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# GENERATOR MAINTENANCE TRAINING FOR HOSPITAL TECHNICIANS IN HAITI

Port-au-Prince, Feb. 29 - Mar. 2, 2012

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## Summary

To ensure maintenance and improve chances for sustainability of the diesel generators installed in Haitian hospitals, USAID's Improving Health Facility Infrastructure (IHFI) project designed and implemented a training workshop for hospital technicians. The seminar focused on the operation, maintenance and monitoring procedures for diesel generators. IHFI worked with the Ministry of Health Project Management Unit (UGP) which sponsored and co-funded the training, including bringing 18 hospital technicians and other technical staff from facilities throughout Haiti to Port-au-Prince for three days of training. Training materials were developed in Creole, and IHFI staff and a local technical expert made up the teaching team.

Workshop materials and basic electrical tools were provided to each technician, and an interactive, one-day hands-on session was designed to meet the training objectives. In addition, participants were taught how to measure and log readings in logbooks and sheets designed for this purpose.

Following are some of the key conclusions and achievements of this training workshop:

- 18 hospital technicians were trained on operation, maintenance and data logging on diesel generator systems. Travel and expenses, including the hotel stay in Port-au-Prince for out-of-town technicians, were paid for all the participants. Funding for this was provided by UGP.
- Overall, the participants were very satisfied. The workshop generated good will and a sense of empowerment among technicians, something that has typically been lacking in many health facilities in Haiti. Moreover, the workshop helped build relationships among the technicians, and more importantly, between technicians and the UGP.
- Data collection and logging, in addition to providing valuable data on operations, challenges technicians to be responsible and know their equipment better; this is one of the underpinnings of the IHFI program in Haiti.
- The Creole curriculum materials that were developed for this workshop can be reused, expanded and built upon for additional training.
- Participation of the Ministry of Health and a local vocational school were key contributors to the success of this workshop, and to the expected continuation of further workshops.

## Introduction

As part of USAID's Improving Health Facility Infrastructure (IHFI) program in Haiti, Tetra Tech (Tt) worked with the Project Management Unit (UGP) of the Haitian Ministry of Health and Population (MSPP) to organize and deliver a basic-level training workshop for MSPP hospital technicians on maintenance and upkeep of diesel generator. The workshop, spanning three full days, focused on operation, maintenance and monitoring of diesel engine generators, with the following objectives:

- Expand knowledge of operation, maintenance and monitoring of diesel engine generators to ensure maintenance and improve chances for sustainability of the installed units in Haitian hospitals.
- Evaluate the technicians' knowledge of operation, maintenance and monitoring of diesel engine generators to better tailor future trainings to their needs.
- Develop and test a basic training approach and curriculum that can eventually be repeated in country to reach all MSPP and other health facility technicians.
- Continue development of a local in-country instructor capacity for future technician trainings, including a local vocational school, Haiti Tec, where much of this capacity could reside.
- Introduce the concepts and habits of measurement, logging and documentation of key operating parameters of diesel generators, as part of a process to develop databases of system performance throughout MSPP health facilities.

## Organization of the Training

### Logistics

The training took place on February 29-March 2, 2012 at the Haiti Tec facilities in Port-au-Prince, Haiti. Eighteen technicians from all over Haiti were invited to participate. Organization and funding were shared between IHFI and UGP: UGP paid for the welcome ceremony, the lodging, the bus transport between hotel and Haiti Tec, and the technicians' travel to Port-au-Prince, while IHFI covered a small per diem for the participants, and paid for instructors, materials and the participation of Haiti Tec and their facilities. On the last day of the training, the Tt team used three generators of 96, 250 and 350 kW at Hopital Universitaire de la Paix (HUP) for practical exercises.

As part of the class, each participant received a binder with course materials and logging sheets to be completed. Each participant also received a tool kit with: a multimeter, wrenches, screwdrivers, safety goggles and gloves. The full list of instruments can be found in Appendix C. Certificates of course completion were provided.



Welcome ceremony at hotel Ideal Villa

### Participants

Eighteen technicians from 12 different hospitals and the Ministry of Health (MSPP) attended the three-day training. The full list of participants can be found in Appendix A.



