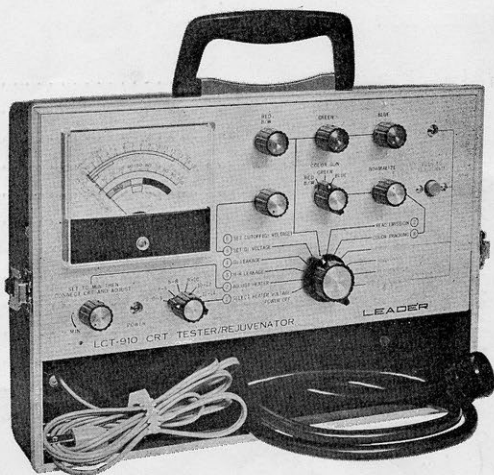


LEADER TEST INSTRUMENTS

LCT-910

CRT TESTER / REJUVENATOR

INSTRUCTION MANUAL



LEADER ELECTRONICS CORPORATION

Model LCT-910
CRT TESTER/REJUVENATOR

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SECTION 1 GENERAL DESCRIPTION

1.1 Use of the LCT-910

This instrument has been designed for rapid and simple tests on the condition of a color or B/W CRT. In addition, provision has been included for activation and rejuvenation of a tube with low emission. It features controls and meter scales which are numbered and color-coded for ease in operation, which makes the LCT-910 an invaluable tester for use in the field and in service shops.

In use, the following tests can be applied:

- * Checking shorts and leakage between heater and cathode, and cathode and G1.
- * Checking cathode emission characteristics.
- * Separately checking condition of the three guns in a color tube and to track the emission.
- * Removal of shorts or leakage between elements in a tube.
- * Activation of low emission cathodes.
- * Rejuvenation of a low emission cathode with use of automatic timing; super-rejuvenation with manual control.
- * Checking of heater warmup characteristic.
- * Simplified life testing.

1.2 Panel Controls, see front view of panel

Before use of the LCT-910, it is advisable for the operator to become familiar with the functions of the different controls in order to achieve the best performance.

(See panel figure on page 7)

- 1 Meter: Scales numbered in sequence of the tests.
- 2 SET TO MIN: Fine adjuster for heater voltage; to be set at MIN when making CRT connections.
- 3 Pilot lamp: Indicates when AC power is on.
- 4 HEATER VOLTAGE switch: For setting the range of heater voltage.
- 5 For AC line fuse.
- 6 Compartment for storage of socket cables and AC cord.
- 7 AC cord for connection to AC line.
- 8 Socket for connection to plug on the socket cable.
- 9 Function switch: With 12 positions for testing and rejuvenation of a CRT.
- 10 G1 voltage controller; continuously adjustable.
- 11 Pushbutton switch used at REMOVE SHORTS and REJUVENATION of Function switch.
- 12 Adjuster to set meter pointer at the NORMALIZE mark on meter dial.
- 13 COLOR GUN switch: For selection of CRT gun, B/W, or as marked.
- 14 Lamp to indicate REMOVE SHORTS and SUPER REJUVENATE mode.
- 15 Knobs marked in color corresponding to the gun in color tube; red B/W knob for a B/W
- 16 tube; used to set the G2 cutoff voltage.
- 17
- 18 Overcurrent warning lamp: when it lights, immediately turn off the power and check the circuit conditions before use.

SECTION 2 OPERATION

2.1 Preparation

1. Remove AC plug of the TV set or chassis from AC line. Set the power switch at off for additional safety.
IMPORTANT!! DO NOT CONNECT AC PLUG TO THE AC LINE DURING CRT TESTS.
2. Referring to the SET-CHART, note heater voltage, G1 voltage and proper socket to be used.
Remove socket on the CRT under test and connect the designated cable socket.
3. Connect socket cable plug to connector on the extension cable.
4. Basic procedures for color and B/W tubes are shown on the printed form inside of the cover.

2.2 Initial Control Settings

1. Function switch [9] at ① POWER OFF.
SET TO MIN [2] knob (lower left on panel) at MIN.
Heater voltage switch [4] at range in use.
2. Function switch at ② ADJUST HEATER.
Rotate SET TO MIN [2] knob for proper voltage indication on scale ② of meter.
Allow about three minutes for warmup.

