DISCABLE

A NEW AUTOMATIC SOUND AND VIEW PROGRAMMING FOR CATV

Co-Authored by
John L. Humphreys - Robert E. Weiblen,
DISCABLE/NATIONAL TREND-IN CORPORATION
1860 Michael Faraday Dr., Reston, Va.

DISCABLE is a new concept in cable services combining FM
stereo programming and video display for CATV systems.
DISCABLE is a combination hardware-software package that
places up to fifty channels of highly tailored musical and
radio programming on the FM portion of the cablecasting
band. In addition, DISCABLE presents a video printout of
the FM programs on useable cable TV channels, while pro-
viding the insertion of local video information messages.
The DISCABLE system is automatic in operation and is con-
trolled by long play, pre-recorded tape operation, produced
by a central production agency.

With the new growth scheduled in the top one hundred mar-
kets, cablecasters are faced with limited income revenues
from the FM broadcast band. (88 to 108 MHz.) Duplication
or re-broadcasting of "over the air" FM stations may pro-
vide little incentive for home listeners to subscribe to
cable FM because of the abundance of Grade A FM signals.
Therefore, local origination of new, non-competitive radio
and music services will prove necessary.

DISCABLE can supply an alternate program service through a
unique long play tape system. The tape format will be
one-half inch wide, employing eight-quarter tracks, running
bi-directional at the speed of 7.5ips. This provides TWO
STEREO PROGRAM SERVICES per reel. Two reel sizes will be
used, 14 inch and 10.5 inch. The long play reels will use
one mil, mylar base tape, supplying six hours total running
time per 14 inch reel at the normal speed of 7.5ips. Lower
quality programming may run at 3.75ips, supplying up to
twelve hours of program time per reel.

Special 14 inch tape decks are used to play back the program
tapes. These decks are horizontally mounted in a standard
rack, and pull out on tray slides for loading. Concentric
reel hubbing is used for space consideration on the supply
and take-up reels. Therefore, the decks mount one over the

other, like file drawers, providing maximum deck space in
the minimum of rack and floor space. Up to six decks may
be housed in one rack. The additional rack space holds the
associated electronic hardware and monitors.

Each equipment package, called a "SOUND ISLAND," provides
up to thirty-six hours of uninterrupted and unmanned stereo
programs for TWO separate FM radio channels. FM stereo modu-
lation generators are included in each Sound Island. Auto-
matic tape cueing and switching is employed, as well as the
use of the Dolby-B noise reduction system. All equipment
access will be from the front of the Sound Islands, allowing
the cabinets to be placed back-to-back or against building
walls. Additional Sound Islands may be added for future
channel expansion.

DISCABLE is proposing to divide the fifty FM channels into
three basic groups for programming. Group one will be de-
voted to the promotion of the Recording Industry. Group two
will be reserved for "Public Affairs." (i.e. Public Service,
Government, Educational and Institutional programming.) And
the third group of FM channels will be reserved for "high
entertainment radio show." (i.e. pay-radio, syndicated pro-
gramming, special services.)

Of special interest to CATV operators is the tie-in of digital
display printout on adjoining television channels of the publi-
cation of the program guides of the various FM radio channels.
This information is taken directly from the program tapes and
remains in perfect syncronization with the program material.
This readout will be displayed for thirty seconds on the tele-
vision set and the sound of this particular radio channel will
modulate the TV aural channel. Then the TV display and sound
will switch to the next FM radio channel to be monitored. As
more Sound Islands are employed, or the more FM channels broad-
cast, several additional TV channels may be used for the pro-
gram guide printout. (i.e. one TV channel for each of the three
basic FM programming groups.) Local advertising or message data
may be inserted by the cablecaster for display on the TV channels,
using the built-in splitscreen technique. This display will be
seen below the program guide information as shown in Figure 1.
Color keying will be used to separate the readout.

Exposure and promotion of the products of the recording industry
is a natural source for part of the DISCABLE programming. The
following technical information of DISCABLE is discussed with
that format in mind.

Technical Discussion:

The overall operation of the DISCABLE system is explained with
reference to Figure 2 in which is shown the arrangement of com-
ponents as the head-end of the CATV facility. Stereo tapes pre-

pared with Dolby-B processing are played on auto-reversing
playback-only machines. Tapes are 7,200 feet long; running
at 7.5ips, they offer 6 hours of programming when run through
in both directions.

Each selection on the tape is preceded by digital data re-
lating to the name, recording group or artis, composer,
record label and catalog number for the selection about to
be heard. This digital information is called a selection
"header." The header also contains information about one or
more following pieces. The header information is recorded
as a series and parallel combination of tones so that the
digital format will be compatible with audio playback machines.
Selection of tones and their duration are such that it is un-
likely that they will be inadvertently duplicated in the
program material and thereby create confusion of header and
audio in the decoder.

