TIME SHIFTING
EASY-TO-USE EVENT PROGRAMMING

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ABSTRACT

Widespread use of VCR's has created a demand for unattended recording of programs delivered through converter/decoders. When used with a timer-equipped VCR, a converter also equipped with a programmable timer can satisfy this requirement.

Event programming of converters is achieved either by adding a timer to a hand-held remote control or by incorporating a timer into the settop unit. However, as many purchasers of VCR's have already found to their chagrin, providing the technical capability for pre-programming events and having a device which is truly user-friendly are not necessarily one and the same thing.

This paper discusses the human-factors considerations affecting the design of one such programmable remote/control timer. Ease of operation is the primary issue discussed in this paper.

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It wasn't that long ago that watching TV was one of the "simple pleasures" of life in our electronic age. The "cable box" of the early '70s typically consisted of a rotary channel selector with perhaps a fine tuning control. It's output was connected through a matching transformer to a piece of "lead-in" wire which, in turn, was screwed onto the back of the subscriber's TV set.

Today's subscriber to an addresssable CATV system is furnished with a microprocessor-controlled "home terminal unit" capable of tuning over 100 channels and equipped with such features as volume control, an electronic lockout for parental control, favorite channel memories, second-audio-program and stereo capabilities, audio muting, last-channel recall, electronic channel mapping, and a host of operator controlled functions to facilitate PPV or premium programming. Some simplifications have been made, however; we have managed to do away with the fine tuning control and, in most cases, with the matching transformer.

It's not just the delivery of CATV programming that has become more complex. The cable subscriber of the '80s is likely also to have a VCR, perhaps an MTS stereo decoder, and maybe even an outboard IPPV control of some kind, all sitting alongside an elaborate component stereo system. As a by-product of all of this gadgetry our subscriber has also probably accumulated a drawer full of "handy" remote control units. Trying to hook all of this together has turned the "TV corner" of many living rooms into a complicated cross between Rube Goldberg and Mission Control.

One of the chief sources of frustration to new VCR owners has been the discovery that their ability to "time shift" by taping programs unattended for later viewing is severely limited by their CATV converter/decoder. Suppliers of addressable equipment, acutely aware of the roadblocks formed by their products have begun to overcome this shortcoming; in recent months a number of manufacturers have announced new or add-on products aimed at providing subscribers with a means of timing their HTU's to match the capabilities of their VCR's. Most of these amount to a programmable timer housed in the remote control for the home terminal unit. The subscriber programs the remote control unit and sets it front of his cable box. At the appointed hour, the timer sends an IR code to the cable box to turn it on and tune it to the selected channel; at the end of the programmed time, another code is flashed, turning the box off again until the next timed "event."

In meeting this challenge, however, it has become apparent that a potential exists for creating new problems even as the old ones are overcome. Programming of VCR timers is a notoriously complex task which has been further complicated by tiny or hidden controls, unforgiving sequential command structures, and poorly written instructions. Everyone has heard horror stories of the time-delayed Super Bowl game that consisted of two beer commercials and thirty seconds of Jimmy the Greek.

These problems, while perhaps amusing, do not concern the cable operator because he is unlikely to hear complaints that his customers' VCR's are difficult to operate. If the programmable timer for your cable box betrays you, however, who ya gonna call? It thus becomes very important that the designers of time shift devices for cable products learn from the mistakes of their brethren in the VCR business by making their devices as easy to learn and use as possible.

The Programmable Remote Control Unit provided by Oak Communications for its Sigma line of addressable home terminals resembles in concept those of its competitors. The timer function was incorporated into the RCU rather than the settop unit for obvious reasons: it enabled the feature to be introduced without re-engineering the entire product, and it allowed the operator to use his existing stock of HTU's, thus making it a more attractive buy.

Moreover, confining any extra controls or hardware required to a discrete device meant that the operator could provide the capability only to those who desired it rather than to his entire subscriber base. As some have learned from experience, providing subscribers with inoperative controls or indicators is to invite needless calls.

Of course, there is also a down side to isolating the timer function in the remote control unit. The subscriber must remember to leave the RCU where the HTU can "see" it, but Oak's device minimized this problem somewhat through use of two wide-angle infrared LED's. Also, the RCU is small and portable and, as most operator's are aware, can be lost, stolen, dropped, accidentally thrown away, or chewed into rubbish by the family pet. The subscriber is unlikely to seriously blame the operator for this type of loss, however, and a reasonable deposit can help insulate the operator from its effects.

Once it was decided to adopt the remote control concept, Oak's engineers faced the problem of how to design a unit that would incorporate the necessary functions, would be economical to build and sell, yet would still be easy to use.

Strictly from the standpoint of number of functions, the standard IR remote control for Oak's Sigma Decoder with its 21-button keypad was already fairly complex. One early idea was to make a number of the buttons do double duty through use of a so-called PROGRAM key (e.g. PROGRAM + VOLUME UP = Date). While this could have kept the key-count low, it would not have made the device any easier to use; in fact, just the opposite. Similarly, a cursory analysis of the existing VCR market showed such a wide disparity in the ways their timers were incorporated, it was felt we would get in less trouble if we simply ignored them all.

