Volume : 3 | Issue : 4 | April 2014 • ISSN No 2277 - 8160

Research Paper | Economics

Possible Faults of Liquid Crystal Display(LCD) Television and Their Remedy Skills Required by Electronic Technicians

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ABSTRACT

The study was carried out to determine possible faults of liquid crystal display(LCD) television and their remedy skills required by electronic technicians. The population for the study was 3209 consisting of 11 electronic teachers and 3198 electronic technicians. The 11 electronic technology teachers and 155 electronic technicians selected by simple random sampling were used for the study. Questionnaire consisting of 64 items was used to elicit responses from electronic teachers and electronic technicians regarding the two research questions. Data collected were analyzed using mean while t-test for independent sample was used to test the null hypotheses at 0.05 level of significance. Analyses revealed possible signs of faults in LCD related to picture section, sound section, power section, control buttons and important ways faults in LCD television can be remedied. It was concluded that Maintenance is required of LCD televisions by electronic technicians to keep them in good working condition.

KEYWORDS : Electronic technology, faults, Liquid Crystal Display Television, Technician.

1 Introduction

Every appliance used by man especially electronic appliances at one point or another develop faults. The faults developed by electronic appliances need to be traced and fixed to keep them in good working condition. The process of tracing these faults and fixing them is known as maintenance. Maintenance is required of electronic appliances for steady functionality, durability, and even aesthetic. Maintenance is the process of keeping equipment, tools, materials, or system in good working condition. Ogbuanya (2009) defined maintenance as the action taken to restore or keep an item in good functional order. It involves decision making and planning by the personnel. Maintenance of electronic appliances are carried out by electronic technicians.

Maintenance of electronic appliances can be in various forms such as dusting, lubricating, replacing burnt/damaged components, repairing, testing, using items for the purpose they are designed and following procedure for the operation of each appliance (Ogbuanya, 2009). The kind of maintenance given to electronic appliance depends on the type of appliance. Different electronic appliances are available in the society such as radios, televisions, DVD players, among others. Advances in technology has led to the manufacture of different kinds of televisions of which Liquid Crystal Display(LCD) television is one of them. LCD televisions as the name implies is made of Liquid Crystal.

According to Theraja and Theraja (2007), a liquid crystal display is a material (usually, an organic compound) which flows like a liquid at room temperature but whose molecular structure has some properties normally associated with solids (examples of such components are: cholesteryl nonanoate and p-azoxyanisole). Liquid crystal "cell" consists of a thin layer (about 10µm) of a liquid crystal sandwiched between two glass sheets with transparent electrodes deposited on their inside faces. The Liquid Crystal Display (LCD) materials are used in construction of LCD televisions. The LCD television has the advantage of reduced weight, low power consumption, among others (Theraja and Theraja, 2007). The advantage of reduced weight of LCD televisions can be attributed to the components that make up LCD televisions which are usually of little weight. The LCD televisions are continuously displacing the use of Cathode Ray Tube (CRT) televisions. The increased level of acceptance of LCD televisions has led to the use of LCD televisions in so many homes, hotels, banks, hospitals, offices, and guest houses.

Most LCD televisions used in banks, hotels, offices and some homes are usually mounted on the walls thereby, occupying little or no floor space in the rooms/areas where they are mounted. The high level of acceptance of LCD televisions has led to continuous importation of LCD televisions in the society. Even human beings don't last forever as such, LCD television is a system which is made up of several components connected together to put it into operation. Some of the parts of LCD television include: the screen, the casing, picture section, sound section and so on. Lewis (2004) identified parts of LCD television to include: power section, tuner, audio, chroma decoder scart 1; and the control buttons Being a system (comprising several components/parts), it is bound to breakdown, it can develop different types of faults at one time or the other. The faults of LCD television's power supply are often difficult to repair without the need of a qualified service technician (Pullman, 2009).

A technician is a person who is trained formally in a particular trade. Technicians are trained formally in technical colleges while artisans are trained informally through apprenticeship systems available in the society. Apprentice in electronic maintenance learn skills involved in maintenance of different kinds of electronic gadgets. Skill is the ability in carrying out task(s). It is dexterity in handling tools, expertness in the use of tools, and machines and that of production of an object with speed and accuracy (Ede, 2001). Students at technical colleges are exposed to different skilled areas, through which one can be trained to become a self reliant technician. This type of education received at technical college level is known as technical education.