2.3 Leakage and Shorts Tests

1. Set Function switch at ③ H-K LEAKAGE.
2. Read one of meter scales of ③ depending on type of tube:
for B/W COLOR GUN switch [13] at RED B/W.
for color COLOR GUN switch at RED, GREEN and BLUE in succession.
The meter swing should be within range of the colored area for satisfactory tubes. If outside, tube is defective.
3. After the H-K leakage test, set Function switch at ④ G1 LEAKAGE, for the G1-K leakage test. Read scale ④ at different settings of COLOR GUN switch:
for B/W at RED B/W.
for color at RED, GREEN and BLUE in succession.
The meter swing should be within range of the colored area on scale ④ G1 of meter. If outside, tube is defective.

2.4 Emission Testing

1. Set Function switch at ⑤ SET G1 VOLTAGE.
2. Rotate knob, traced line marking from ⑤, and set G1 voltage on scale ⑤ of meter as specified in SET-UP CHART.
This voltage is generally at 45V (70V is used for some tubes).
3. Set Function switch at ⑥ SET CUTOFF.
4. Set COLOR GUN switch at RED B/W.
5. Rotate the red colored knob until meter pointer swings just to "set cut off" (approx. "0") on scale ⑥ of meter. For a color tube, repeat this adjustment with respective G2 voltage adjusters, green and blue, at GREEN and BLUE positions of COLOR GUN switch.

IMPORTANT!! DO NOT TOUCH THE COLORED KNOB(S) AFTER THE ADJUSTMENT.

6. Set Function switch at READ EMISSION ⑦ .

The emission is determined on the BAD GOOD scale ⑦ on meter.

If bad, the tube is defective (refer to section on activation and rejuvenation).

For a color tube, set COLOR GUN switch at three positions and note meter readings on scale ⑤ to be used in the next step.

2.5 Color Gun Tracking, applicable to color CRT's only

1. Set Function switch at COLOR TRACKING ⑧ .
2. For normalizing, set COLOR GUN switch at position of gun with the highest reading noted in Step 6, Section 2.4.
3. Rotate and set NORMALIZE control [12] to set meter pointer on the "L" mark at lower right of box of scale ⑧ on meter.
4. The guns are satisfactory when meter pointer swing is within the area of the box at two other positions of COLOR GUN switch.

(When the reading is low, it may be possible to apply the activation procedure.)

2.6 Warmup Characteristics

The warmup characteristics of color guns can be checked after emission and tracking tests, and have proven to be satisfactory.

With controls set at positions for color tracking tests, set Function switch at ① POWER OFF.

Allow 10 minutes or more to cool the tube.

Set Function switch at COLOR TRACKING ⑧ .

After two minutes, set COLOR GUN switch successively at three positions.

Meter pointer should swing within the area of scale ⑧ NORMALIZE scale on meter.

If indication for any gun is low, allow two minutes more and recheck with COLOR GUN switch at the three positions. If after this four minute (total) period the pointer swing is within area of the box, the warmup characteristic is at the lower limit of being satisfactory.

2.7 Simplified Life Test

1. Set Function switch at READ EMISSION ⑦ .
2. Set SELECT HEATER VOLTAGE switch [4] at lowest range, 0-3.
Note the time required for meter pointer to swing to zero.
For a color tube, repeat steps 1 and 2 above for each color gun.
3. A tube is satisfactory when the emission current is stationary, or slightly increases before gradually falling to zero.

If emission current rapidly falls to zero, the cathode condition is such that life expectancy is short, or near end.

Note: For a directly heated cathode (instant type) tube, time for the fall to zero will be short.

2.8 Remove Shorts Procedure

1. Set Function switch at REMOVE SHORTS (at this position, heater voltage is cut off).
Allow about 10 minutes to cool heater.

2. Set COLOR GUN switch at RED B/W for a B/W tube and at the relevant gun for a color tube.
3. Press REJUVENATE switch **11** momentarily.
4. Repeat step ② for ADJUST HEATER and step ③ for H-K LEAKAGE and check whether leakage has been removed.

If a short has been removed, check emission, step ⑤ through ⑦.

Note: In the CRT, a short is most likely to occur between cathode and G1.

2.9 Tube Activation

It is possible to increase the emission of some tubes when the useful emission has decreased to a low level. However, it must be borne in mind that activation will not be effective on all tube with low emission.

In activation, the flow of emission current is maintained with increased heater voltage.