Group picture of the participants and the instructors

### Instructors

The training was instructed in Creole by Ronick Dieudonne (Tt), Loby Gratia (Tt), and Franz Gilbert (Services Professionnels).

**Loby Gratia** is an electrical technician on the IHFI project with nearly 20 years of experience with electrical installations and inverter repair.

**Ronick Dieudonne** is an electrical engineer on the IHFI project with several years of experience in diesel generator operations and maintenance.

**Frantz Gilbert** is the owner and principal technical expert of Services Professionels, a Haitian firm that specializes in repair and maintenance of diesel generators. With more than 20 years of experience, he supervises approximately 15 technicians that service equipment and provide emergency repairs throughout the country.



IHFI employees and technical expert instructing hospital technicians with Power Point presentation (left) and hands-on labs (right) in HUP

## Course Structure and Content

### Summary Agenda

The first two days of the seminar consisted of Power Point presentations while the last day was dedicated to practical exercises on generators at the Hopital Universitaire de la Paix (HUP). The following table provides a brief description of the course structure. The detailed agenda of the training can be found in Appendix B.

Day #	Title	Instructors
Day 1 Haiti Tec	<ul style="list-style-type: none"> <li>• 1. General description of generators</li> <li>• 2. How to start and stop a generator</li> <li>• 3. Control board</li> </ul>	Ronnick Dieudonné; Loby Gratia; Frantz Gilbert
Day 2 Haiti Tec	<ul style="list-style-type: none"> <li>• 4. Most frequent problems</li> <li>• 5. Safety measures</li> <li>• 5. Maintenance</li> <li>• 6. Logging</li> </ul>	Ronnick Dieudonné; Loby Gratia; Frantz Gilbert
Day 3 HUP	<ul style="list-style-type: none"> <li>• Practical exercises:               <ul style="list-style-type: none"> <li>- Identify generator parts</li> <li>- Maintenance procedures</li> <li>- Logging</li> </ul> </li> </ul>	Ronnick Dieudonné; Loby Gratia; Frantz Gilbert and a technician from Services Professionels

## Day 1 – Introduction and operation of generators

The first half of the day consisted of a basic introduction to the seminar. The participants first completed a registration form to provide data on their education and experience background, and the type of generators they are in charge of at their hospital. They were then given a short test to evaluate their knowledge and assess their training needs. Finally, using a Power Point presentation with diagrams and pictures, the instructors gave a general introduction to generators covering the following topics:

### Chapter 1: General description of generators

- Basic operation of generators
- Most popular brands of generators in Haiti
- How to read generator ID tags
- Main components of generators: motor, alternator, etc.
- Speed and frequency
- Main systems: air, fuel, oil and water for cooling

In the afternoon, the instructors explained how to start and stop a generator and how to read and navigate control boards.

### Chapter 2: How to start and stop a generator

- Parameters to check before starting a generator (oil, water, fuel, battery)
- Start procedure
- Parameters to check after starting a generator (alarm, voltage on each phase, frequency, temperature, oil pressure, battery voltage)
- Stop procedure

### Chapter 3: Control board

- Most common control boards
- How to read and navigate control boards

## Day 2 – Troubleshooting, maintenance and monitoring of generators

The second day of the workshop was dedicated to troubleshooting, safety, maintenance and monitoring of generators. First, the instructors explained the most common issues with generators, the main causes of these problems and the appropriate corrective measures. Then, they described all the safety measures required and stressed the importance of maintaining a clean environment around generators. The course followed with detailed explanations accompanied by simple drawings on how to perform maintenance. Finally, the technicians were provided with a logging booklet including daily logging sheets and logging sheets for every 250 operating hours.

### Chapter 4: Most common issues with generators

- Discharged battery
- Over-heating
- Unbalanced phases
- Old fuel

### Chapter 5: Safety and maintenance

- Safety measures

- Importance of cleanliness
- Maintenance (change oil, fuel and air filters, and oil)

#### Chapter 6: Logging

- Importance of logging
- Daily logging
- Logging every 250 operating hours

All students received a tool kit comprising a multimeter, a set of screwdrivers and wrenches, safety goggles and gloves.