Federal Republic of Nigeria (2004) defined technical and vocational education as a comprehensive term referring to those aspects of the educational process involving in addition to general education the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. Technical Education is that aspect of education that leads to acquisition of practical and applied skills as well as basic scientific knowledge (Okoro, 1999). At technical college level, technical education is provided to impart technical/occupational skills in the areas of electricity, electronics, metalwork, woodwork, automobile, and so on. This implies that electronic technology is an aspect of technical education.

Electronic technology is the process of applying scientific knowledge in the design, selection of materials, construction, operation and maintenance of electronics (Theraja, 2007). It provides the skills, knowledge and attitudes necessary for effective employment in specific occupation. Electronic technicians produced at technical college level are those that offered courses in electronic technology. Electronic technicians are trained to meet the requirements of man in the ever changing technological society. One of such prominent changes in the field of electronics is the production of more sophisticated electronic gadgets of which liquid Crystal Display(LCD) television is one of them.

Unfortunately, most electronic technicians lack knowledge and skills required to service, diagnose faults, and repair LCD televisions. This

may be as a result of the fact that LCD televisions are new in the society and many electronic technicians did not study its maintenance in school. It may also be attributed to the fact that LCD television maintenance is not included in the curriculum of electronic technology at technical college level. The general maintenance provided in the curriculum of electronic technology is not enough to impart the necessary knowledge and skills required for maintenance of LCD televisions. The components used in construction of LCD televisions are different from the components used in construction of other televisions as such, the operation of the components are different. It is also important to note that the internal components of LCD televisions are more complex, fragile and some are miniaturized in nature. Another issue of serious importance is the fact that LCD televisions are very expensive. This calls for the need for competent technicians to repair these televisions when they develop faults. Inadequate competent technicians to repair these televisions has led to continuous importation of new LCD television and increase in the number of faulty LCD televisions in the environment thereby causing environmental hazards such as being host to mosquitoes. Other challenges of LCD televisions include: insufficient screen resolution, problem of viewing angle and so on (Theraja and Theraja, 2007). This implies that electronic technicians require knowledge and skills which will enable them to effectively maintain LCD televisions. To carry out effective maintenance of LCD televisions, electronic technicians must know the parts/sections of the LCD television. Some of the parts of LCD television include: the screen, the casing, picture section, sound section and so on. Lewis (2004) identified parts of LCD television to include: power section, tuner, audio, chroma decoder scart 1; and the control buttons Being a system (comprising several components/ parts). However, these parts/sections of LCD televisions at one time or the other develop different kinds of faults.

Faults developed by LCD televisions are of various types, among them are ghosting of pictures, poor picture quality, audio faults, and so on. Wistrom (2011) identified some of the numerous problems of LCD television to include: on power/image, no signal, picture issues. If these faults are not properly checked, it may result to total damage of the television. Faults developed by LCD televisions can be traced and remedied.

The kind of remedy given to LCD television fault depends on the type and nature of the problem identified. Some of the ways of solving LCD television faults have been identified by Wistrom (2011). According to Wistrom (2011) if there is no power/image, check the power cord, and make sure that it is fully inserted into the outlet. You may want to test the outlet with another appliance to see if there is a problem with the outlet. Turn the power button on. If the picture looks extremely distorted, external devices may be interfering with the signal. Remove any appliances near the television, and see if it works better. Fluorescent lights can also interfere with the image. Move the television to a new location. The kind of remedy required for the faults developed by Liquid Crystal Display(LCD) television requires electronic technicians who are skilled in providing solutions to such faults.

Unfortunately, most electronic technicians do not have adequate knowledge and skills required to effectively provide remedy to the LCD television faults. This study therefore will find out the possible faults of Liquid Crystal Display(LCD) television and their remedy skills required by electronic technicians.

2. THEORIES

Faults of any electronic appliance can be found by troubleshooting the appliance. Troubleshooting theory according to Tecumseh Power (2009) states that before troubleshooting any system problem, see original equipment manufacturer's (O.E.M.) instructions. Make your troubleshooting easier by preparing as follows: Work in a clean, well-lighted place; Keep proper tools and materials nearby; Keep an adequate supply of clean petroleum-based solvent. This theory is relevant to this study because it emphasized the need to troubleshoot in a well-lighted environment using the right tools and materials.