1. Steps ① SELECT HEATER VOLTAGE through ⑦ READ EMISSION are first completed and emission current is noted, using scale ⑤ for reference.
2. Set Function switch at ② and adjust heater voltage to 40% higher than that specified in SET-UP CHART.

For a 6.3V tube, adjust the voltage to 8.8V (6.3 x 1.4).

3. Set Function switch at ⑦ READ EMISSION and note meter reading.
After five minutes, again note meter reading.
If pointer swings upward and becomes stationary, the tube has been activated.
4. Set Function switch at POWER OFF and allow three minutes for cooling.
5. Set Function switch at ② and readjust heater voltage to normal.
Test at ③ and ④ for H-K and G1 leakage.
6. Leakage in a CRT may increase after activation. For check, repeat steps ⑤, ⑥, and ⑦.

If emission has not been improved, rejuvenation may be effective when applied, see below.

Note: Application of rejuvenation is not advised when a tube is still in the warranty condition.

2.10 Rejuvenation

Notes: A. The rejuvenation mode should be applied to a tube which has been definitely established through emission tests that its present condition is defective.

B. In a color tube, rejuvenation should be applied only to the defective gun.

C. Rejuvenation should be applied only when a tube is out of warranty.

1. Set Function switch at REJUVENATE 1.
2. Set COLOR GUN switch at RED B/W for a B/W tube or at gun to be rejuvenated in a color tube.
3. Note exact pointer setting on the meter.
4. Press REJUVENATE switch momentarily.
Note meter reading.
5. Repeat pressing the switch until the pointer swings into GOOD portion on scale ⑦ on meter, or until there is no increase in readings.
6. If pointer does not indicate in GOOD portion after step 4 above, set Function switch at REJUVENATE 2. Allow 15 seconds for heater to reach a new operating temperature and note meter reading.

Press REJUVENATE switch momentarily.

Repeat pressing the switch until there is no further increase in meter reading.

7. Notes: A. When REJUVENATE switch is pressed, the rejuvenate cycle is automatically timed.
- B. If the rejuvenate steps do not increase emission to a working level, there is the choice of applying SUPER REJUVENATION mode, see below.

2.11 Super Rejuvenation

In this mode, the rejuvenate cycle is manually controlled.

At SUPER REJUVENATE setting of Function switch, the lamp 14 at upper right on panel will light to warn that care must be exercised.

1. At SUPER REJUVENATE setting of Function switch, note meter reading.
2. Press REJUVENATE switch for 1/4 to 1/2 second and release immediately.

Note meter reading.

If emission is still low, press the switch again after about five seconds.

Repeat this step until there is no increase in emission.

Switch timing can be increased to 1 or 2 seconds if there is any improvement. Note that this cycling is manual.

Notes: A. The cycling should not be continued at any rejuvenation mode if there is a decrease in meter reading after the last pressing of the switch.

- B. Do not apply SUPER REJUVENATION mode to a tube with shorted elements.

2.12 Repairing Open Lead Connections

When there is an open connection in cathode or G1 leads, it may be possible to repair it by the following method.

During the repairs, the tube is tapped lightly at the neck with the handle of an insulated screw driver, or carefully shaken.

At the same time, apply steps 1, 2 and 3 in the REMOVE SHORTS procedure, Section 2.8.

When the weld is made, a bright flash will be seen.

If this procedure does not produce the weld, set Function switch at SUPER REJUVENATE and press REJUVENATE switch while lightly tapping the neck of the tube. A bright flash will be seen when the weld takes place.

Retest tube to check leakage and emission.

SECTION 3 CALIBRATION

3.1 General

To recalibrate the meter in the LCT-910, the following equipment are required:

1. Accurate AC voltmeter with 15V range.
2. DC milliammeter for readings at 300 μ A and 3mA.
3. Resistor, 120k Ω \pm 10%.

To expose the chassis, set the function switch at POWER OFF and disconnect the AC plug from the line.

Remove four screws on the cover with the carrying handle.

The calibration adjusters are mounted on the PCB.

