ALL CHANNEL ALERT
Message Distribution System

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Abstract

The All Channel Alert (ACA) system is a video and audio processor which uses a cablesystem interface to display static and moving messages on selected channels. It utilises an existing character generation device and communications interface with software and memory to provide full functionality on each individual channel. Each rack mountable ACA unit provides up to 36 channels enough to support a typical cablesystem and three units can provide a maximum of 108 channels when they are connected together in a daisy chain fashion.

1.0 Background

The ACA was developed in Canada by Pelmorex Communications Inc. which owns and operates two satellite-to-cable television networks broadcasting meteorological and environmental information in English (The Weather Network) and French (MétéoMédia). In answer to a proposal requested by Environment Canada's Atmospheric Environment Services (AES) for a national weather warning delivery system, the ACA evolved into a multi-leveled distribution system interfacing cable and broadcast television with civil protection agencies (federal and provincial) via satellite.

Following discussions with potential users and representatives from the broadcast industry, a fail-safe ACA will be implemented in Canada this year as the national Emergency Broadcast System under the auspices of Emergency Preparedness Canada and Industry Canada. AES will be the most frequent users displaying only the most severe warnings such as tornadoes or unforecasted snow storms. Currently, weather warnings issued by AES are always displayed on The Weather Network and MétéoMédia on a priority basis, this system will continue to be used for lower priority weather warnings.

The following will discuss the design of this system which will be implemented as the national Emergency Broadcast System to warn Canadians of impending danger.

2.0 ACA System Overview

The system is composed of the Network Controller, the Command Centre and the ACA unit; the cable company provides the necessary link between the Network Controller and the ACA unit. As illustrated in Figure 1, an incoming message is received at Pelmorex's broadcast centre where it is pre-processed by the Command Centre which verifies the messages for errors and compliance to format. The Command Centre then addresses and configures the data to be transmitted via satellite to the Network Controller located at the cable headend. This procedure is fully electronic and requires no human intervention.

2.1 Network Controller

The Network Controller receives a baseband data subcarrier via the satellite receiver at the headend and determines if the data has been addressed to it for post processing. If so, it processes the data for immediate transmission to the ACA unit with the appropriate command instructions; otherwise, the data is ignored.

Located at the cable headend, the Network Controller is the company's current broadcasting infrastructure and for the ACA system provides the logical link between the Command Centre and the ACA unit. This proprietary technology is individually addressable geographically by the Command Centre and thus is capable of locally

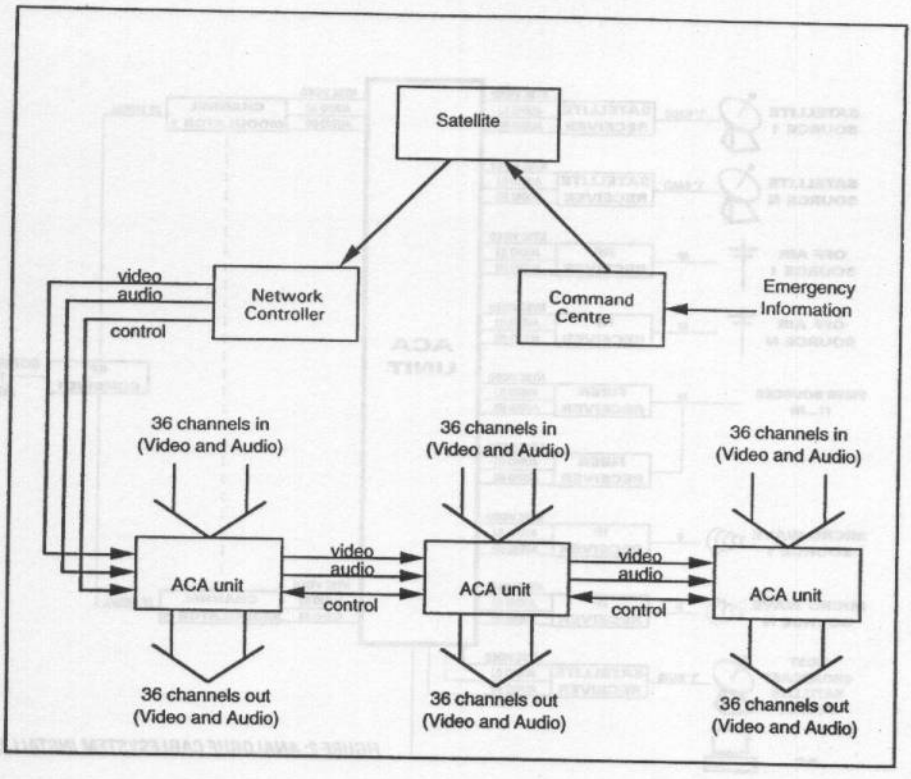

Figure 1 System Overview

distributing information pertinent only to a small community.