Another theory of troubleshooting according to Jamie(2009) stated that troubleshooting involves the following: identify the problem, establish a theory of probable cause, test the theory to determine cause, once the theory is confirmed determine next steps to resolve problem, if theory is not confirmed re-establish new theory or escalate, establish a plan of action to resolve the problem and implement the solution, verify full system functionality and if applicable implement preventative measures, document findings, actions and outcomes. This theory is related to the present study because it emphasized the need for problem identification in the troubleshooting process. This is so because troubleshooting LCD television involves identification of faults by critically examining the different sections of LCD television set for faulty components or parts.

The two theories above are related because each of the theories emphasized the importance of following the right steps in identification of faults which include making reference to the manufacturer's manual guide to identification of the fault(s) and taking actions to remedy the fault(s).

3. RESEARCH QUESTIONS:

The following research questions guided the study:

1. What are the possible signs of fault in LCD televisions?
2. What are the possible ways faults in LCD televisions can be remedied?

4. HYPOTHESES:

The following hypotheses that guided the study were tested at 0 .05 levels of significance:

Ho_1: There is no significant difference between the mean responses of electronic teachers and technicians on the possible signs of fault in LCD televisions.

Ho_2: There is no significant difference between the mean responses of electronic teachers and technicians on the possible ways faults in LCD televisions can be remedied.

5. METHOD

The design adopted for this study was a descriptive survey research design. Descriptive survey design according to Ezeji (2004), is concerned with specifying the properties of educational and other phenomena. The design is appropriate because it sought the representative views of electronic teachers and technicians on possible faults of Liquid Crystal Display(LCD) television and their remedy skills required by electronic technicians.

The population for the study was 3209 persons. This consist of 11 electronic teachers in 10 Government Technical Colleges in Anambra State as well as 3198 electronic technicians in Anambra State. This figure was obtained from Anambra State Post Primary School Management Board (2011) and Anambra State Ministry of Commerce and Industry (2012).

All the 11 electronic technology teachers in 10 Government technical Colleges in Anambra State were used for study as well as 155 electronic technicians selected by simple random sampling. According to Gall, Gall, and Borg (2007), simple random sampling is the selection from a population through the process that provides every sample of a given size an equal probability of being selected. The teachers and the electronic technicians have similar culture.

The questionnaire was the instrument used for eliciting responses from the respondents. The questionnaire was divided into two sections namely sections A, and B, which consisted of 64 structured items. Section A sought information on the possible signs of fault in LCD televisions, while section B sought information on the possible ways faults in LCD televisions can be remedied. The questionnaire utilized a 4-point scale of The questionnaire items was rated as follows: Very Important(-VI), Important(I), Moderately Important(MI), and Not Important(NI) for research questions one; and Very Possible(VP), Possible(P), Moderately Possible(MP) , and Not Possible(NP) for research questions two, and three.

Three experts, two from department of Vocational Teacher Education, University of Nigeria, Nsukka and one technician were requested to carry out face validation of the instrument. Their comments, suggestions and advice were used to modify some of the items.

The reliability of the instrument was established by trial testing using electronic teachers and technicians in Enugu State. Cronbach Alpha was used to determine the internal consistency of the items in the instrument. A reliability coefficient of 0.89 was obtained.

The researcher administered and collected the instrument with the help of six research assistants. The research assistants were requested to administer the instrument to the respondents and collect them immediately after completion by the respondents. The respondents were required to provide information that represent their opinion out of the available response alternative in the questionnaire. The instrument was be collected immediately after its administration, the same day. It took two weeks to administer and collect the instrument and 95% of the administered instrument were returned.