3.2 Heater Voltage Range

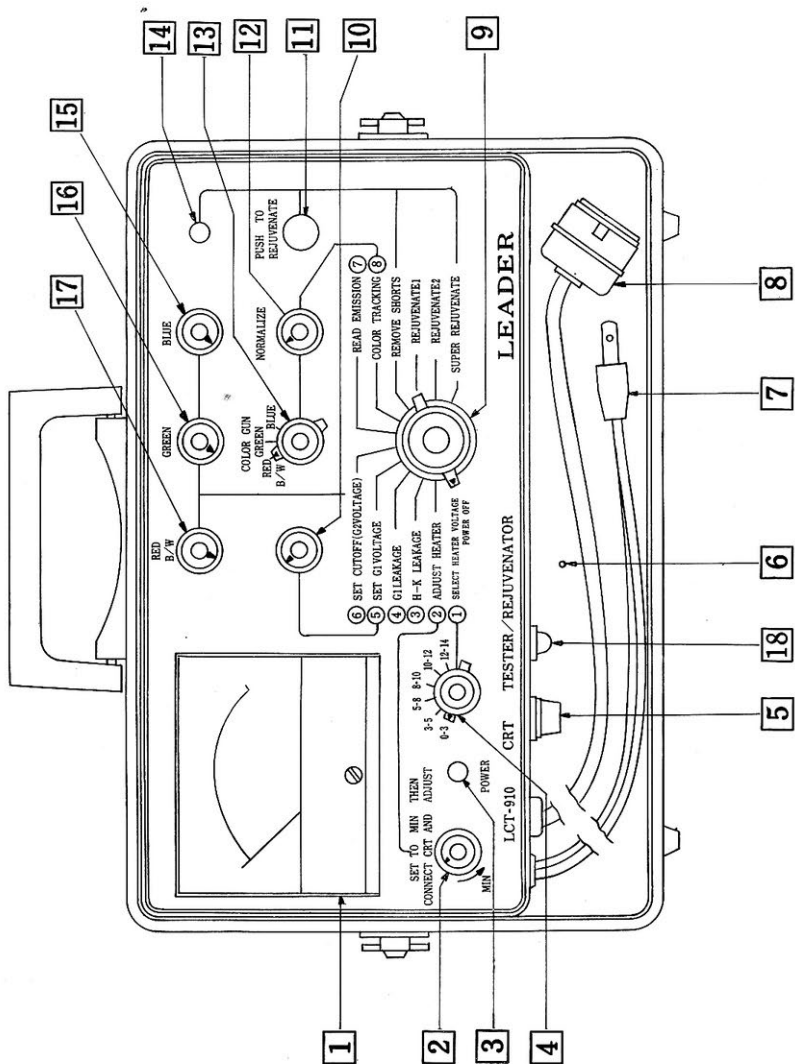
1. Connect the AC voltmeter to pins 1 and 11 on the socket connector.
2. Connect the AC plug to the line; voltage must be 117V. (or specified)
3. Set the function switch at ② ADJUST HEATER and the voltage range switch ④ at 10-12. Rotate the SET TO MIN knob ② so that the AC voltmeter reading is 10V.
4. Adjust VR5 (HEATER CAL) until the panel meter reading is 10V.