#### Day 3 – Practical exercises

The last day of the training was dedicated to practical exercises at Hôpital Universitaire de la Paix (HUP). HUP made available its three generators of 96 kW, 250 kW and 350 kW for the seminar. This section was taught by groups of three participants rotating on the different exercises:

#### Practical exercises

- Identification of the main components of generators
- Maintenance procedures (change oil, change oil filter)
- Logging
- Discussion and questions



Generator maintenance session led by Frantz Gilbert on one of HUP's generators

The full list of training materials provided to the participants, as well as some examples, can be found in Appendix C.

# Evaluation of the Training

## Participants' Evaluation

All the participants filled out an evaluation form; results are provided in Appendix D. Instructors got excellent marks, ranging from 4.4 to 4.9 out of 5. Similarly the topics covered were in line with the participants' satisfaction, marks ranged from 3.6 to 4.6 out of 5, except for the sessions on the most common issues of generators. In terms of logistics, the participants were very satisfied by the organization (4.5/5), tool kit (4.4) and documents (4.3) but less so by the food (3.4), transport (3.5) and classroom (3.6).

## General Comments from the Participants

As during the March and December 2011 workshops on battery maintenance, the technicians raised the issue of access to the supplies and tools needed, stating that they do not always receive it in a timely manner from the hospital administration. It discussed how logging will help plan and order supplies, and anticipate potential issues. It also explained that the future training for Hospital Administrators will help solve this issue.

Regarding the topics that should be covered again in future seminars, the technicians mentioned predominantly the control board and practical exercises (listed by 10 technicians), followed by troubleshooting and logging (6). Nine technicians also mentioned that future trainings should cover the installation and/or repair of inverters.

## Testimonies

Testimony 1 sent by email after the workshop:

« Cette formation sur les génératrices m'a beaucoup plu. Elle me rend encore plus motivé quant à la tâche que je dois à l'hôpital et pourquoi pas mes train-trains quotidien. Merci infiniment pour ce beau travail que vous êtes en train de faire. Je souhaite que vous n'allez pas décourager face aux difficultés de toutes sortes que vous avez déjà rencontrés et celles que vous allez encore faire face. Merci encore! Que Dieu vous guide, vous encourage et vous protège de son manteau protecteur. merci pour la photo! »

"I liked the seminar a lot. It made me more motivated to do my work at the hospital and my day-to-day tasks. A million thanks for the beautiful work you are doing."

Testimony 2 from the training evaluation form:

"The seminar was excellent. I am very happy. I hope it will continue with other workshops."

## Summary and Recommendations

Overall, the training was a success. The technicians were satisfied with the topics covered, and they had time to ask specific questions and actually practice maintenance procedures under guidance during the hands-on exercise. They were also thrilled to receive the tools that they were given at the training. Moreover, UGP and IHFI now have local allies at the health facilities represented by the technicians, making communication, problem reporting, and troubleshooting much easier. A number of areas were identified as lessons or items to follow-up to improve future trainings:

- 1) Training facility: This third workshop confirmed that Haiti Tec looks to be a good partner for trainings. Their facility is in a good location in Port-au Prince, they have a supportive administrative team, and they already have a program that teaches similar classes. However, the absence of Haiti Tec instructor co-teaching this training jeopardizes the sustainability of the program. It is recommended that IHFI work with Haiti Tec to identify other instructors who are interested in using this system in their future classes and who could co-teach the next UGP/Tt trainings. Tetra Tech will also investigate potential partnerships with other technical training institutions in Port-au-Prince.
- 2) Training follow-up: It is recommended that the Haiti Tt team call each hospital technician and/or conduct follow-up site visits to review and assist them in generator maintenance. Repeat or more advanced trainings for the same technicians could be offered annually. The same training should also be offered to new technicians.
- 3) Training material and schedule: Based on previous recommendations, the initial and final tests were done as verbal reviews both individually and with the entire class. This gave the instructors the ability to (1) test the technical understanding of each technician without testing their literacy level, and (2) expand further into concepts when needed.