The data collected for this study was analyzed using mean. t-test for independent samples was used to test the hypothesis at 0.05 level of significance. The response to the items was interpreted using table of real limit of numbers as follows:

Very Important(VI)/Very Possible(VP) = 3.50 – 4.00

Important(I)/Possible(P) = 2.50 – 3.49

Moderately Important(MI)/Moderately Possible(MP) = 1.50 – 2.49

Not Important(NI)/Not Possible(NP) = 0.50 – 1.49

Base on the above limits, any item that has a mean score of 3.50 – 4.00 was regarded as Very Important/Very Possible, 2.50 – 3.49 was regarded as Important/Possible, 1.50 – 2.49 was regarded as Moderately Important/Moderately Possible, 0.50 – 1.49 was regarded as Not Important/Not Possible**.**

6. RESULTS

Table 1: Mean ratings, standard deviation and t-test analysis of responses of electronic technology teachers and technicians on the possible signs of fault in LCD televisions.

s/n	Possible signs of fault in LCD televisions.		S.D	Electronic Technicians. n = 149		Electronic Teachers. n = 9		t- cal	Sig.(2-tailed)	Decision
					$S.D_1$		$S.D_2$			
1	No picture.	3.54	0.61	0.61	0.58	3.00	0.87	2.761	0.006	S
2	Automatic turn off of the TV or going into standby.	3.53	0.64	3.54	0.64	3.33	0.50	0.933	0.352	NS
3	No picture and menu information from equipment connected to the scart connector.	3.52	0.62	3.54	0.61	3.22	0.67	1.496	0.137	NS
4	Ghosting of pictures/ poor image/poor picture/ unstable picture.	3.51	0.58	3.52	0.59	3.33	0.50	0.949	0.344	NS
5	Appearance of snow and noise on the screen.	3.52	0.62	3.52	0.62	3.44	0.53	0.373	0.709	NS
6	Dotted lines or stripes on the screen.	3.54	0.58	3.55	0.59	3.44	0.53	0.529	0.598	NS
7	No colour on colour programmes.	3.56	0.58	3.57	0.58	3.44	0.53	0.631	0.529	NS
8	Increased brightness of the TV pictures.	3.53	0.58	3.54	0.59	3.33	0.50	1.051	0.295	NS
	Possible signs of fault in LCD televisions related to sound.									
9	Noisy picture.	3.50	0.61	3.51	0.61	3.33	0.50	0.850	0.397	NS
10	Stripe noise during playback/recording of a VCR.	3.50	0.56	3.51	0.53	3.33	0.50	0.916	0.361	NS
11	Noisy picture when viewing TV channel.	3.48	0.62	3.49	0.62	3.33	0.50	0.740	0.460	NS
12	No sound but with good picture.	3.49	0.62	3.50	0.61	3.22	0.67	1.334	0.184	NS
13	Failure to receive a stereo or dual sound broadcast.	3.51	0.62	3.52	0.62	3.33	0.50	0.867	0.387	NS
14	Strange sound making the TV to creak.	3.49	0.62	3.50	0.61	3.22	0.67	1.334	0.184	NS
15	Buzzing of the TV.	3.50	0.62	3.51	0.62	3.33	0.50	0.836	0.405	NS
	Possible signs of fault in LCD televisions related to power section of LCD TV circuit.									
16	Blinking/low power on the television.	3.52	0.58	3.54	0.58	3.22	0.67	1.579	0.116	NS

17	Short circuit.	3.49	0.63	3.51	0.62	3.22	0.67	1.343	0.181	NS
18	Television fails to power on.	3.52	0.57	3.54	0.56	3.22	0.67	1.610	0.109	NS
19	TV fails to receive power.	3.52	0.58	3.54	0.58	3.22	0.67	1.579	0.116	NS
20	Total TV dead set.	3.49	0.59	3.50	0.59	3.33	0.67	1.382	0.169	NS
	Possible signs of fault in LCD televisions related to tuner, audio, chroma decoder, scart 1									
21	Absence of picture on the screen.	3.49	0.63	3.50	0.62	3.33	0.71	0.759	0.449	NS
22	Standby indicator lights up in red.	3.46	0.61	3.47	0.61	3.22	0.67	1.176	0.241	NS
23	No sound and picture on the TV.	3.47	0.63	3.49	0.61	3.11	0.78	1.778	0.077	NS
24	TV menu refuses to function.	3.46	0.60	3.47	0.60	3.22	0.67	1.229	0.221	NS
	Possible signs of fault in LCD televisions related to control									
25	TV power fails to turn on.	3.44	0.65	3.46	0.64	3.11	0.78	1.577	0.117	NS
26	Control buttons refuse to function.	3.42	0.66	3.44	0.66	3.22	0.67	0.943	0.347	NS
27	Control buttons refuse to function properly.	3.45	0.65	3.47	0.65	3.11	0.60	1.607	0.110	NS
28	Motion blurs.	3.46	0.64	3.48	0.65	3.22	0.44	1.150	0.134	NS
29	Power button refuse to function.	3.45	0.64	3.47	0.64	3.11	0.60	1.631	0.105	NS
	Other possible signs of faults in LCD television include:									
30	Fuzzy scanning lines.	3.46	0.62	3.48	0.62	3.22	0.67	1.187	0.237	NS
31	Poor horizontal images on the TV.	3.47	0.62	3.50	0.61	3.00	0.71	2.379	0.019	S
32	Poor vertical images on the TV.	3.46	0.64	3.48	0.63	3.00	0.70	2.242	0.026	S