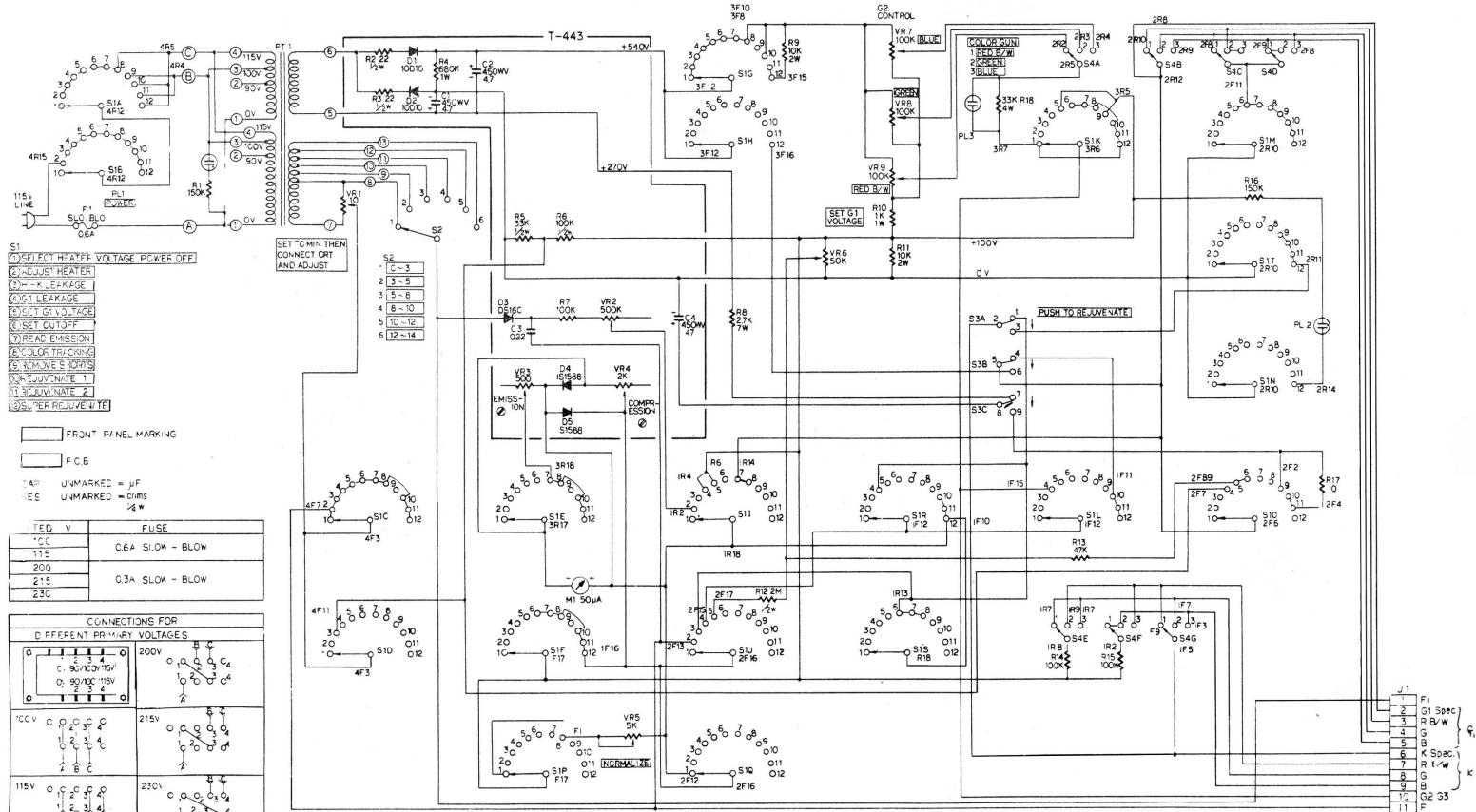
3.3 Emission Range

1. Control settings:
 - a. Function switch at READ EMISSION ⑦ .
 - b. COLOR GUN switch at RED B/W.
 - c. Three knobs, red, green and blue, at full counterclockwise.
 - d. Milliammeter range to read $300\mu\text{A}$.
2. Connections:
 - a. Lead from pin 6 of the socket connector to the negative terminal of the milliammeter.
 - b. $120\text{k}\Omega$ resistor in series with the lead from the positive terminal of the milliammeter to pin 10 on the connector.
3. Adjustments:
 - a. Rotate the red knob ⑩ of G2 so that the milliammeter reading is $300\mu\text{A}$.
 - b. Adjust VR3 (EMISSION ADJ) until the panel meter pointer is set at the lower limit of the GOOD marking on the ⑦ scale.

3.4 Full Scale Compression

1. Control settings:
 - a. Function switch at READ EMISSION ⑦ .
 - b. COLOR GUN switch at RED B/W.
 - c. Three knobs, red, green and blue, at full counterclockwise.
 - d. Milliammeter range to read 3mA.
2. Connections:
 - a. Lead from pin 6 of the socket connector to the negative terminal of the milliammeter.
 - b. $120\text{k}\Omega$ resistor in series with the lead from the positive terminal of the milliammeter to pin 10 of the connector.
3. Adjustments:
 - a. Rotate the red knob of G2 so that the milliammeter reading is 3mA.
 - b. Adjust VR4 (COMPRESSION ADJ) until the panel meter pointer is set at 100 (full scale) on the ⑤ scale.





