VDT or Visual (Video) Display; a terminal which comprises a keyboard for data input and a display screen for control of the input (Cakir, A et al, 1982)

Since 1980's, technological developments in the fields of microelectronics and information processing have given rise to a rapid growth in office automation in every branch of office and industrial activities. Subsequently, VDT has become a major element in the modern work environment as an interface between operator and computer. At the same time, problems of maintaining health of VDT operators have become a focus of attention in Thailand.

Ergonomic and organizational concerns pertaining to eye discomfort, stress reactions or pain in the neck or the wrists and other musculoskeletal disorders, motivate a number of studies and preventive actions.

VDT study review:

In the late 1970s to early 1980s, it was suggested that 3 types of adverse health effects were caused by working with a VDT. These effects were cataracts, adverse pregnancy outcomes and skin rashes. According to a WHO press release 1998,

- cataracts and other eye diseases were not found to have any link with VDT tasks. Glare and reflections from VDT displays have been identified as a source of eye strain and headaches in extreme circumstances.

- adverse pregnancy outcomes were studied in many epidemiological and animal studies. Taken as a whole, these studies have failed to demonstrate any effect on reproductive processes due to radiation from VDTs. Stress, anxiety and working posture are ergonomic factors possibly affecting this problem.
Skin rashes could not be linked to radiation emitted from VDTs. Laboratory tests conducted on people with these symptoms showed their symptoms were not a result of any electromagnetic field exposure.

Sasitorn T. and Saito (1993) conducted a physiological study of the resting states of the eyes of 35 subjects and recommended that (i) the display screen should be lower than the eye level for downward gaze, (ii) viewing distance should be between 50-70 cm, and (iii) display polarity should be positive (dark characters on bright background) under illumination level of 500 lux.

Metta R. (1995) studied the impact on vision after VDT tasks among 40 operators and found that the near-sighted VDT operators developed more visual fatigue and temporal myopia (near-sightedness) than the operator with normal vision. Visual fatigue was also found after 1 hour of data entry tasks during computer use and recovered after 10 minute rest (Somporn R., 1996).

The Division of Occupational Health (DOOH), Dept. of Health is the organization that is concerned with health impacts of all working conditions and realizes health protection is more important than health remedy. Several studies were conducted and several documents were disseminated to target population, in order to understand how to work with computers safely. Under the responsibility of DOOH, visual fatigue and musculoskeletal disorders were studied among 152 VDT operators and it was found that most VDT workstations were not properly set up for the users. 92% of the users knew the adverse effects to their eyes while only 3% knew of musculoskeletal disorders due to VDT work. Occupational stress among the users, however, was not found in the study (Sasitorn et al., 1994).
In 1996, DOOH conducted a VDT radiation measurement by using a VDT Radiation Survey Meter, ML 3600, among 71 displays in the Dept. of Health. It was reported that the level of electromagnetic radiation decreased with the distance from the display. Specifically, at 30 cm from the display, the level was much lower than the standard (figure 1,2). However, the users usually sit at the distance 50-70 cm from the front of the screen. The screen filters used in general were also found to lower the exposure level of radiation. The study concluded that working with computers included no health risk according to radiation, contrary to the worries of many users (Sasitorn and Toranapong, 1996)

Recommendation on VDT workstation adjust-ment:

Figure 3 shows the recommended VDT workstation adjustment. Each user must be able to find his/her best work position by following this recommendation in order to prevent visual strain and musculoskeletal disorders. The recommendations are:

- downward gaze: about 20 deg downwards from horizontal plane;
- viewing distance between 50 - 70 cm;
- adjustable seat height or/and height adjustable table;
- sitting upright with back support; and
- illumination level between 300 -500 lux with a positive display polarity.

The most commonly asked questions about VDTs and health are:

**Do VDTs emit radiation?**

Like any electrical appliance, VDTs emit electromagnetic radiation in the form of electric and magnetic waves that produce the following fields:
- direct current (DC) electrostatic;
- extremely low frequency (ELF) and very low frequency (VLF) magnetic;
- very low frequency (VLF) electric.

Levels of other non-ionising radiation, including microwave, ultraviolet, visible light and infrared are below hazardous levels.
How can electromagnetic fields (EMF) from VDTs be measured?

With either an electric field or magnetic field sensor. However, since emissions from a VDT do not increase with the age of a unit, it is not necessary to continually monitor VDT emissions after initial testing.

How does a VDT compare to a TV set?

Both operate on the same principle - they are a picture tube or cathode ray tube and therefore emit the same types of fields. TV sets, however, generally have larger screens and usually in colour, requiring larger voltages and currents than VDTs. That means electric and magnetic fields are slightly higher than those from VDTs.

But TV viewers exposure to these fields is lower because they are usually sitting several meters away from the TV.

How do flat screen displays compare with regular VDTs?

Flat panel displays, i.e. liquid crystal (LCD), plasma (gas discharge) and electroluminescent (ELD) displays, operate on different principles to conventional VDTs.

LCD, plasma and ELD panels do not use a picture tube, deflection coils or a flashback transformer and so produce little or no electric or magnetic fields.

Where can I find more information?

- Contact Division of Occupational Health, Dept. of Health, Ministry of Public Health, Tivanon Rd., Nonthaburi 11000. Tel. 590-4293, 590-4296
- You can access the WHO EMF home page at: http://www.who.ch/emf/.

REFERENCE

5. Somporn R. Visual fatigue in video display terminal task and in inspection task. A thesis for Dept. of Master of Engineering, Chulalongkorn University, 1996