

1 Experiment No. 4

2 Experiment Title

Observation & Verification of fault analysis for color TV (Cathode Ray & LED TV) .

3 Objective

The objectives of this lab are as follows:

- To analyze the system's response to these faults.
- To demonstrate and understand different types of faults.

4 Theory

Fault switches are there to make user understand the effect of the particular switch. Fault Switch schemes are protection functions intended to trip a transmission line breaker when closed on to a faulted line. Dedicated fault switches are available in various designs, but since the fault-detecting elements tend to be more sensitive than conventional, impedance-based line protection functions, they are generally designed to be "armed" only for a brief period following breaker closure. Depending on the details of scheme design and element settings, there may be implications for line relay loadability.

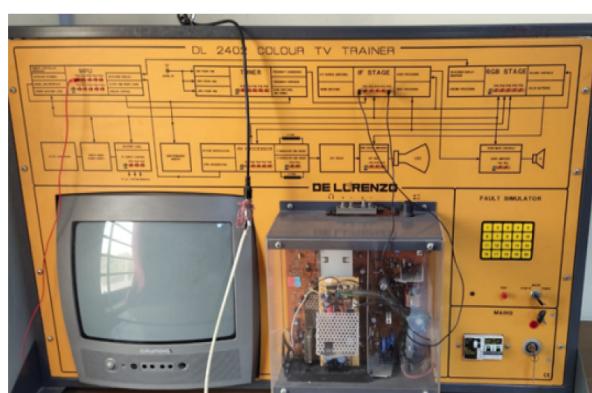
4.1 GENERAL CHARACTERISTICS OF THE TRAINER DL 2402

The trainer is composed of modular elements assembled in the metallic frame containing the front panel of the trainer itself.

The trainer front panel includes the synoptic panel that reproduces the diagram of the equipment in a simplified form, suitable to the educational use and to the collective carrying out of the exercises.

The measurement points of the front panel are composed of 2 mm terminals to which it is possible to connect both external instruments and equipments.

It is important that the measurement points are not short-circuited among them or towards ground. This could cause bad operations in the equipment, even if in the equipment suitable protections have been included.



(a) DL 2402 Colour TV Trainer

The functional study of the TVC can be carried out with the only access of test-points of the synoptic panel. In-depth study of the trainer requires the removal of the protective transparent cover. The electronic boards become therefore accessible. Since potentially hazardous voltages become accessible, it is recommended in this case that the students are duly instructed on general and specific safety rules.

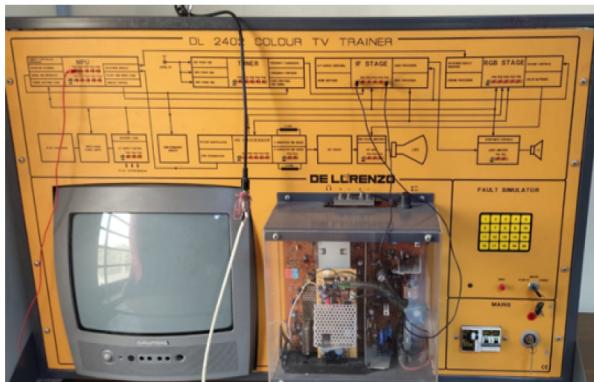
On the front panel the fault simulator is assembled, that can be either with microprocessor (DL 2402M) or with microswitch (DL 2402A or DL 2402K).

This manual is valid for both the versions, both for what is referred to the description of the equipments and to the exercises. Some sections, however, can be used by one of the two versions and this is clearly specified in the title or in the relative paragraphs.

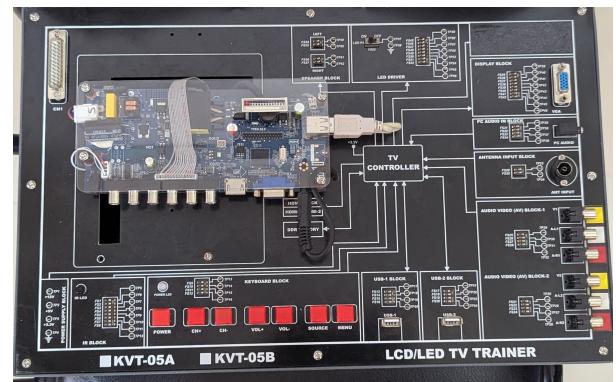
5 Required Apparatus

1. DL 2402 Colour TV Trainer.
2. LCD/LED TV Trainer (KVT-05A/B Trainer Kit).
3. Oscilloscope (TBS-1000c).
4. Connecting wires & Probes.

6 Experimental Setup



(a) DL 2402 Colour TV Trainer



(b) KVT-05A/B LED TV Trainer Trainer Kit

7 Procedure for LED TV fault analysis

1. Connect AC Supply to the kit.
2. Press "POWER" switch.
3. Keep all the fault switches FS1-FS57 at ON Position.
4. Make the switch faults as given in the following table and observe the result.