The provision for a local PC to be incorporated in the ACA chassis to operate the ACA system without the Network Controller.

2.2 ACA Unit

The analogue ACA unit receives data and command instructions from the Network Controller and places static or moving messages on any or all NTSC video and unmodulated audio processed by the unit. Each NTSC channel board supports 4 channels with up to 9 boards for a maximum of 36 channels per chassis. A maximum of 108 channels is obtained by daisy-chaining three chassis together.

The modular design of the ACA enables it to evolve to meet present and future functional requirements. It is anticipated that the ACA will be altered to keep pace with technological changes in the cable industry which will focus around digital video compression. Each analogue unit is easily replacable with a digital one. The chassis will be described further in this document.

2.3 ACA Functionality

(1) Message generation

An integrated character generator is built into the ACA to generate text. A customised chip defines a set of 128 different characters and can generate English as well as French text.

Messages can be displayed as static or as moving at a fixed rate horizontally or vertically. The text can appear as a line, a partial or full page of characters displayed statically, as a single line of text crawling horizontally across the screen at any

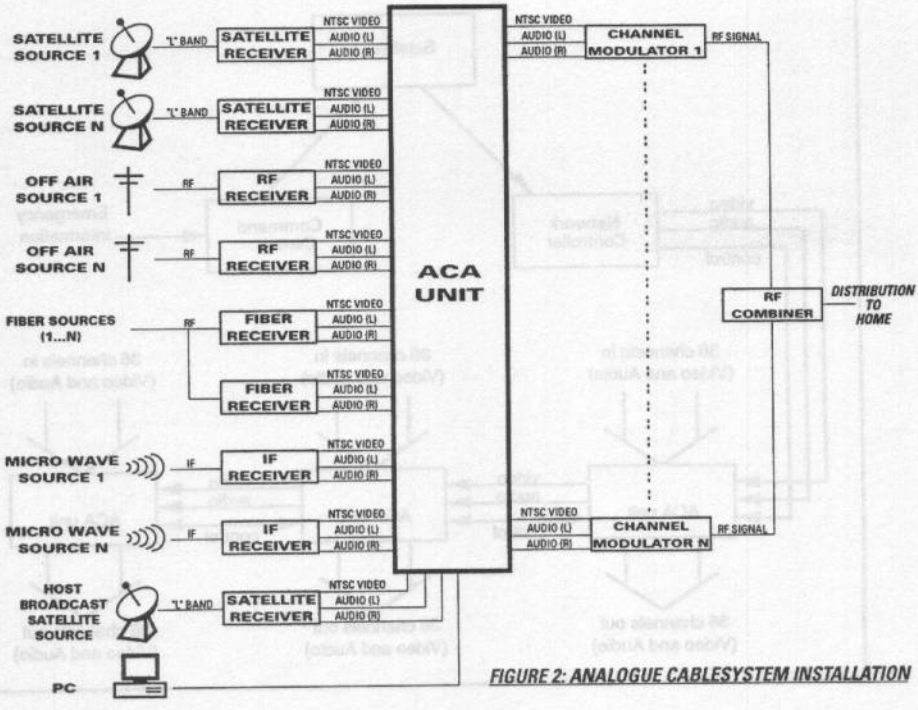

FIGURE 2: ANALOGUE CABLESYSTEM INSTALLATION

one of 10 line position available, or as up to 240 line of contiguous text scrolling vertically. Approximately 12 seconds are given for both horizontal crawl or vertical scroll to traverse the screen.

(2) Control

Control is executed through the Network Controller via a standard interface such as RS-232 of RS-422. The functionality provides for the insertion of a number of messages on different channels at different times while allowing, but not limited to, English and French message generation within the same ACA unit. Since each channel chip has its own character generator chip, the interface is language independant; furthermore, each channel can operate independant of each other. The ACA places a valid message on the channels within seconds of being instructed to do so.

(3) Video switcher

The ACA provides the ability to input NTSC video and unmodulated audio as well as RF and IF modulated video and audio, as shown in Figure 2. The output signal is NTSC video and unmodulated audio regardless of the input signal.

