

Improvisation in current weather display system

M. K. BHATNAGAR

Meteorological Office, Palam, New Delhi

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सारा — इस समय भारत के चार अंतर्राष्ट्रीय हवाई अड्डों में वायु यातायात के नियंत्रण एककों को चालू मौसम की सूचना संवृत दूरदर्शन (सी. सी. टी. वी.) प्रणाली द्वारा दी जा रही है। नियंत्रण टॉवर में बैठा मौसम विज्ञान सहायक अपने सामने रखी विभिन्न सूचियों/तालिकाओं से अपेक्षित सूचना एकत्रित करता है और मौसम के विभिन्न प्राचलों की प्रविष्टि करके एक प्रदर्शन कार्ड तैयार करता है। तत्पश्चात् इस कार्ड को वह संवृत दूरदर्शन प्रणाली के माध्यम से प्रदर्शित करता है। मौसम सूचना को प्रदर्शित करने की यह पद्धति पुरानी हो गई है और इसमें गुणवत्ता की भी कमी होती है। अतः उचित सूचना को प्रदर्शित करने के लिए मौसम कार्यालय, पालम में कम्प्यूटर आधारित दो उन्नत प्रणालियाँ विकसित की गई हैं। ये प्रणालियाँ चालू मौसम की सूचना प्रदर्शित करने की गुणवत्ता में काफी सुधार लाएंगी। इन प्रणालियों का उपयोग दूरस्थ उपयोगकर्तियों, जैसे, अंतर्राष्ट्रीय एयरलाइन्स कार्यालयों के लिए चालू मौसम की सूचना की प्रदर्शन प्रणाली की सुविधा प्रदान करने के लिए किया जा सकता है। इनमें से एक प्रणाली का मौसम कार्यालय पालम टर्मिनल I में परीक्षण किया जा रहा है और वह संतोषजनक कार्य कर रही है। इस प्रदर्शन प्रणाली का एक दूरवर्ती विस्तार टर्मिनल II में स्थित अंतर्राष्ट्रीय मौसम विज्ञान कार्यालय में भी कार्य कर रहा है जो कि टर्मिनल I में स्थित मुख्य कार्यालय से 10 कि. मी. दूर है।

ABSTRACT. Presently the current weather information at four International Airports in India is being provided to air traffic control units through a Close Circuit Television (CCTV) system. The meteorological assistant who sits in the control tower obtains the information from various panels in front of him, prepares the display card by filling values of various parameters and then displays it through CCTV system. This method of display is outdated and lacks quality. Two improved computer based display systems have been developed at Meteorological Office, Palam. These systems greatly improve the quality of display presentation. These can also be used to extend the current weather display system to distant users, like, International Airlines offices. One of the system is under test at the Meteorological Office, Palam, Terminal I and working satisfactorily. A remote extension of this display system is also working at international Meteorological Office at Terminal II, which is 10 km away from the main office at Terminal I.

Key words — Current weather, Close Circuit Television (CCTV), Display system, Video, Monitor, Parameter.

1. Introduction

The knowledge of current weather at an airport is one of the most vital meteorological information required by the aviators. It is required not only for the aircrafts, landing/taking-off from an airport but also by many other aviators at other airports who may wish to use the airport in question as an alternate. At International Airports, the knowledge of current weather at the airport, is required by not only the aviators but also by many other ground agencies associated with aviation services. Further as per International Civil Aviation Organisation (ICAO) recommendations, it is essential to have the current weather information available immediately at various locations for smooth landing and taking-off of aircrafts.

Earlier meteorological offices used to distribute hand-written current weather information to different Air Traffic Control (ATC) units through messengers. In this method there used to be

unavoidable delays in delivery of information to different users located on different floors in different rooms. To improve upon this, Close Circuit Television (CCTV) system was installed at four International Airports in India, namely, Delhi, Calcutta, Bombay and Madras, in late seventies. These CCTV systems are still being used to provide current weather information at these International Airports to Air Traffic Control units.

2. CCTV system

The CCTV system uses a CCTV camera, a document viewer and video distribution network as shown in Fig 1. The current weather observer in ATC tower writes the current weather on a card by hand and puts it in the Document Viewer in front of CCTV camera. The video output of the camera is distributed through Video Distribution Amplifier (VDA) unit to monitors kept at various locations in ATC building. This method of display is very old and lacks clarity and quality. As the information is

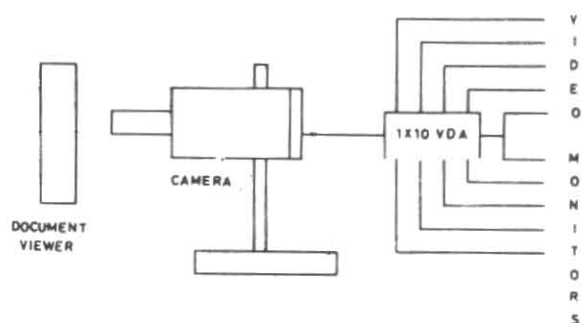


Fig. 1. CCTV display system

written by hand it varies from person to person and is some times illegible. The presentation also suffers due to poor resolution and poor sharpness. Another defect of this system is that inspite of reverse video type of camera, the background on monitor screens is not completely black but has shades of bright grey patches. As most of the monitors are kept in dark or dimly-lit rooms like approach radar room, the monitor's background luminescence disturbs the operators. Further the CCTV system can not be extended to distant users due to cable losses. As there are a number of other users which are located beyond the effective range of CCTV system like Airlines offices, International Airport Authority of India (IAAI) and other ground agencies, they are passed this current weather information whenever asked for through telephone and one person becomes engaged only for passing this information on phone. The information also gets delayed in this process.