Each line of video program guide that will be developed from
the header is stored in a separate integrated-circuit memory,
as shown in Figure 2. The line memories are each 6x32 or
6x40 bits in capacity, permitting either 32 or 40 characters
of data per raster character line from the half-ASCII set of
64 possible alphanumeric and special characters. The use of
individual line memories allows flexibility of presentation--
for instance, scrolling of portions of the display and steady
presentation of other lines. There is a set of line memories
for each stereo channel. The program guide printout in each
set is sequentially shown on a TV channel. The guide infor-
mation is presented on the top or bottom half of the raster,
with the remaining half available for local advertising. Dif-
ferent colors for the two halves set off the two sets of ma-
terial. The audio material cablecast over each FM channel is
sampled and used as audio background for the video guide when
the associated program information is being shown. All tim-
ing for sequential presentation of material and scrolling and
advertising changes is conveniently obtained from the vertical
synch for the video channel.

Video quide information is gathered from the tape into 6-bit
character groups and stored in the various line memories.
Lines containing fewer than the maximum number of characters
are filled with ASCII spaces or blanks to avoid recirculation
and display of old data. After the information has been read
from the tape and stored, the end of the digital header is
sensed and control of the memory is given over to the recircu-
lation and readout control. Characters are generated in dot-
matrix form from their 6-bit ASCII equivalents. The 6-bit data
are recycled through the line memory to permit as many video
presentations as will be required for the duration of the pro-
gram selection being reproduced from the tape at the moment.
Line memory readout is controlled sequentially in accordance
with raster vertical position. If there are more line memories
than lines presented in the video program guide format, the

line memories can be selected in sliding groups such as 1,
2, 3, 4, then 2, 3, 4, 5, then 3, 4, 5, 6, and so forth to
effect a scrolled guide. Other line memories filled from a
source other than the program tape (such as cassette or
paper tape) are also processed in the sequence to fill, say,
the bottom portion of the raster to provide advertising space.
Advertising is changed or sequenced independently of the pro-
gram guide information and continues while the program guide
memories are being updated and while the program tape is
awaiting change or maintenance.

In addition to the headers for each audio selection, there
are cueing control tones and a tape reel identifier on the
tape. The identifier is a tone-code placed at the beginning
of the reel that is sensed after the tape is started. The
identifier tones are recorded in a tape cassette for verifi-
cation and audit purposes. The tone code contains cassette
start and stop commands as well as ID information, thus
automating the verification procedure. Cueing tones recorded
at the beginning and end of the tape set up the tape to the
beginning of the recorded material, reverse the direction,
and finally stop the tape after the reverse-direction tracks
have been played and the tape is wound back onto its original
reel.

Tape masters are prepared with the aid of a mini-computer,
as shown in Figure 3. The mini both directs the sequence of
selections to be recorded and generates the digital tone codes
for the selection headers. After a three- or six-hour pro-
gram has been decided upon and details have been laid out,
two lists of the selections are drawn up. One list contains
details concerning each selection as mentioned earlier; the
entries in this list will appear in the two "now playing"
character lines of the video presentation. The other list is
comprised of less detailed information about each selection
and each such entry will occupy one video character line in
the "next to be heard" list. The lists are typed on a key-
board entry device for the mini and stored in its memory,
subject to verification and correction of list data. A four
thousand world memory is sufficient.

When the tape is first created, the computer types out the
name of the first selection. This ensures that the selections
are recorded in the intended sequence. The computer is then
commanded to generate the tone code sequence for the detailed
list entry associated with the upcoming selection, and for
several entries in the less detailed list for the next several
selections. The computer indicates when the header has been
completed (several seconds) and the computer pauses while the
selection is recorded. The operator requests the name of the
next selection from the computer and the process is repeated,
now with the next entry from the detailed list and the next
appropriate grouping of selections subsequent to the selection
about to be recorded.

The ASCII-coded data for each alphanumeric character in a list entry are treated in bit-serial fashion. Each bit value controls the states of tone generators encoding data and control functions. The tone sequences thus developed are recorded on the tape and comprise the header that is read by the head-end playback equipment and reconstructed into ASCII characters and stored for video presentation.

Conclusion:

The DISCABLE system, for the first time in radio history, allows the addition of a visual presentation, promoting radio tune-in.

The FM radio channels must not be ignored or discounted, during the fast growth of cable systems. Radio, by itself, is an effective, imaginative, and vital communicator; it should be used and expanded. DISCABLE offers an exciting and valuable service to cablecasters in the dynamic communications explosion by CATV.

Biography of Authors:

John L. Humphreys - Seventeen years experience in Radio and Television Broadcasting. President of National Trend-In Corporation, Reston, Virginia, serving the CATV and Broadcast Industries with magnetic tape products, high speed tape duplication, program syndication and facility development.