Key: NS = Not Significant, S = Significant, df = Degree of freedom, t-cal = Calculated value of t-test using SPSS, S.D = Standard Deviation, $\bar{X}_1$ = Mean for Electronic technicians, $\bar{X}_2$ = Mean for Electronic Teachers, n_1 = number of Electronic technicians, n_2 = number of Electronic teachers, Level of Significance = 0.05.

Data presented In Table 1 shows that all the items had their mean ranging from 3.46 to 3.54 which falls within the response categories of Possible and Very Possible. This indicates that the items 1 to 10, 13, 15, 16, 18 and 19 are Very Possible signs of fault in LCD televisions with their mean scores ranging from 3.50 to 3.56. While items 11, 12, 14, 17 and 20 to 32 are Possible signs of fault in LCD televisions with mean scores ranging from 3.42 to 3.49. The standard deviation for the items ranges from 0.56 to 0.66. This implies that the Electronic Teachers and Electronic Technicians are homogenous in their responses on the possible signs of fault in LCD televisions. The result also shows that there is a significant difference in the mean responses of Electronic Teachers and Electronic Technicians on items 1, 31, and 32. Since their significance level are 0.006, 0.019, and 0.026 respectively, which are less than 0.05 level of significance. Therefore, the null hypothesis of no significance difference at 0.05 level of significance was rejected for those items.

The result also revealed that there was no significance difference in the mean responses of Electronic Teachers and Electronic Technicians on items 2 to 30. Since their significance level ranges from 0.055 to 0.547 which are more than 0.05 level of significance. Therefore the hypothesis of no significance difference was not rejected at 0.05 level of significance for those items.

Table 2: Mean ratings, standard deviation and t-test analysis of responses of electronic technology teachers and technicians on the possible ways faults in LCD televisions can be remedied.

s/n	Important ways faults in LCD televisions can be remedied.		S.D	Electronic Technicians. n = 149		Electronic Teachers. n = 9		t- cal	Sig.(2-tailed)	Decision
					$S.D_1$		$S.D_2$			
33	If there is no picture, connect the TV to the mains and press the power button. If it continues, replace the tuner.	3.41	0.63	3.40	0.64	3.56	0.53	-0.706	0.481	NS

34										
If the TV turns off automatically or goes into standby replace the damaged IC or resistor or diode on the power stage.	3.40	0.64	3.40	0.63	3.44	0.73	-0.221	0.826	NS	
35										
If there is no picture or menu information on the equipment connected to the Scart 1 connector, press the button repeatedly on the remote control until the correct input symbol is displayed on the screen.	3.41	0.61	3.41	0.60	3.33	0.71	0.363	0.717	NS	
36										
If there is ghosting of pictures, change the electrolytic capacitor on the horizontal stage.	3.37	0.67	3.37	0.66	3.33	0.87	0.155	0.877	NS	
37										
If there is appearance of snow and noise on the TV screen, replace the tuner.	3.37	0.65	3.38	0.64	3.22	0.83	0.685	0.494	NS	
38										
If there is dotted lines or strips, keep the TV away from electrical noise such as cars, motorcycles or hair dryers. If it continues, replace the electrolytic capacitor on the vertical stage.	3.35	0.69	3.36	0.68	3.22	0.83	0.593	0.554	NS	
39										
If there is no colour on the colour programme, replace the transistor in the tube base.	3.37	0.63	3.38	0.62	3.11	0.78	1.254	0.212	NS	
40										
For increased brightness of TV picture, reduce screen adjustment.	3.39	0.66	3.40	0.66	3.22	0.67	0.771	0.442	NS	
Important ways faults related to sound in LCD televisions can be remedied:										
41										
For noisy picture, replace the faulty IF stage or the tuner.	3.40	0.61	3.41	0.60	3.22	0.67	0.898	0.371	NS	
42										
For stripe noise during playback, keep VCR away from the TV, replace the playback cord.	3.37	0.65	3.38	0.65	3.22	0.67	0.685	0.494	NS	