7.1 Locations & Observations of faults for LED TV

Table 1: FS1-FS8 (IR and Keyboard Block)

| Faults No | DIP Switch | Observations (Switch is off) |
|-----------|------------|------------------------------|
| 1 | Pin-1 | Remote control will not work |
| 2 | Pin-2 | Power key will not work |
| 3 | Pin-3 | CH+ key will not work |
| 4 | Pin-4 | CH- key will not work |
| 5 | Pin-5 | V+ key will not work |
| 6 | Pin-6 | V- key will not work |
| 7 | Pin-7 | Menu key will not work |
| 8 | Pin-8 | Source key will not work |

Table 2: FS21-FS24 (Audio Video Block-2)

| Sr. No | DIP Switch | Observations (Switch is off) |
|--------|------------|--|
| 1 | Pin-1 | Video Signal got cut off, hence No Video/Audio |
| 2 | Pin-2 | Left Audio didn't not work |
| 3 | Pin-3 | Right Audio didn't not work |
| 4 | Pin-4 | All Switches Common GND, No Audio/Video |

Table 3: FS25-FS28 (Audio Video Block-2)

| Sr. No | DIP Switch | Observations (Switch is off) |
|--------|------------|--|
| 1 | Pin-1 | Video Signal got cut off, hence No Video/Audio |
| 2 | Pin-2 | Left Audio didn't not work |
| 3 | Pin-3 | Right Audio didn't not work |
| 4 | Pin-4 | All Switches Common GND, No Audio/Video |

Table 4: FS35-FS42 (Display Block)

| Sr. No | DIP Switch | Observations (Switch is off) |
|---------|-------------|---|
| 1 | Pin-1 | RED Colour got eliminated from the image |
| 2 | Pin-2 | GREEN Colour got eliminated from the image |
| 3 | Pin-3 | BLUE Colour got eliminated from the image |
| 4 | Pin-4 | HORIZONTAL SYNC was missing, hence monitor gets Blank |
| 5 | Pin-5 | VERTICAL SYNC was missing, hence monitor got Blank |
| 6,7 & 8 | Pin-6,7 & 8 | GND got disconnected, no display. |

8 Procedure for Cathode-ray TV fault analysis

1. Connect AC Supply to the kit.
2. Press "POWER" switch.
3. Keep the fault switches ON Position once at a time.
4. Make the switch faults as given in the following table and observe the result.

8.1 Locations & Observations of faults for Cathode-ray TV

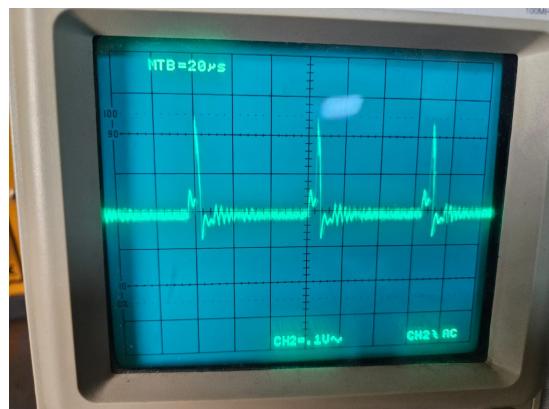
Table 5: Fault analysis of Cathode-ray TV

| Fault Number | Location | Observation | Oscilloscope Observation |
|--------------|--------------------------|--|----------------------------|
| 1 | Remote control | No fault detected | Straight line |
| 2 | Key-board operation | No fault detected | Distorted spiky wave |
| 3 | Reset of microcontroller | Power off | Straight line |
| 4 | Audio | Only audio,no video | Straight line |
| 5 | On-screen-display | Display flickered | Chain shaped wave |
| 6 | On-screen-display | Sound flickered | Straight line |
| 7 | On-screen-display | Sound flickered | Straight line |
| 8 | RGB stage | Sound flickered | Spike |
| 9 | On-screen -display | Sound flickered, faded display | Two parallel straight line |
| 10 | On-screen-display | Audio on, display off | Straight line |
| 11 | Tuner | Audio off, display on | Straight line |
| 12 | Tuner | No fault detected | Dot signal |
| 13 | Tuner | No fault detected | Dot signal |
| 14 | CPU | Yellowish display | Straight line |
| 15 | IF stage | Audio off, display flickered | Straight line |
| 16 | IF stage | No fault detected | Distorted signal |
| 17 | IF stage | Audio off, greyish display | Blurry wave |
| 18 | RGB stage | Pale display | Spiky blur signal |
| 19 | Picture control | Black and white display | Distorted sine wave |
| 20 | Audio amplifier | White straight line in the middle of the display, audio on | Blurry sine wave |