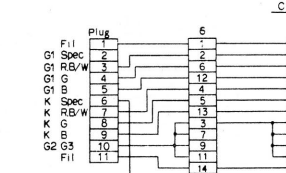
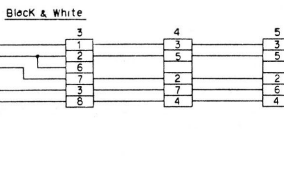
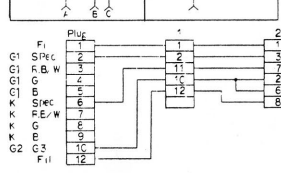
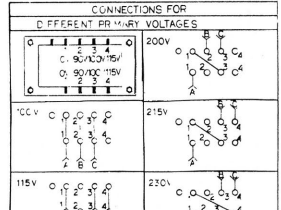
- S1 SELECT HEATER VOLTAGE (POWER OFF)
- S2 ADJUST HEATER
- S3 LEAKAGE
- S4 LEAKAGE
- S5 G1 VOLTAGE
- S6 SET G1 OFF
- S7 READ EMISSION
- S8 G1 VOLTAGE
- S9 G1 VOLTAGE
- S10 VOLTAGE 1
- S11 VOLTAGE 2
- S12 SET REJUENATE

FRONT PANEL MARKING

F.C.E.

U/MARKED = µF
E.S. U/MARKED = OHMS
W = W

TEMP. V.	FUSE
115V	C6A SLOW - BLOW
200V	
215V	C3A SLOW - BLOW
230V	



SCHEMATIC	model LCT-910	O-803A
	CRT TESTER / REJUENATOR	LEADER ELECTRONICS CORP.

Socket adapters NO 6 & NO 9 are not included as standard accessories.

LEADER TEST INSTRUMENTS

LEADER ELECTRONICS CORP.

2-6-33 TSUNASHIMA-HIGASHI, KOHOKU-KU,
YOKOHAMA, JAPAN.

LEADER INSTRUMENTS CORP.

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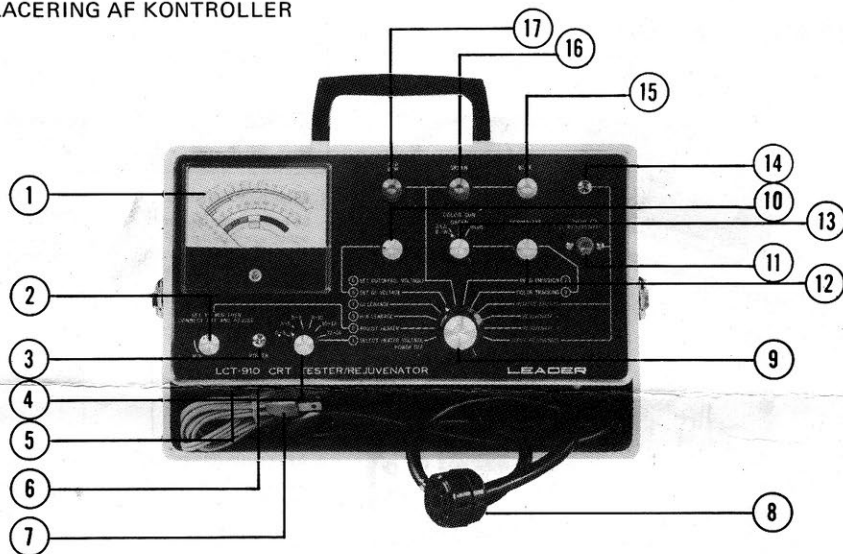
WEST COAST DIVISION

7733 DENSMORE AVE., VAN NUYS, CA. 91406 U.S.A.
(213) 989-2760

LCT-910 FARVEBILLEDØRSREGENERATOR

Denne tester er blevet konstrueret til hurtig og simpel test af tilstanden af et farve- eller B/W CRT. Desuden inkluderer den mulighed for aktiviering og regeneration (fornyelse) af et rør med lav emission. Det indeholder kontroller og instrument med skalaer, der er nummereret og farvekodet for letelse i brug. LCT-910 er et uvurderligt instrument for anvendelse i marken og på serviceværkstedet.