43										
If there is noisy picture when viewing a TV channel, replace the faulty IF stage.	3.41	0.61	3.42	0.61	3.22	0.67	0.959	0.339	NS	
44										
If there is no sound but with good picture, replace the sound IC.	3.37	0.64	3.39	3.11	0.63	0.78	1.262	0.209	NS	
45										
If the TV fails to receive a stereo or dual sound broadcast, replace the faulty speaker.	3.38	0.66	3.39	3.22	0.65	0.83	0.732	0.465	NS	
46										
If the TV creaks, reduce the temperature of the TV by using standing fan.	3.39	0.62	3.40	3.22	0.60	0.83	0.822	0.412	NS	
47										
For buzzing of the TV, turn "off" the TV and turn it "on" again.	3.41	0.63	3.41	0.63	3.33	0.71	0.351	0.726	NS	
Important ways faults related to power section in LCD televisions can be remedied:										
48										
If there is blinking/ low power on the TV, replace the power IC with short circuit.	3.41	0.62	3.41	0.62	3.33	0.71	0.357	0.721	NS	
49										
For short circuit, slowly remove the components one by one to see high Ohms reading will be obtained and replace the faulty component.	3.44	0.63	3.44	0.63	3.33	0.71	0.503	0.615	NS	
50										
If the TV fails to power "on", replace the blown fuse if it continues, replace the power pack.	3.41	0.66	3.42	0.65	3.22	0.83	0.886	0.377	NS	
51										
If the TV fails to receive power, replace the damaged power IC or capacitor.	3.40	0.68	3.42	0.66	3.00	0.87	1.834	0.069	NS	
52										
For total TV dead set, replace the TV power cord if it continues, replace faulty component in the power stage.	3.41	0.67	3.42	0.66	3.22	0.83	0.873	0.384	NS	

59	For refusal of the control buttons to function properly, vary the variable resistors responsible for the control button.	3.44	0.64	3.46	0.63	3.11	0.78	1.602	0.111	NS
58	If the control buttons refuse to function, use multi-meter set at times 1Ω to trace the faulty component in the control buttons circuit and replace the faulty component.	3.43	0.66	3.44	0.65	3.22	0.83	0.972	0.333	NS
57	If the TV power fails to turn on, press the energy saving switch (•).	3.45	0.64	3.47	0.63	3.11	0.78	1.631	0.105	NS
	Important ways faults related to control button section in LCD televisions can be remedied:									
56	If the TV menu refuses to function, press SYNC MENU, select TV control and select Home (menu) or options to control the TV.	3.46	0.62	3.46	0.62	3.33	0.71	0.604	0.547	NS
55	For no sound and picture on the TV, replace the IC in the IF stage.	3.45	0.66	3.47	0.64	3.11	0.93	1.583	0.284	NS
54	If the standby indicator lights up in red, replace the function IC.	3.44	0.64	3.46	0.63	3.22	0.83	1.061	0.290	NS
53	If there is absence of picture on the screen, connect antenna properly if it continues, replace the tuner.	3.41	0.67	3.43	0.65	3.00	0.87	1.888	0.061	NS
	Important ways faults related to tuner, audio, chroma, decoder, scart 1 section in LCD televisions can be remedied:									
60	For motion blurs, adjust the setting of the TV colour to obtain the desired degree of colour saturation.	3.44	0.64	3.45	0.64	3.33	0.71	0.526	0.600	NS
61	If the power button refuses to function, replace with new power button from the same manufacturer.	3.44	0.63	3.46	0.62	3.22	0.83	1.108	0.270	NS
	Other ways faults in LCD televisions can be remedied are:									
62	For fuzzy scanning lines, adjust the focus of the TV.	3.47	0.65	3.47	0.65	3.44	0.73	0.112	0.911	NS
63	For poor horizontal images on the TV, adjust the setting of the horizontal deflection coils to 10-15 percent over scan left and right.	3.47	0.63	3.48	0.62	3.44	0.73	0.149	0.882	NS
64	For poor vertical images on the TV, adjust the setting of the vertical deflection coil size so that there is about 10-15 percent over scan top and bottom.	3.45	0.64	3.46	0.64	3.33	0.71	0.555	0.579	NS