Robert E. Weiblen -

Stevens Institute of Technology - BS, 1955
Columbia University -   MS, 1962

Seventeen years experience in electronics R&D, product development, marketing and management. President of House-hold Data Services, Incorporated, a small research and development firm concerned with two-way CATV services and hardware.

TYPICAL TV SCREEN MESSAGE

CHAN - 99 mc - FM

NOW - Mozart - Symphony   no. 36 in C Major
        Columbia MS - 5893
NEXT - Lalo - Symphonie Espagnole

ADVERTISING
MESSAGE
IN THIS SPACE

FIGURE 1

DIGITAL PROCESSING & VIDEO GENERATION

TAPE
START,
STOP, REVERSE

FROM TAPE
REPRODUCER

DIGITAL
DATA

TO
STEREO
MUX
AND
F M

HEADER
TONE SENSING
& DECODING

ADVERTISING
DATA
SOURCE

AURAL
GEN.

DATA
&
CONTROL

DATA
PRESENT

4.5 MHz

VERIFICATION
ELECTRONICS
& RECORDER

DATA

TV
SYNCH
GEN.

MEMORY
CONTROL

VIDEO

SYNCH AND
BLANK

TV
GENERATOR

TO
CABLE

READ-WRITE

LINE SELECT

VIDEO

P1
P2

PROGRAM
GUIDE
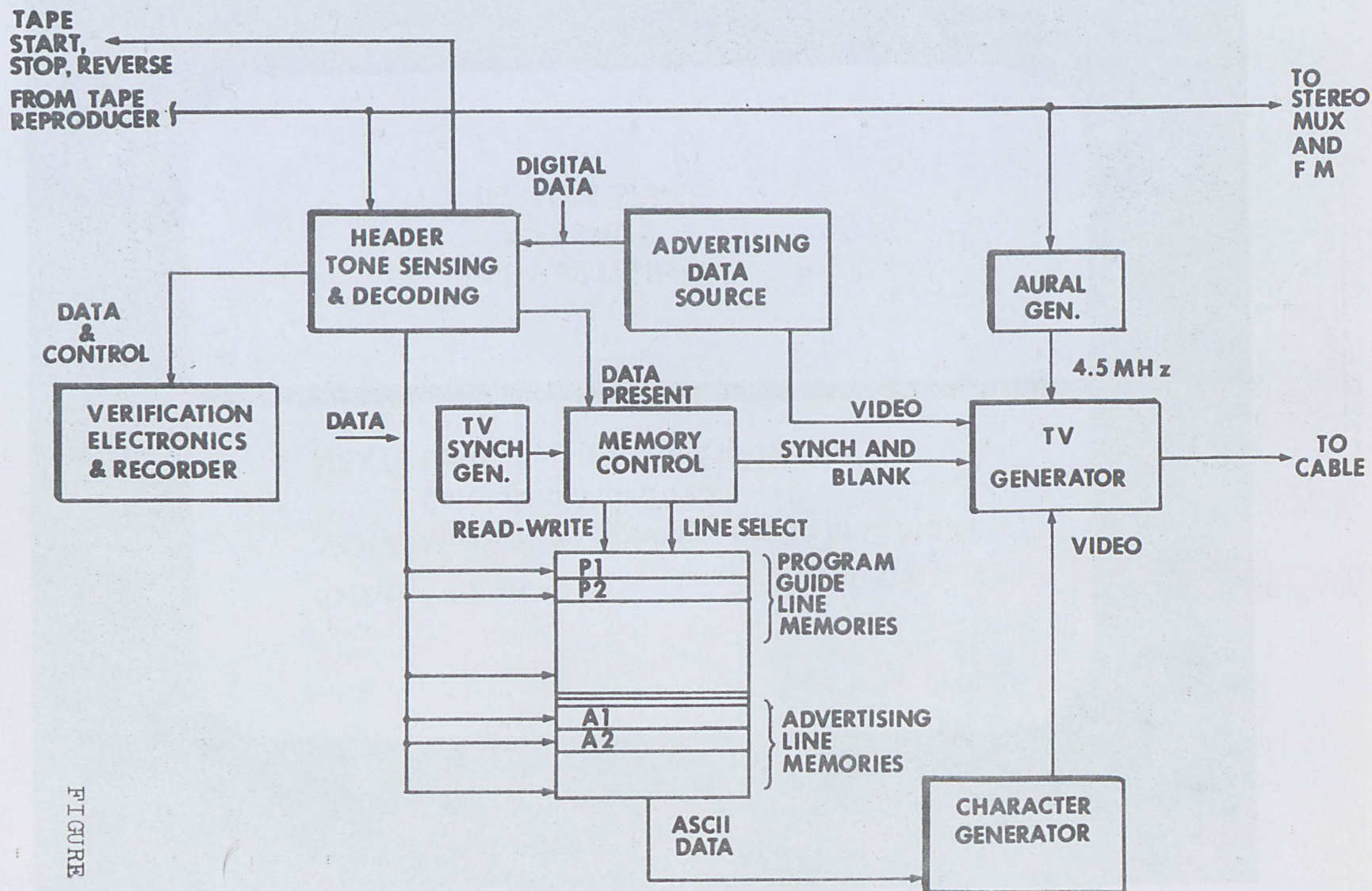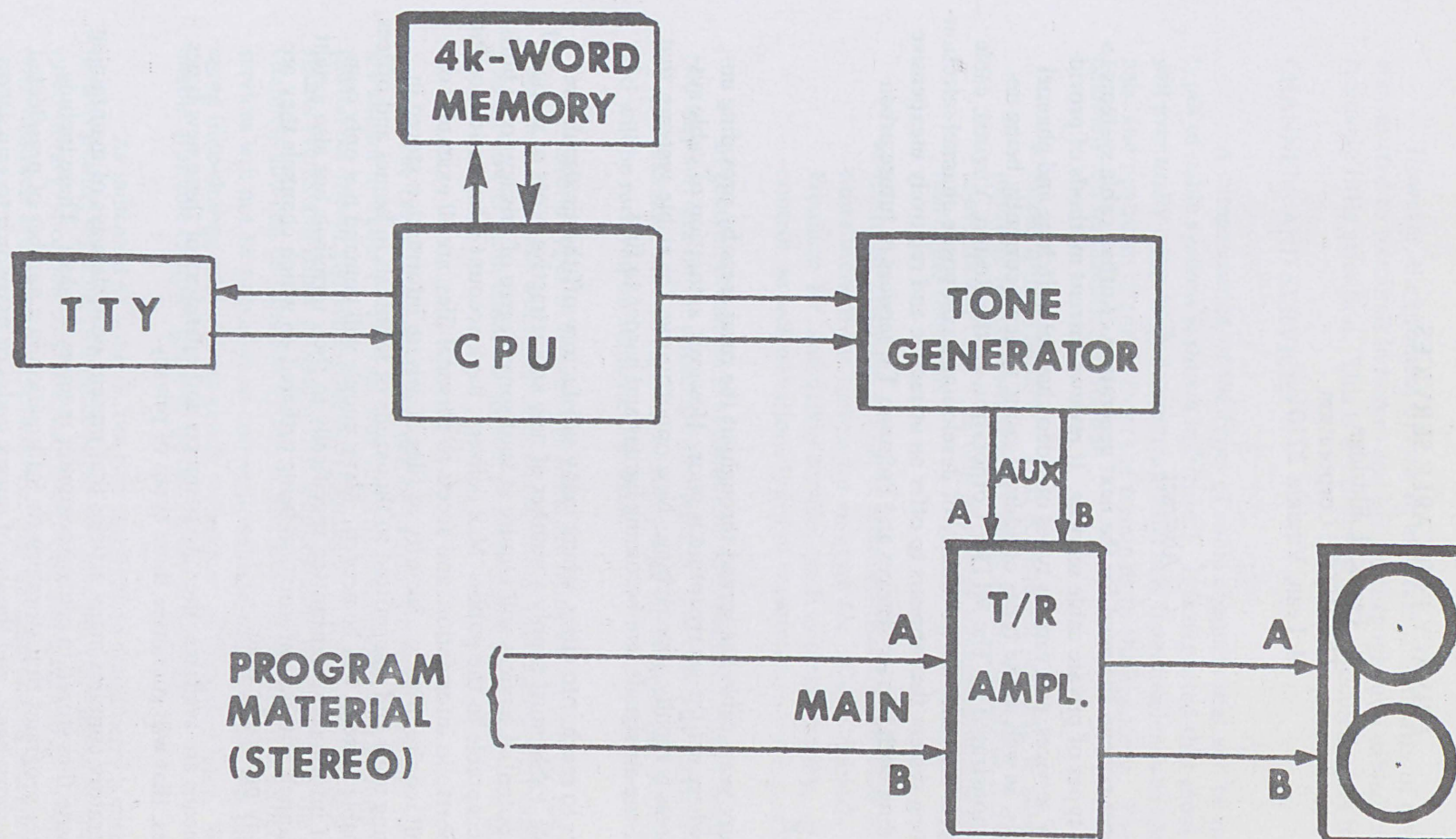LINE
MEMORIES

A1
A2

ADVERTISING
LINE
MEMORIES

ASCII
DATA

CHARACTER
GENERATOR

MASTER TAPE PRODUCTION

FIGURE 3