Now that it has been taught once, the training schedule can be adjusted to reflect the amount of time actually needed in class. Some corrections to the existing curriculum can be made from errors seen in this class.

- 4) Training organization: As recommended after the March and December 2011 training, it would be useful for the instructors to meet one day in advance and conduct a mock training in order to go over the different teaching styles and review some basic teaching methodologies. This would also help to improve coordination between the different instructors' interventions.

## Appendix B: Training Agenda

Wednesday, February 29	Thursday, March 1	Friday, March 2
<ul style="list-style-type: none"> <li>• <b>Welcome</b></li> <li>• <b>Introduction to generators</b></li> <li>• <b>Chapter 1: General description of generators</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Review Day 1</b></li> <li>• <b>Chapter 4: Most frequent problems with generators</b></li> <li>• <b>Chapter 5: Safety measures</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Review Day 1 and 2</b></li> <li>• <b>Practical exercises</b> <ul style="list-style-type: none"> <li>○ Identify generator parts</li> <li>○ Maintenance (change oil, oil filters, etc)</li> <li>○ Logging practice</li> </ul> </li> </ul>
Lunch	Lunch	Lunch
<ul style="list-style-type: none"> <li>• <b>Review Chapter 1</b></li> <li>• <b>Chapter 2: How to start and stop a generator</b></li> <li>• <b>Chapter 3: Control Board</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Review Chapter 4 and 5</b></li> <li>• <b>Chapter 5: Maintenance</b></li> <li>• <b>Chapter 6: Logging</b></li> <li>• <b>Discussion</b></li> <li>• <b>Test</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Practical exercises (continued)</b></li> <li>• <b>Distribution of certificates</b></li> </ul>

## Appendix C: List of Training Materials Provided

The following documents were distributed to all the participants as handout material:

- 1) A binder in Creole with the following course material:
  - a. Cover page
  - b. Contact information
  - c. Agenda
  - d. Chapter 1: General description of generators
  - e. Chapter 2: How to start/stop generators
  - f. Chapter 3: Control board
  - g. Chapter 4: Most common issues
  - h. Chapter 5: Safety and maintenance measures
  - i. Chapter 6: Logging
  - j. References
  - k. Test questions
  - l. Daily logging sheets and logging sheets for every 250 operating hours for approximately one year

Examples of some of the slides can be found below.

- 2) A tool kit including the following:
  - a. Multimeter
  - b. Oil filter wrench
  - c. Adjustable wrenches
  - d. Screwdrivers
  - e. Two rolls of electrical tape
  - f. A pair of black air infused PVC palm coated gloves with 15 gauge seamless nylon knit liner
  - g. Safety goggles

Power Point Presentation used during the seminar and distributed to the participants

### Séminaire de formation des techniciens sur l'opération, l'entretien et le suivi des génératrices

Organisé dans le cadre du projet d'Assistance des Infrastructures de Santé en Haïti (AIS-H), financé par USAID et dirigé par l'Inetech.

Boile Math Tac, l'Inetech-TRINIDAD, Haïti  
22 Février - 2 Mars 2012

### Séminaire de formation des techniciens sur l'opération, l'entretien et le suivi des génératrices

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### Fèy enskripsyon

- Non, Prenon
- Lopital ou responsabla
- Dire etid ou
- Konbyen tan eksperyans ou genyen
- Konbyen tan ou genyen nan Lopital la
- Nimewo telefòn ou
- Kourye ou si ou genyen

### Dèlko lopital la

- Konbyen dèlko ki genyen?
- Pou chak Dèlko:
  - Mak
  - Modèl
  - Pwisans
  - Laj
  - Konbyen è de mach li genyen?
  - Ki pwoblèm li genyen?
  - Konbyen tan dèlko a fè ap mache chak jou?