Key: NS = Not Significant, S = Significant, df = Degree of freedom, t-cal = Calculated value of t-test using SPSS, S.D = Standard Deviation, $\bar{X}_1$ = Mean for Electronic technicians, $\bar{X}_2$ = Mean for Electronic Teachers, n_1 = number of Electronic technicians, n_2 = number of Electronic teachers, Level of Significance = 0.05.

Data presented In Table 2 shows that all the items had their mean ranging from 3.35 to 3.47 which falls within the response categories of Important. This indicates that all the items are the important ways faults in LCD televisions can be remedied . The standard deviation for the items ranges from 0.60 to 0.69. This implies that the Electronic Teachers and Electronic Technicians are homogenous in their responses on the possible ways faults in LCD televisions can be remedied. The result also shows that there was no significance difference in the mean responses of Electronic Teachers and Electronic Technicians on all the 32 items. Since their significance level ranges from 0.061 to 0.911 which are more than 0.05 level of significance. Therefore, the null hypothesis of no significance difference was not rejected at 0.05 level of significance for those items.

7. DISCUSSION

The findings of the study revealed that 32 items are possible signs of fault in LCD televisions as indicated by the responses of the electronic technology teachers and electronic technicians. The items are as follows: faults related to picture include: absence of picture, automatic turn off of the TV, absence of picture and menu information from equipment connected to the scart connector, ghosting of pictures/ poor image/poor picture/unstable picture, appearance of snow and noise on the screen, dotted lines or stripes on the screen, no colour on colour programmes, increased brightness of the TV pictures. Possible signs of fault in LCD televisions related to sound include: noisy picture,

stripe noise during playback/recording of a VCR. noisy picture when viewing TV channel, absence of sound but with good picture, failure to receive a stereo or dual sound broadcast, strange sound making the TV to creak, and buzzing of the TV. Possible signs of fault in LCD televisions related to power section of LCD TV circuit include: blinking/ low power on the television: short circuit, television failing to power on, TV failing to receive power, and total TV dead set. Possible signs of fault in LCD televisions related to tuner, audio, chroma decoder, scart 1 include: absence of picture on the screen, standby indicator lighting up in red, no sound and picture on the TV, and TV menu refusing to function. Possible signs of fault in LCD televisions related to control buttons include: TV power failing to turn on, control buttons refusing to function, control buttons refusing to function properly, motion blurs, and power button refusing to function. Other possible signs of faults in LCD television include: fuzzy scanning lines, poor horizontal images on the TV, and poor vertical images on the TV. This is in line with Steer (2011) as well as Mukai and Kobayashi (1988). Some of the possible signs of faults in LCD television identified by Steer (2011) include no raster, improper synchronization, no vertical and horizontal synchronization, among others.

The result of the analysis of the hypothesis revealed that there was no significant difference in the responses of electronic technology teachers and electronic technicians on 29 possible signs of faults in LCD televisions. However, significant difference existed in the respondents responses on only 3 items as can be seen from table 1. The hypothesis of no significant difference was upheld for 29 items, but was rejected for 3 items (see table 1). Majority of the electronic technology teachers and electronic technicians rated the possible signs of faults in LCD televisions the same way. The result confirms the findings of Steer (2011) who identified possible signs of faults in LCD television to include no raster, improper synchronization, no vertical and horizontal synchronization, among others.