9 Fault analysis wavehape of Cathode ray TV



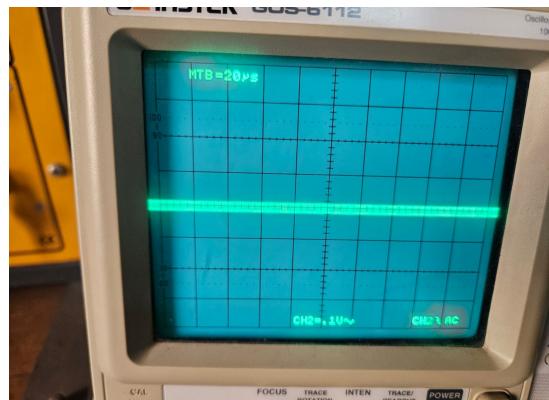
(a) Fault 1



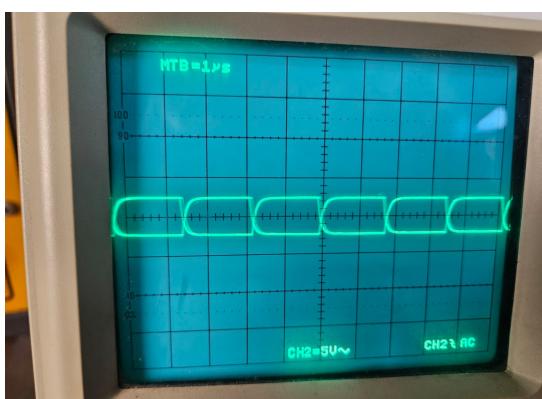
(b) Fault 2



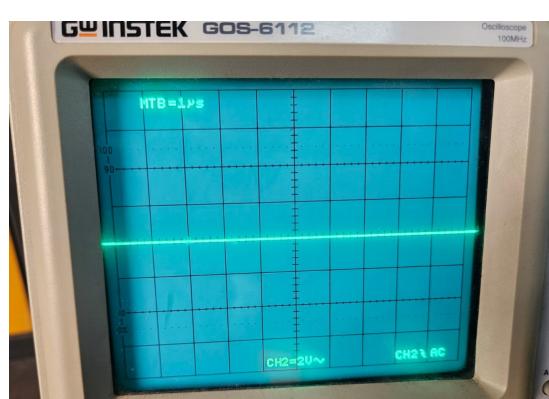
(c) Fault 3



(d) Fault 4



(e) Fault 5



(f) Fault 6



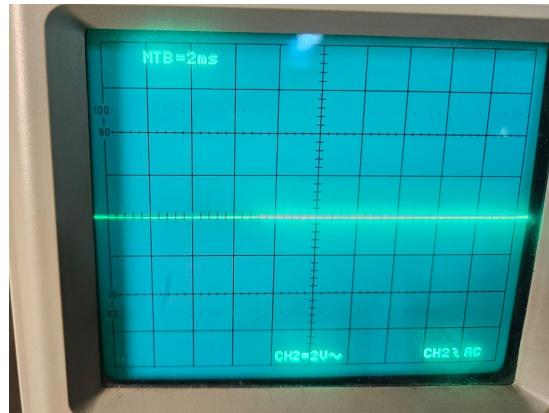
(g) Fault 7



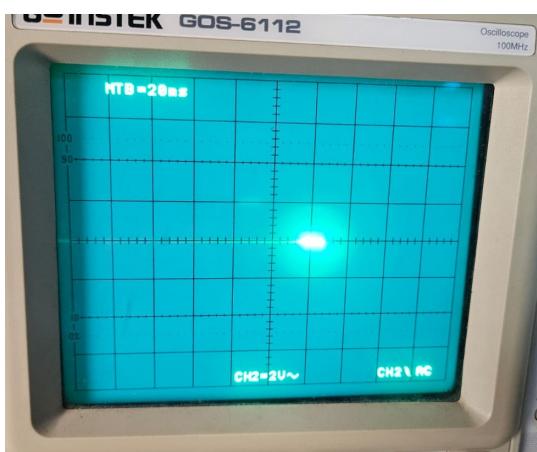
(h) Fault 8



(a) Fault 9



(b) Fault 10



(c) Fault 11



(d) Fault 12



(e) Fault 13



(f) Fault 14



(g) Fault 15



(h) Fault 16



(a) Fault 17



(b) Fault 18



(c) Fault 19



(d) Fault 20

10 Discussion

In this laboratory experiment, the analysis of fault locations and observations was done using two primary trainers: an LCD/LED TV Trainer (KVT-05A/B Trainer Kit) and a DL 2402 Color TV Trainer.

For the LED TV fault analysis, several types of faults were investigated, including those related to the IR remote, keyboard, audio, video, and display. By switching off specific DIP switches, each of these faults was successfully analyzed.

Regarding the cathode ray TV fault analysis, a total of 20 faults were intended to be analyzed; however, some of these did not function in accordance with the laboratory manual. For certain faults, the TV was required to be restarted to ensure proper operation. Simultaneously, the oscilloscope output was observed to understand the nature of each fault.