### Egzanp fèy enskripsyon ranpli

INSTRUKSYON	ANONSEMANTE	ANONSEMANTE
1. Nòm de l'opérateur	2. Nòm de l'opérateur	3. Nòm de l'opérateur
4. Nòm de l'opérateur	5. Nòm de l'opérateur	6. Nòm de l'opérateur
7. Nòm de l'opérateur	8. Nòm de l'opérateur	9. Nòm de l'opérateur
10. Nòm de l'opérateur	11. Nòm de l'opérateur	12. Nòm de l'opérateur
13. Nòm de l'opérateur	14. Nòm de l'opérateur	15. Nòm de l'opérateur
16. Nòm de l'opérateur	17. Nòm de l'opérateur	18. Nòm de l'opérateur
19. Nòm de l'opérateur	20. Nòm de l'opérateur	21. Nòm de l'opérateur
22. Nòm de l'opérateur	23. Nòm de l'opérateur	24. Nòm de l'opérateur
25. Nòm de l'opérateur	26. Nòm de l'opérateur	27. Nòm de l'opérateur
28. Nòm de l'opérateur	29. Nòm de l'opérateur	30. Nòm de l'opérateur

### Ajennda Seminè

1. Deskripsyon jeneral yon Dèlko
2. Demare / Kanpe yon Dèlko
3. Tablo kòmand
4. Problèm ki pi frekan yo
5. Mezi sekirite yo / Antrèy an
6. Fomilè
7. Diskisyon
8. Tès

### Chapit 1: DESKRIPSYON JENERAL YON DELKO

1. Ki sa yon Dèlko fè?
2. Ki pati esansyèl yon Dèlko
3. Diferan sikwi alimentasyon yo
4. Dèlko dizèl ki pi popilè yo

### Ki sa yon Dèlko fè?

- Wòl yon dèlko se prodwi kouran ou byen nou ka pi byen di, transfòme enèji kalòrifik (chale) an enèji mekanik epi enèji mekanik an enèji elektrik.

### Dèlko dizèl ki pi popilè yo

- 1-SDMO
- Olympian
- Himoinsa
- Broadcrown
- Cummins Onan

### Foto Dèlko dizèl ki popilè yo

- 1-SDMO

### Foto Dèlko dizèl ki popilè yo

- 4-Olympian
- 5-Himoinsa

### Foto Dèlko dizèl ki popilè yo

- 6-Broadcrown
- 7-Cummins Onan

### Plak idantifikasyon yon dèlko

### Ki pati esansyèl yon Dèlko

- Yon Dèlko genyen yon motè a gaz ki atache ak yon altènate (dinamo)

### Figure 1. Dèlko ak konpzan'l yo

- 1- Pwèzant
- 2- Pwèzant
- 3- 2 tèt
- 4- Tablo chèf
- 5- Gwòsèl
- 6- Sèkè
- 7- Sèkè
- 8- Alimantè DC
- 9- Relewa
- 10- Dinamo
- 11- 2 tèt lamè
- 12- Chak asanblè
- 13- Bot
- 14- 2 tèt
- 15- Relewa gaz

### Figure 2. Dinamo oubyen Altènate

### Diferan pyès ki konpoze dinamo a

### Vitès et frekans ke yo itilize

- Vitès
  - Dèlko ak vitès ba: 600 rpm
  - Mwayèn vitès: 900-1,200 rpm
  - Vitès wo: 1,500-3,600 rpm
  - 1800 rpm: vitès ki pi renkontre an Ayiti e an Amerik
  - 1200 rpm: vitès ki pi renkontre an Afrik e an Ewòp
- Frekans
  - 60 Hz: Ayiti e tout Amerik dinò
  - 50 Hz: Ewòp, Afrik e Amerik disid

### Diferan tip alimentasyon yo

- Alimentasyon lè
- Alimentasyon gaz
- Alimentasyon lwil
- Alimentasyon dlo pou refwadisman

### Figure 3. Alimentasyon gaz

- 1- Relewa
- 2- Filtrè gaz
- 3- Pompe inyeksyon
- 4- injeksyon
- 5- Alimentasyon
- 6- Canalisasyon HP
- 7- Gaz
- 8- Alimentasyon
- 9- Pomp ak men (Priming Pump)