PLACERING AF KONTROLLER



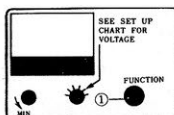
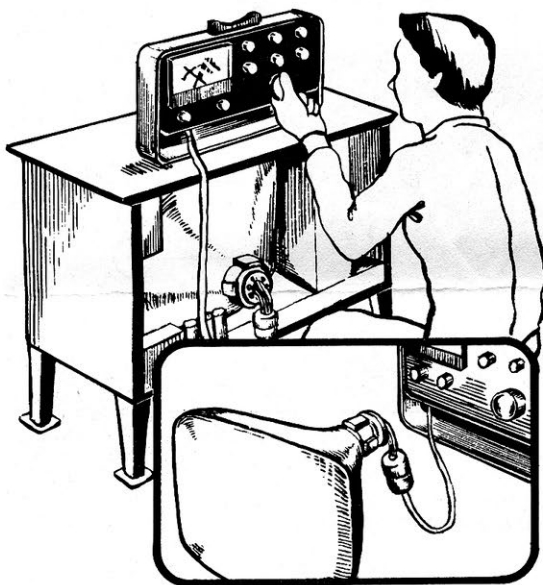
1. Instrument: Skalaer nummereret i målerækkefølge.
2. Sæt på: Finjustering for gløde spænding. Sættes på under CRT forbindelse.
3. Kontrollampe: Viser, når AC net er tilsluttet.
4. Glødespændingsomskifter: Indstilling af glødespændingsområde.
5. Netspændingssikring.
6. Sikring til kredsløbsbeskyttelse.
7. AC netledning.
8. Sokkel for forbindelse til stik på sokkelkabel.
9. Funktionsomskifter: 12 positioner for test og regulering af CRT.
10. G 1 spændingskontrol: Konstrueret variabel.
11. Trykknapskifter: Til remove shorts (fjern kortslutning) og rejuvenation (regenerering) af funktionsomskifter.
12. Juster instrumentviser til Normalize mærket på skalaen.
13. Farvekanonomskifter: For adskillelse af CRT kanon, B/W, eller som markeret.
14. Lampe til visning af remove shorts og super rejuvenate indstilling.
- 15.-16.-17. Knapper mærket i farve henførende til kanonen i farverør, rød B/W knap for et B/W rør; bruges til at sætte G2 cutoff spænding.

ANVENDELSE

- Checker kortslutning og afledning mellem glødetråd og katode, og katode og G 1.
- Checker katode emission karakteristik.
- Separat checkningsforhold af de tre kanoner i et farverør og spore emissionen.
- Fjerner kortslutninger og afledninger mellem elementer i et rør.
- Aktivering af lav-emissionskatode
- Regenerering af lav-emission-katode ved hjælp af automatisk timing; superregenerering med manuel kontrol.
- Checkning af glødetrådets opvarmningskarakteristik.
- Simple varighedstest.

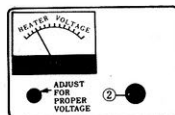
EKSEMPLER PÅ BRUG

Emissionstest - med CRT i chassiet.



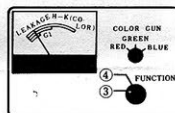
1. GLØDESPÆNDING

Se brugsanvisning for egnet sokkeladapter for CRT under test. Sæt **FUNKTION** omkifter på (1).



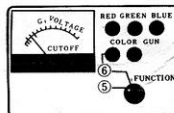
2. GLØDESPÆNDINGSJUSTERING

Sæt **FUNKTION** omkifter på (2).



3. AFLEDNINGSTEST

Sæt **FUNKTION** omkifter på (3) for H-K afledning. Sæt **F**-omkifter på (4) for G 1 afledning. Gode rør aflæses inden for **LEAKAGE** området på skalaen.

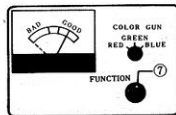


4. G-1 SPÆNDING

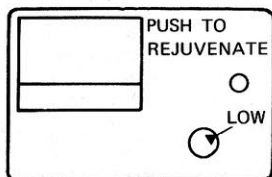
Sæt **F**-omstilling på (5). Juster G-1 spænding.

5. EMISSIONSTEST

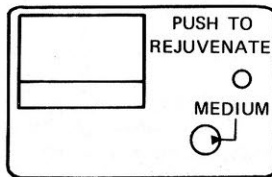
Sæt **F**-omstilling på (7). Aflæs **GOOD-BAD** (god-dårlig) skalaen.



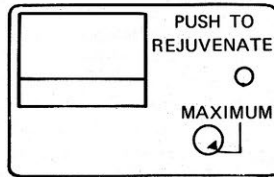
Regenerering - med CRT i chassiet.



1. Lav regenerering



2. Middel regenerering



3. Maximum regenerering

CRT TESTER / REJUVENATOR

CONDENSED INSTRUCTIONS

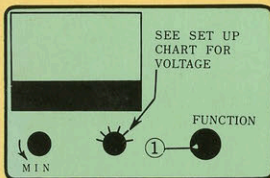
LEADER ELECTRONICS CORP.