Instead, the content of the message was analyzed and a straightforward means of sending it was provided. Every timer message takes the same form: "Please BEGIN. Turn on my cable box on DATE, tuned to CHANNEL, at START TIME. Then, turn the box off at STOP TIME. That is the END, thank you." Within each message, the longest piece of information was the time; up to four digits plus selection of a.m. or p.m. To make entering the message analogous to a more familiar task it was treated like an entry in a handheld calculator or the equally familiar automatic teller machines; the device would prompt for each bit of information needed, the user would key it into the display, then ENTER it with an appropriate push button. Using a microprocessor, the messages could be entered in random order and their numbers limited only by amount of RAM space provided by the micro.

To provide feedback of the data entry, it was a tempation to try some firmware gymnastics and creative symbol design to allow use of an existing 3-character display on the face of the Sigma HTU. On further reflection, however, the low cost and ready availability of a standard LCD clock display clearly made it the better selection. The fact that, again, it would be less complicated for the user sealed the argument. Moreover, the microprocessor selected for use in the device (a low-current CMOS device) already featured an integral LCD driver. The selected micro also had sufficient RAM space to enable up to 15 events, so there was little danger in any home VCR exceeding the capacity of the cable device. The addition of a DAILY function, contained in memory as a single event, made it doubly unlikely that its capacity would be overwhelmed anytime soon.

To ensure that the user could check what he or she had done, a REVIEW key was added to individually recall every event. A correction key (CLR) allows any one portion of an entry (e.g. the start time) to be cleared and re-entered without rekeying the

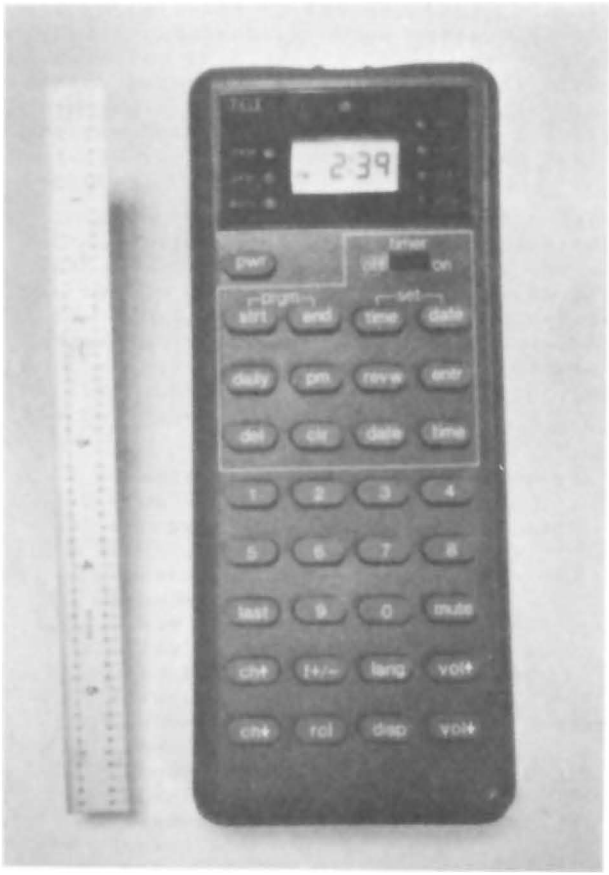

Figure 1. Programmable Remote Control/Timer

entire event sequence. A delete function (DEL) is provided to allow erasure of an entire event with one key stroke. Finally, function keys were added to allow the current date and time to be set or reviewed.

The resulting device, shown in Figure 1, includes a total of 34 controls, seven LED programming indicators, an LCD, and one LED feedback indicator for normal remote control functions. While this sounds complicated in the description, it's less so in the flesh. All timer controls are grouped together at the top of the keyboard while the HTU controls (except for POWER) are at the bottom. The silk-screened outline around the timer functions also helps to guide the user. A custom LCD is in the process of being incorporated which will eliminate the seven status LED's; instead, the written prompt will appear in the display in the appropriate sequence.

So far, the results have been gratifying. When introduced at the Western Cable Show in December 1985, many users who had never seen the device were able to program and operate it even without using the instruction sheet provided. A number of the units are now being field tested in homes of employees and customers (not all of whom are technically oriented) and the reactions of these users, their friends and relatives, are also being compiled. In fact, some additional minor changes (e.g. precise arrangement of buttons) may still be incorporated as a result of this feedback. The initial reception has been sufficiently encouraging that similar devices are now in design for Oak's TotalControl RF addressable terminals.

Notwithstanding this success, however, the Programmable Remote Control Timer must still be considered an interim device. It adds to the growing complement of electronics in subscribers' homes and the very necessity for the device is testimony that the day has yet to arrive when cable-ready home entertainment devices will meet a cable that is ready for them.

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