### Diferan tip gaz pou Dèlko

- Dizèl
- Mazout
- Gazolin
- Propa'n

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### Diferan tip enjeksyon yo

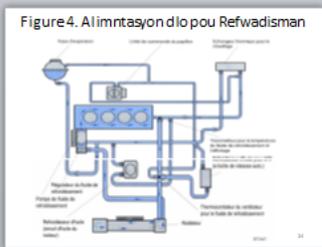
- Enjeksyon dirèk
- Enjeksyon alimantasyon DC
- Enjeksyon elektronik

22

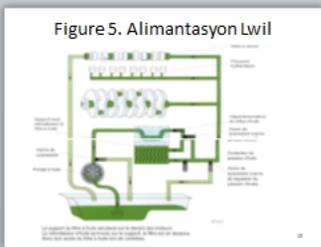
### Sensors

- Sensor lwil
- Sensor gaz
- Sensor tanperati
- Sensor nivo dlo nan radyatè

23



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### Chapit 2: SISTEM DEMARAJ E KANPEYON DELKO

1. Sa ou dwe verifiye anvan w demare yon Dèlko
2. Pwosedi demaraj
3. Paramèt ou dwe verifiye apre ou fin demare yon Dèlko
4. Pwosedi pou'w kanpe yon Dèlko

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### Sa ou dwe verifiye anvan w demare yon Dèlko

- Nivo lwil
- Nivo dlo nan radyatè a
- Nivo gaz la
- Eta batrì

27

### Kòman w verifiye nivo lwil?

- Rale get lwil la epi gade nan ki nivo lwil la ye

28

- Ajoute lwil si se nesesè epi reajiste get la nan plas li

29

### Pwosedi demaraj

- Demaraj analog (avèk kle)
- Demaraj dijitalize (avèk Tablo kòmand)
- Kite l mache 3 ak 5 minit anvan ou mete chaj sou li.

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### Paramèt ou dwe verifiye apre ou fin demare yon Dèlko

- Verifiye si pagen alam ki aktive
- Verifiye vòltaj chak faz yo (L1, L2) pou dèlko yon sèl faz yo epi (L1, L2, L3) dèlko ki gen twa faz yo.

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- Verifiye Vòltaj liy yo tankou (L1-L2) pou dèlko 1φ epi (L1-L2, L2-L3, L1-L3) pou dèlko 3φ

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### Paramèt ou dwe verifiye apre ou fin demare yon Dèlko

- Verifiye frekans la (59-61Hz)
- Verifiye tanperati a (80-85°C)
- Verifiye presyon lwil
- Verifiye vòltaj batrì a (13-14VDC)

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### Foto verifikasyon frekans, vòltaj batrì e vitès

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### Foto verifikasyon presyon lwil ak tanperati

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### Paramèt ou dwe verifiye aprè ou fin mete chaj sou yon Dèlko

- Kouran L1 epi L2 pou dèlko monofaze

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- Kouran L1, L2 epi L3 pou dèlko trifaze

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### Pwosedi pou'w kanpe yon Dèlko

- Retire chaj sou dèlko a
- Kite l mache 3 ak 5 minit epi etèn li
- Analog (ak Kle)
- Dijitalize (ak tablo kòmand)

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### Chapit 3: TABLO KOMAND

1. Tip tablo
2. Lekti tablo

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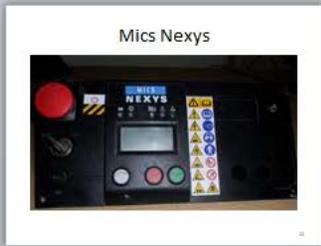
### Tip tablo lekti paramèt yo

- Power Wizard
- Mics Nexys
- Board 2001
- Kohler PC board
- Deepsea
- Mics Telys

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**Chapit 4: PROBLEM KI PI FREKAN YO**

