase III - Fault Selection

FAULT	CIRCUIT AREA	COMMENTS

COMMENTS:

Post Phase III Review Completed by ____________ on ____________

Time Involved: ____________

ANALYST'S	ANALYST NO.	PAGE ____ OF ____ PAGES

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GENERAL CONTINUATION SHEET	PRODUCT VIDEO PRODUCT	SAMPLE NO.

X-RAY RADIATION DATA

AC Line Voltage (volts)	B+ (volts)	mA	kV	Victoreen Reading mR/hr

Date ____________

Victoreen # ____________

Background ____________ mR/hr

Start Time ____________

Stop Time ____________

Operating Time ____________

Condition:

Location of Observed Emission	Victoreen Reading mR/hr	Bkg mR/hr	Net mR/hr
Top			
Back			
Bottom			
Right Side			
Left Side			
Front			

Date ____________

AC Line Voltage ____________

Start Time ____________

Stop Time ____________

Operating Time ____________

Victoreen # ____________

Condition:

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GENERAL CONTINUATION SHEET	PRODUCT VIDEO PRODUCT	SAMPLE NO.

RADIOFREQUENCY E-FIELD SURVEY - DATA SHEET

Brand ________ Model ________ Serial No. ________

Line Volt monitor: Brand ________ Model ________ Serial No. ________

Line Voltage: ________

C.R.T. face:

Highest reading: ________ V/M Antennae: S M L Instrument scale: Hi Lo

Location of reading: ________

Background reading: ________ V/M

Other Surfaces:

Highest reading: ________ V/M Antennae: S M L Instrument scale: Hi Lo

Location of reading: ________

Background reading: ________ V/M

Description of RF shielding:

____

____

____

Comments:

____

____

____

____

Date: ________

ANALYST(S)	ANALYST NO.	PAGE ____ OF ____ PAGES

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GENERAL CONTINUATION SHEET	PRODUCT VIDEO PRODUCT	SAMPLE NO.

REPAIR RECORD

DATE OF SET FAILURE:

CAUSE AND NATURE OF PROBLEM:

ACTUAL REPAIR WORK PERFORMED:

ANALYST'S REPAIR TIME:

DESCRIPTION OF FAULTY COMPONENTS:

DATE PARTS WERE ORDERED:

DATE REPLACEMENT PARTS RECEIVED:

DESCRIPTION OF REPLACEMENT PARTS:

DATE REPAIR COMPLETED:

COMMENTS:

REPAIR ANALYST'S NAME:

ANALYST(S)	ANALYST NO.	PAGE ____ OF ____ PAGES

FD FORM 431a (3 71) REPLACES FORM FD 431-1 WHICH MAY BE USED UNTIL SUPPLY IS EXHAUSTED.

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APPENDIX C

COMPUTER PROGRAM FOR PLOTTING AND COMPARING POWER CURVES

MAY 1, 1986

APPENDIX C

COMPUTER PROGRAM FOR PLOTTING AND COMPARING POWER CURVES

WEAC Compliance Testing Procedure

Included in this Appendix is a listing of a computer program for the Hewlett-Packard 9830 calculator intended for use as an aid in plotting and comparing data obtained from television compliance testing reports.

The purpose of the computer program is to produce a simple and clear representation of the power curve data shown on the summary of data sheet in the report. A second order exponential regression technique is utilized to represent power curves.

APPENDIX D

RADIOFREQUENCY RADIATION SURVEY PROCEDURE

APPENDIX D

RADIOFREQUENCY RADIATION SURVEY
WEAC TESTING PROCEDURES

Introduction

All surfaces of the sample will be surveyed for RF Electric Field (E-field) strength. A distance of 30cm is chosen to approximate the closest approach of a user's eye to the sample when in use. The survey instrument, IFI Model RHM-1, has three orthagonal antennae and has a frequency range of 10 kHz to 220 MHz. This instrument electronically measures and performs a vector addition of the E-field stengths in the X, Y, and Z axes. The meter reads out this vector sum.

NOTE: Any attempts made by the manufacturer to shield the sample from RF emisson will be recorded.

Procedure:

1. Assemble the equipment listed below. (The instruments listed in parentheses are those used at WEAC.)

    a. Isotropic RF E-field meter (IFI Model RHM-1, S/N 156)

    b. 9 RHM-1 antennae

    c. Line voltage monitor

    d. Variable autotransformer

2. Record the brand, model number and serial number of the sample on the data sheet.

3. Check the RF meter mechanical zero before turning the meter on. Adjust, if necessary. Turn the meter on. Allow 3-5 minute warm-up. Check the electrical zero with no antennae and the "scale" switch in the "Low" position. Adjust, if necessary.

    NOTE: DO NOT TOUCH THE METER WHILE TAKING ANY MEASUREMENTS NOR WHILE CHECKING THE ZERO. ALL READINGS MUST BE TAKEN WITH THE METER SUPPORTED BY THE SPECIAL HANDLE OR WITH THE METER RESTING ON A STYROFOAM BLOCK.

4. Screw in the medium length antennae.

5. Perform a battery check by touching a finger to the tip of any one of the antennae. The meter needle should rapidly deflect up-scale. If the meter cannot be zeroed or if the battery does not check good, consult the Project Leader.

6. Turn the sample on. Adjust the line voltage to 120 Vac. Fill the screen with characters (using the keyboard or the WEAC Monitor Test Generator). Adjust the user controls to produce typical viewing brightness (brightness and contrast at approximate mid-scale).

NOTE: Use a cross-hatch test pattern for monochrome receivers and a color bar pattern for color receivers.

7. Scan all surfaces of the sample with the "X" axis antennae perpendicular to and pointing towards the surface. The base of the antennae shall be 30cm ± 1.5cm from each surface. Locate and record the highest reading obtained from the front surface of the sample. Locate and record the highest reading obtained from scanning the remainder of the sample surfaces. Record the location of these readings. (Use the longer (more sensitive) antennae or the shorter (less sensitive) antennae if necessary.) Record the antennae and scale used for each reading.

8. Turn the sample off. Measure and record a background reading at each of these two locations using the same antennae used to obtain the corresponding RF emission readings.

   NOTE: The following shall be observed for all RF scans:

   a. All three antennae used at any one time must be of the same length.

   b. The "X" axis antennae shall be perpendicular to and pointing at the surface being surveyed.

   c. The "Y" axis antennae shall point towards the top (upwards) when surveying the front, back, left side and right side surfaces.

   d. The "Z" axis antennae shall point towards the rear of the sample when surveying the top and bottom surfaces.

9. When the back is removed from the sample (usually during the ionizing radiation testing) visually examine the interior of the sample. Record any RF shielding which may be present (e.g. metal liner inside case, metal housing around flyback transformer, conductive spray paint inside cover).

Special Viewfinder Considerations:

Camera viewfinders are frequently received separate from their associated cameras. In these cases, the RF characteristics that the viewfinder/camera combination would have cannot be judged. In either case (viewfinder alone or with camera), these samples shall be surveyed only at the "face" of the viewfinder at the distance of closest approach without touching the antennae or the RF meter base to the sample.

Many viewfinders have a mirror/lens reflected image so that the CRT face is not pointing towards the eye. In these cases, the "face" of the viewfinder shall be defined as the face of the eyepiece. The RF survey shall be performed at that eyepiece surface. A cross-hatch test pattern shall be used for all viewfinder testing.