3. Computer based current weather display system

To improve upon the above limitations of CCTV system, efforts have been made by the author to develop two computer based current weather display systems at Meteorological Office, Palam. While one system utilizes the existing hardware of Automatic Message Switching System (AMSS) installed at Meteorological Office, Palam at Terminal II, the other utilizes PC AT 386 available at Meteorological Office, Palam. For the sake of differentiation, the first system has been named as PDP 11/84 computer based display system and the other has been named as PC based display system. The required software for both the systems has been developed locally by the author. These display systems fully meet the technical specifications of the meteorological department and the requirement of preservation of records. Care has been taken to

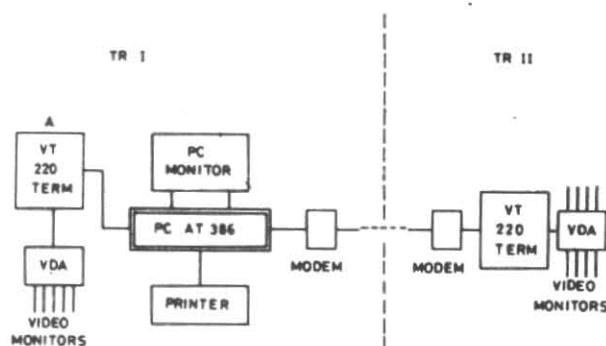


Fig. 2. PC based current weather display system

make these computerised display systems most user friendly for easy adaptability. The information display format and character sizes have been designed in consultation with users while maintaining the departmental guidelines.

3.1. PDP 11/84 computer based current weather display system

The PDP 11/84 computer based current weather display system is configured as shown in Fig. 3. It uses the standby PDP 11/84 computer available at Meteorological Office, Palam for AMSS at Indira Gandhi International (IGI) Airport, Terminal II. The current weather display system can also use one of the two AMSS computers, if required and can work alongwith AMSS. Three video terminals from the computer are extended to Terminal I. Two of these video terminals are kept in control tower and the third is kept with Duty Officer in the meteorological briefing room at Terminal I.

The video Terminal A' is current weather observer position.

The video Terminal B is display position.

The video Terminal C is Duty Officer position.

Fourth video Terminal D is placed in meteorological briefing office, Terminal II for extending the current weather display facility to Terminal II international meteorological briefing office and if required to any other International Airlines through distribution network at Terminal II.

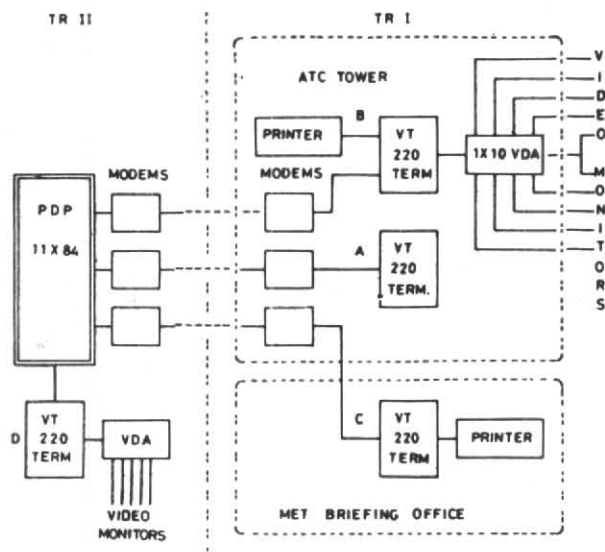


Fig. 3. PDP 11/84 computer based current weather display system

3.1.1. Sequence of events for the display of information

(1) The current weather observer in ATC tower starts the entry session by running a program called "METAR". The computer in turn prompts him to enter following parameters which are to be displayed:

- Date
- Time
- Type (METAR/SPECI)
- Wind
- Visibility
- RVR
- Weather
- Cloud
- Temperature
- Dew point
- QFE
- QNH

If the observer has committed an error in typing, he can go back to that parameter group and do the correction before finally coming out of the editing session. All this entered information is stored in a file called "Metar Doc".

(2) After report has been prepared, the current weather observer informs Duty Officer in Met briefing room by giving a command from his terminal which generates an audio alarm in the form of bells on video Terminal C and also flashes a visual message "please append trend forecast" on video Terminal C.