The findings of the study revealed that the important ways faults in LCD televisions can be remedied are: ways faults related to picture in LCD televisions can be remedied include: if there is no picture, connect the TV to the mains and press the power button; if it continues, replace the tuner; if the TV turns off automatically or goes into standby replace the damaged IC or resistor or diode on the power stage; if there is no picture or menu information on the equipment connected to the Scart 1 connector, press the button repeatedly on the remote control until the correct input symbol is displayed on the screen; if there is ghosting of pictures, change the electrolytic capacitor on the horizontal stage; if there is appearance of snow and noise on the TV screen, replace the tuner; if there is dotted lines or strips, keep the TV away from electrical noise such as cars, motorcycles or hair dryers; if it continues, replace the electrolytic capacitor on the vertical stage; if there is no colour on the colour programme, replace the transistor in the tube base; and for increased brightness of TV picture, reduce screen adjustment. Important ways faults related to sound in LCD televisions can be remedied include: for noisy picture, replace the faulty IF stage or the tuner; for stripe noise during playback, keep VCR away from the TV, replace the playback cord; if there is noisy picture when viewing a TV channel, replace the faulty IF stage; if there is no sound but with good picture, replace the sound IC; if the TV fails to receive a stereo or dual sound broadcast, replace the faulty speaker; if the TV creaks, reduce the temperature of the TV by using standing fan; and for buzzing of the TV, turn "off" the TV and turn it "on" again. Important ways faults related to power section in LCD televisions can be remedied: if there is blinking/ low power on the TV, replace the power IC with short circuit; for short circuit, slowly remove the components one by one to see high Ohms reading will be obtained and replace the faulty component; if the TV fails to power "on", replace the blown fuse if it continues, replace the power pack; if the TV fails to receive power, replace the damaged power IC or capacitor; and for total TV dead set, replace the TV power cord if it continues, replace faulty component in the power stage. Important ways faults related to tuner, audio, chroma, decoder, scart 1 section in LCD televisions can be remedied include: if there is absence of picture on the screen, connect antenna properly if it continues, replace the tuner; if the standby indicator lights up in red, replace the function IC; for no sound and picture on the TV, replace the IC in the IF stage; and if the TV menu refuses to function, press SYNC MENU, select TV control and select Home (menu) or options to control the TV.

Important ways faults related to control button section in LCD televisions can be remedied include: if the TV power fails to turn on, press the energy saving switch (•); if the control buttons refuse to function, use multi-meter set at times 1Ω to trace the faulty component in the control buttons circuit and replace the faulty component; for refusal of the control buttons to function properly, vary the variable resistors responsible for the control button; for motion blurs, adjust the setting of the TV colour to obtain the desired degree of colour saturation; and if the power button refuses to function, replace with new power button from the same manufacturer. Other ways faults in LCD televisions can be remedied include: for fuzzy scanning lines, adjust the focus of the TV; for poor horizontal images on the TV, adjust the setting of the horizontal deflection coils to 10-15 percent over scan left and right; and for poor vertical images on the TV, adjust the setting of the vertical deflection coil size so that there is about 10-15 percent over scan top and bottom. This was in line with Pullman (2009) and Goldwasser (2011). Pullman (2009) identified some of the ways of remedying LCD television faults to include: checking to see that the power outlet is receiving electricity by plugging a different device into the plug and turning the power on, replacing blown fuse, among others.

It was found in the hypothesis that there was no significant difference in the responses of electronic technology teachers and electronic technicians on all the items identified for important ways faults in LCD televisions can be remedied (see table 2). Therefore, the null hypothesis was upheld for all the items. Majority of the electronic technology teachers and electronic technicians rated the important ways faults in LCD televisions can be remedied the same way. Majority of the respondents agreed that the identified the important ways faults in LCD televisions can be remedied. The finding is consistent with Pullman (2009), who identified some of the ways of remedying LCD television faults to include: checking to see that the power outlet is receiving electricity by plugging a different device into the plug and turning the power on, replacing blown fuse, among others.

8. CONCLUSION

Based on the findings of the study, the following conclusions were made: LCD televisions are new in the society and their maintenance should be taught as a separate topic in electronic technology. Maintenance is required of LCD televisions by electronic technicians to keep them in good working condition thereby, minimizing high cost of buying new LCD televisions. This will help the electronic technicians to be self employed, thereby reducing unemployment and crime rate in the society.

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