PRECAUTIONS

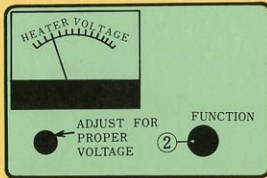
To check C.R.T.'S installed in TV chassis.

1. Remove line power from chassis.
2. Remove socket from C.R.T. base.

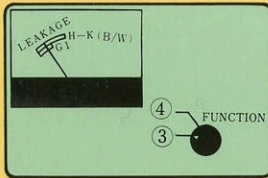
BLACK & WHITE TUBE CHECKING

**1. HEATER VOLTAGE**

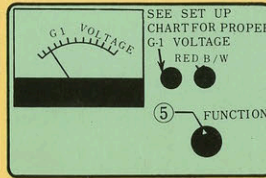
- * Refer to SET UP CHART for proper socket adapter for CRT under test.
- * Set FUNCTION switch at ①.

**2. HEATER VOLTAGE ADJUSTMENT**

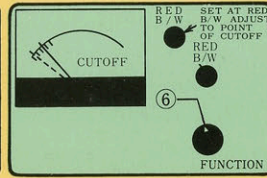
- * Set FUNCTION switch at ②.

**3. LEAKAGE TEST**

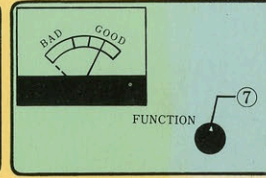
- * Set FUNCTION switch at ③.
- * Set FUNCTION switch at ④.
- * Set FUNCTION switch at ④.
- * Good tubes read within leakage limit scale.

**4. G-1 VOLTAGE**

- * Set FUNCTION switch at ⑤.
- * Adjust G-1 voltage.

**5. CUTOFF VOLTAGE**

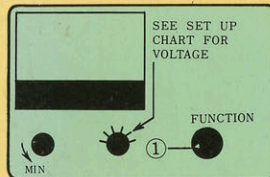
- * Set FUNCTION switch at ⑥.

**6. EMISSION TEST**

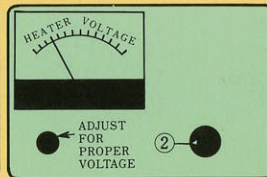
- * Set FUNCTION switch at ⑦.
- * Read GOOD-BAD scale

Note : For additional test, rejuvenation and repair procedures refer to instruction manual.

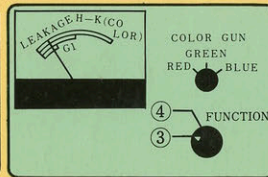
COLOR TUBE CHECKING

**1. HEATER VOLTAGE**

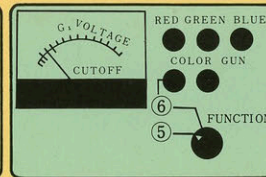
- * Refer to SET UP CHART for proper socket adapter for CRT connection.
- * Set FUNCTION switch at ①.

**2. HEATER VOLTAGE ADJUSTMENT**

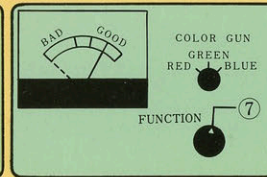
- * Set FUNCTION switch at ②.

**3. LEAKAGE TEST**

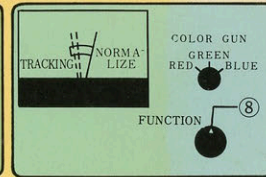
- * Set FUNCTION switch at ③.
- * H-K Set COLOR GUN switch at RED, GREEN and BLUE in succession.
- * Set FUNCTION switch at ④.
- * G-1 Set COLOR GUN switch at RED, GREEN and BLUE in succession.

**4. G-1 VOLTAGE and CUTOFF**

- * Set FUNCTION switch at ⑤.
- * Adjust G-1 voltage, see SET UP CHART.
- * Set FUNCTION switch at ⑥.
- * Adjust G-2 voltage for cutoff at RED, GREEN and BLUE color gun settings respectively.

**5. EMISSION TEST**

- * Set FUNCTION switch at ⑦.
- * Set COLOR GUN switch at RED, GREEN and BLUE.
- Read BAD-GOOD scale for condition.

**6. COLOR TRACKING**

- * Set FUNCTION Switch at ⑧.
- * Using the gun with highest emission, set the pointer on the right vertical line TRACKING scale with NORMALIZE adjuster.

Note : For additional test, rejuvenation and repair procedures refer to instruction manual.