The ACA is also capable of inputting and switching an override video and an override audio onto one or a group of channels. Synchronisation of video switching from one video source to the other is controlled by the Network Controller which instructs the ACA to switch the videos at the appropriate time. Synchronous and asynchronous video switching becomes necessary when commercials are interrupted on American and Canadian programming schedules.

3.0 The ACA Chassis

The ACA chassis is constructed of a modular architecture grouping blocks of boards in different modules, as illustrated in Figure 3. The three modules consist of the AT backplane, the ACA backplane and a power supply which provides the power required in the ACA unit.

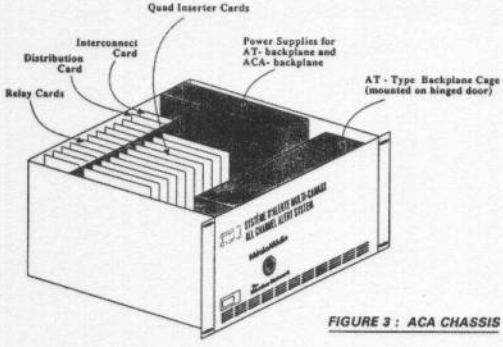

FIGURE 3 : ACA CHASSIS

3.1 The AT backplane

An AT passive backplane assembly capable of taking in 6 PC cards. The cards are fully accessible from the front of the unit and may be installed or removed without removing any chassis parts. Additionally, a local equipped PC can be incorporated on the AT backplane to control the ACA unit in the absence of a Network Controller.

3.2 The ACA backplane

The ACA backplane and cardguides form a second sub-chassis within the box. The backplane is used to provide the mechanical and electrical interface between the video and audio connector input and outputs, and the video and audio processor boards. It also allows digital control signals and selected video and audio signals to be bussed to all boards. The cards connected to the backplane are described below.

3.2.1 Quad Inserter

The channel cards comprise the largest functional block within the ACA chassis and contain video and audio control circuitry to implement the various required modes of operations: providing channel or replacement video, with or without overlaid character data. A micro-controller provides the local intelligence within the ACA system accepting serial commands and data from an external controller and performing the required operations.

As the name implies, each channel card processes 4 channels of video and audio. Each Quad Inserter is interconnected to an associated relay card via the backplane, it controls the video and audio by-pass relays directly.

Each card assumes an address from the backplane connector which allows it to identify the chassis and slot number where it has been installed. This allows commands to be sent to individual quad inserter cards within an ACA system. Each video channel provides the vertical interval flag to the micro-controller sector to synchronise display operations and to indicate whether a video signal is actually connected to the channel. Further, the analogue section contains video buffers and electronic switches to select either the channel video signal or the replacement video signal. The character generation and overlay device is also electronically switched in or out of the circuit as required.

3.2.2 Relay Cards

The ACA relay card is a subassembly comprised of a printed circuit board and a metal panel; the panels form the major portion of the rear panel of the unit and functions as a modem between video and audio signals and channel control circuits.

All cable channel video and audio signals are connected to the relay card. Each board holds the relays which physically bypass the video and audio signals in case of power failure or system malfunction. The audio bypass relays are also used to select the replacement audio signals.

4.0 ACA Design Results

To design a user friendly, cost effective and widely available system, Pelmorex met and exceeded the requirements implied in the initial proposal. The following results are thus obtained:

(1) Ease of use

The input of text messages is highly centralised and requires only a basic word processor. The data path thereafter is entirely automatic and requires no human intervention.

(2) Realtime access

Validated and formatted data sent to the ACA unit appears on the television screens immediately. At the same time, video and audio products can be made available to the local television and radio broadcaster if required.

(3) Addressability

By utilising an existing addressing structure such as the Canadian postal codes and the Network Controller at local cable headend, highly local messages can be delivered to the desired community, on an individual channel level.

(4) Affordability

The target cost for manufacturing the ACA system in volume is C$1800 per unit, or C$50 per channel.

(5) Upgradeability

The modular design of the ACA unit allows future modifications to one block without interrupting the others. This is intended for keeping up with changing technology.

5.0 Conclusion

The first field testing of the ACA units across Canada is scheduled for mid 1994. Pelmorex Communications Inc. will act in collaboration with the various levels of governments and the broadcast industry to establish, install and operate the first Emergency Broadcast System in Canada by utilising cable and television broadcast technology.

Through this valuable cooperation of private industry with the public sector, the ACA has evolved as a unique and innovative solution to the long-standing challenge of implementing a national warning system in Canada.