1. Batri dechaje
2. Dèlko a sichofe
3. Faz yo pa balanse
4. Pwoblèm vye gaz

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**1 - Batri dechaje**

**Ki sa ki ka lakoz batri a dechaje?**

- a) Altènate anpann
- b) Batri a ka pa bon
- c) Regilatè DCA ka pa bon (konsekans)
- d) Bòd sòti Kouran eksitatis 12V

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**Altenate DC e pyès lesansyèl ki konpoze'l yo**

1- Pwèl AY  
2- Pwèl AT  
3- Roto  
4- Sèmi  
5- Regilatè  
6- Dyo  
7- Stator  
8- Bousin  
9- Sètiye rekrasyon

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**2 - Dèlko a sichofe**

**Ki sak ka koz yon dèlko sichofe?**

- a) Radyatè a ka sal
- b) Radyatè a koule
- c) Tiyo sikwi dlo a ka koule
- d) Kouwa a ka kase
- e) Pòp dlo a ka pa bon
- f) Tèmòst ka pa bon

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**3 - Faz yo pa balanse**

**Ki sak ka koz faz yo pa balanse?**

- Move konsepsyon sikwi yo
- Mete chaj sou sikwi yo san kontwòl

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**4 - Pwoblèm vye gaz**

- Gaz la kapab manke rafine
- Gaz la kapab te ramase kras kote yo te stoke l la
- Gaz la kapab pran kras nan materyèl menm ki konpoze sikwi a, si delko a alimante pa yon tank ekstèn.

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**Chapit 5: MEZI SEKIRITE YO E ANTRETYEN AN**

1. Mezi sekirite yo
2. Enpotans antretyen an
3. Pwosedi pou'w antretyen

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**Mezi sekirite yo**

- Toujou li ti livrè dèlko a anvan menm ou komanse itilize l
- Pa mete pyès ki pa fèt pou dèlko a ladan l
- Pa fimen lè n'ap mete gaz nan dèlko a
- Toujou byen seche gaz ki tonbe yo ak yon eponj ou byen yon twal absòban epi sere li yon kote ki si.

54

**Mezi sekirite yo - 2**

- Pa mete gaz nan dèlko a pandan l'ap mache
- Toujou verifye si tout sinyalizasyon yo aktive nan tablo komand la (Si tout sensor yo bon)
- Evite tout kontak avek pouw asid batri a oubyen a gwo presyon ki soti nan enjektè yo

55

**Mezi sekirite yo - 3**

- Evite netwaye, mete lwil ou lòt aranjman nan dèlko pandan l'ap mache
- Toujou evite rete pre tout pati k'ap vire yo
- Evite mete gwo rad epi kite cheve w lage lè w pre yon dèlko k'ap mache
- Pa devise bouchon radyatè a pandan dèlko a cho

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**Mezi sekirite yo - 4**

- Evite touche kò motè dèlko a lè l'ap mache
- Evite mete dlo lamè ou tout lòt pwodwi ki ka lakoz korozyon nan sikwi refwadisman an
- Dekonekte bòn batri a anvan nenpòt entèvansyon nan sikwi elektrik dèlko a

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**Enpotans antretyen an**

- Antretyen an pèmèt ou kenbe dèlko a pwòp epi asire bòn mach li.

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**Enpotans propreté**

- Gade tout otou kote dèlko a ye a pwòp pèmèt ou evite gwo dife pran.
- Gade kò dèlko a pwòp ap pèmèt ou deyekte tout ti fwit ki genyen nan dèlko a.

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**Kòman dèlko dwe ye deyò e anndan**

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## Appendix D: Evaluation of the Training by the Participants

Legend	
1	Very bad
2	Not good
3	Average
4	Good
5	Excellent

INSTRUCTORS			
#	Ronick	Frantz	Loby
1	5	5	5
2	5	5	5
3	5	5	4
4	5	5	4
5	4	4	4
6	5	5	4
7	4	5	3
8	5	5	5
9	5	5	5
10	5	5	5
11	5	5	4
12	5	5	5
13	4	5	3
14	5	5	5
15	5	5	5
16	4	4	4
17	4	5	4
18	5	5	5
<b>Avg</b>	<b>4.7</b>	<b>4.9</b>	<b>4.4</b>