(3) The Duty Officer retrieves the "Metar Doc" file on video Terminal C and appends Trend Forecast. He can modify any part of the report if required. Then he gives a command which rings bells on video Terminal A and also flashes a message: "Trend Forecast Appended" on A.

(4) The current weather observer then gives a command for display from his Terminal A. The computer prepares the report in desired format and displays it on video Terminal B and video Terminal C and also on the 10 monitors through distribution network. The same information is also simultaneously displayed on video Terminal D and on all the monitors installed at Terminal II. Desired number of hard copies of the displayed information is simultaneously obtained on a printer kept in the ATC tower for ATC officer's signature and for distribution to meet the technical requirement. Hard copy can also be obtained on printer kept in Met briefing room for Duty Officer's use.

(5) This sequence of operations is repeated every half an hour or earlier in case a SPECI is to be displayed. The SPECI information is displayed with a distinctive video display (blinking header) for users attention.

3.1.2. Storage

All the current weather messages put for display are also stored in the hard disc of the computer. These can be preserved at least for one month. It is also possible to store this information on magnetic tapes for long term archival and retrieval if required.

This PDP 11/84 computer based display system is already in use at Meteorological Office, Palam on experimental basis during day time since September 1993. This working system does not utilize the video Terminal C due to non-availability of video Terminal, Modems and DOT lines. At present Trend Forecast is appended by the current weather observer from ATC tower itself on the advice of Duty Officer. The same system of appending Trend Forecast by current weather observer on the advice of Duty Officer is in practice in the CCTV system also.

3.2. PC based current weather display system

The PDP 11/84 computer based display system is dependent on Department of Telecommunication (DOT) lines between Terminal I and Terminal II and Modems. Though these lines and Modems are

highly reliable, but the dependence on these lines and Modems can be avoided if a PC located in ATC tower itself is used instead of PDP 11/84 computer. Keeping this in mind, a PC based current weather display system has been developed. The system is shown in Fig. 2. It consists of a PC (AT-386) with its display and key board. One VT220 video Terminal A and one printer are also attached to the PC. The output of the VT220 video terminal is given to the 1:10 video distribution amplifier unit (VDU) for driving 10 number of monitors at different operational locations in ATC building. It is also possible to connect one more VT220 video Terminal B to the PC which can be used for extending the display system to remote locations like international meteorological briefing office at Terminal II.

The current weather observer runs a program on PC. The PC prompts him to enter all the parameters which are to be displayed. This version is slightly different from the earlier explained PDP 11/84 version, in a respect that the computer prompts the different parameters with the previous value of the same parameter in brackets. If the current value of the parameter is same as the previous value, then the operator need not enter it again. He can simply give a carriage return and the previous value of the parameter is taken as current value. In case the current value is different from the previous value, then the operator has to enter the new value. In this version also, if the observer has committed an error in typing, he can go back to that parameter group and do the correction before finally coming out of the editing file called "Metar Doc". Then the current weather observer gives a command and the current weather information in the desired format is displayed on video Terminals A and B and also on all the 10 monitors at different location. At the same time a hard copy is printed on the printer attached to the PC. The display format and the information character size has been maintained same as in PDP 11/84 version.

4. Standby system

The present CCTV camera has been kept as standby so that in case of any problem in computer, the camera can be switched "IN" using the camera/

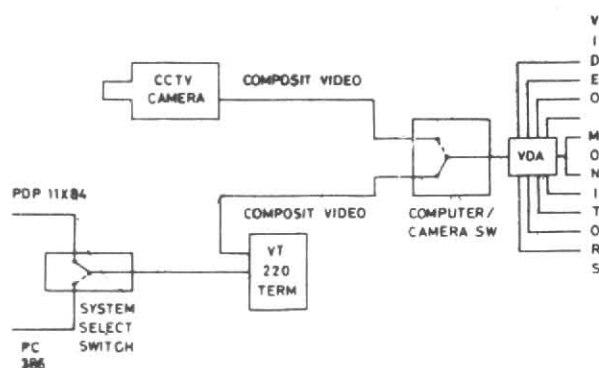


Fig. 4. Standby arrangement

computer selector switch "SW". In addition to this, it is also possible to use one of the two computer based display systems as on-line and the other system as standby so that in case of any problem in the running system, the other system can be switched in using a system selector switch (Fig. 4).

5. Conclusion

The computer based display system overcomes all the limitations of CCTV display system. The information displayed is uniform and legible. The size of the displayed characters has been increased to 4 times the normal video character size so that the displayed information can be read clearly by the users from their respective seats. The computer generated characters are much sharper and resolution is very good. Display is also independent of camera focussing or lighting intensity in the document viewer. The background luminescence on monitor screens is completely black, resulting in much improved contrast and also making the monitors ideal for dimly-lit rooms like radar room. Through this arrangement the current weather display system can also be extended to remote locations like Terminal II users and current weather can be made instantaneously available to various Airlines, Operations Offices and other ground agencies to take crucial decisions in case of marginal weather.

This is a major improvement over the CCTV system.