LOGISTICS							
#	Transport	Hotel	Food	Classroom	Documents	Tools	Organization
1	3		3	3	3	5	5
2	5		4	5	5	5	5
3			3	5	4	4	5
4			3	3	4	4	4
5	4		3	4	4	5	5
6	4	5	5	4	4	4	5
7	3	4	3	3	4	4	4
8			3	4	3	3	4
9	4		5	4	5	5	5
10	3		1	3	5	5	4
11			4	4	5	5	4
12	3	2	4	3	4	4	5
13	3	4	3	3	4	4	4
14	4		4	3	4	5	5
15	4		4	5	5	5	4
16	2	4	3	3	5	4	4
17	3	4	3	3	5	4	4
18			OK	OK	OK	OK	OK
<b>Avg</b>	<b>3.5</b>	<b>3.8</b>	<b>3.4</b>	<b>3.6</b>	<b>4.3</b>	<b>4.4</b>	<b>4.5</b>

TOPICS							
#	General description	Start/Stop	Control board	Issues	Maintenance	Logging	Practice
1	5	5	4	5	6	4	5
2	5	5	4	4	5	5	5
3	3		4		3	5	5
4	5	4	4	4	4	5	5
5	5	4	4		4	4	4
6	5	5	4	5	4	5	5
7	4	3	3	2	4	3	4
8	4	5	5	0	5		5
9	5	4	5		5		5
10	3	4	4		5	5	5
11	4	4	4	4	5	4	5
12	4	3	4	2	4	4	4
13	4	3	4	2	4	5	5
14	5	3	5			3	5
15		4	5		4	5	5
16	4	4	4	4	3	4	3
17	4	3	3	2	4	4	3
18	4	4	5	0	5	5	5
<b>Avg</b>	<b>4.3</b>	<b>3.9</b>	<b>4.2</b>	<b>2.8</b>	<b>4.4</b>	<b>4.4</b>	<b>4.6</b>

Subjects to cover again in future seminars							
#	General description	Start/Stop	Control board	Problems	Maintenance	Logging	Practice
1			x			x	
2	x		x	x		x	x
3							
4				x			
5				x			
6	x		x	x		x	x
7		X	x		x	x	x
8							
9					x		x
10			x			x	
11	x	X	x	x	x		x
12	x		x	x		x	x
13			x				x
14	x		x		x		x
15			x		x		x
16							x
17							x
18							
<b>Avg</b>	<b>5</b>	<b>2</b>	<b>10</b>	<b>6</b>	<b>5</b>	<b>6</b>	<b>10</b>

## Appendix E: Technicians' Backgrounds

#	Bat, Inv	Gen	# of years of study	Specialty	School name	# of years of experience	# of years in the hospital
1		x*	Until 12-13 yr old	Electricity	EDH	12	4
2	x	x	1 year	Electricity in building	PVS	21	21
3		x*	2 years	Electricity	Ste Trinite	8	8
4		x	3 years	Electricity in building/industrial	Ecole Professionnelle JB Damier	6	6
5		x	3 years	Electricity	Ste Trinite	6	6
6	x	x	3 years	Electricity	Prof. Acces School, Miragoane Fac des Sciences, UEH, MPCl	10	2
7		x*			Coeurs Unis	4	2
8		x		Plumbing	Christian Center School	30	24
9	x	**	Until 18 yr old	Diesel car mechanics	Ste Trinite	2	1
10		x	2 years	Electricity	Salesien	7	5
11	x	x	2 years	IT	InfoNet	5	4
12	x	x				1	1
13		x	4 years	Electro-mechanics	CDAM	6	6
14		x		Electricity	Mathurin School		3
15		x*	2 + 2 years	Electricity, Plumbing	Centre technique de St Gerard	16	1
16		x	2 years	Electricity	Centre technique de St Gerard		3
17		x	2 years	Electricity	Centre technique de St Gerard	4	4
18		x	2 years	Car mechanics	The International School	10	5

\* Start/stop the generator but is not in charge of maintenance/repair

\*\* Knows about generators but no generator at the site

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