

## TIME LAPSE MOVIE EQUIPMENT FOR FIELD USE

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### ABSTRACT

Time lapse cinematography using Super 8 filming equipment is a low cost way of providing the qualitative background impressions useful to the meteorologist involved in elucidating regional atmospheric processes. With a little care, good quality quantitative information is also obtainable. The equipment used in a valley study is described, together with the steps taken to make it fully automatic.

### INTRODUCTION

Meteorologists have used time lapse films of atmospheric motions for many years, particularly in studying growth of clouds and chimney plumes. Perhaps the most familiar use today is in plotting the motion of cyclones from geostationary satellites. The technique can be very helpful when it is required to characterise a small region in terms of weather type statistics and is ideal where there exist natural and anthropic wind tracers such as clouds, fogs, fires, and chimney plumes.

Much local interest in the results of a continuing time lapse movie study of part of the Latrobe Valley, about 200 km east of Melbourne, suggests that the techniques and experience obtained from some 18 months of operation may be useful to others. The equipment operates automatically, filming for the first few hours of daylight each morning. This has been found to be sufficient for those factors peculiar to a valley for environmental impact study considerations.

### SUITABLE EQUIPMENT

Only recently, due to the wide acceptance and popularity of Super 8 format, have cine cameras become available that are inexpensive and reliable enough for continuous field use. One such camera is the Minolta\* Autopack 8D6. It is well suited to time lapse work because of the ease of handling Super 8 film cartridges, the camera's automatic aperture control down to f1.8, and its facility for taking single frame exposures. In conjunction with the Minolta Intervalometer P, single exposures may be taken automatically every 0.5, 1, 2, 4, 8, 15, 30, or 60 seconds. With a standard 15 m (50 ft) film cartridge, this gives a filming duration in hours equal to the exposure interval in seconds. Film resolution requirements for this type of application are stringent; Kodachrome II has proved successful.

### ADDITIONAL EQUIPMENT

It is highly desirable to have the camera operating automatically, but only when the average light level is adequate. This is particularly important in regional studies where the camera may be mounted in a remote area for reasons of panoramic view and security.

\* Minolta Camera Co., Japan.

A light level switch was used for the present study to control the Intervalometer and hence the cine camera. It was soon found that the interval between film changes could be extended with little loss of information by restricting the operation of the camera to the first few hours of daylight each morning by use of control electronics.

The circuit schematic, Fig 1, reproduces the controller being used. It consists of three parts:

- (1) a light level switch with sufficient inertia and hysteresis to be untroubled by transient drops in light level;
- (2) a CMOS oscillator and divider chain activated by (1) to generate a control voltage which is self-cancelling after a selected time interval - 1, 2, or 4 hours with the oscillator component values in Fig 1. Circuitry ensures that when power is first applied the control voltage is cancelled.
- (3) a Zener stabilised supply is switched on (off) when the control voltage is present (absent). This supply is used to power the Intervalometer P and hence control the 'start' and 'stop' times of the camera.

With the slide switch (Fig 1) in the 'All' position the camera operates in time lapse mode from sunrise to sunset.

The additional equipment and Intervalometer P are powered by a 9 volt battery (Eveready 276) with a life span of several months.

### THE UNIT IN PRACTICE

The camera components are installed in a weatherproof box on a user-high stand on a steep hill at an altitude of 200 m above mean valley floor level. Considerable cover overhang is required to keep rain from wetting the camera lens area. Nevertheless, condensation and frost on the glass front prove a problem at times. The unit is shown being serviced in Fig 2.

Automatic operation of the camera for 4 hours per day at a framing interval of 60 seconds is generally used. Such a rate gives a convenient film cartridge life of 14 days with sufficient reserve for titling.

The integral camera battery, made up of 4 AA cells, has proved to have inadequate reserve at low ambient temperatures for sustained single frame operation - the peak instantaneous current drain is about one amp for the 8 D6 camera. An external 6 volt battery (Eveready 509) has been added to give a camera battery life comparable to that of the ancillary battery.

### CONCLUSION

The equipment has operated successfully for over 18 months and has produced a wealth of information. Perhaps the most immediate result has been an appreciation of the complexity of flows peculiar to a valley region. For example, early morning fogs, whether natural or anthropic, often make visible internal gravity waves set into sloshing modes of oscillation in the surface air, much like seiching of water in a bay.

In addition to aiding the compilation of climatological statistics of frequencies of foggy mornings, light winds, cloud cover, rain, etc., the films are used to pick out particular events for analysis in conjunction with routine data from slow ascent radiosonde flights carried out early each morning and from the surface meteorological network.

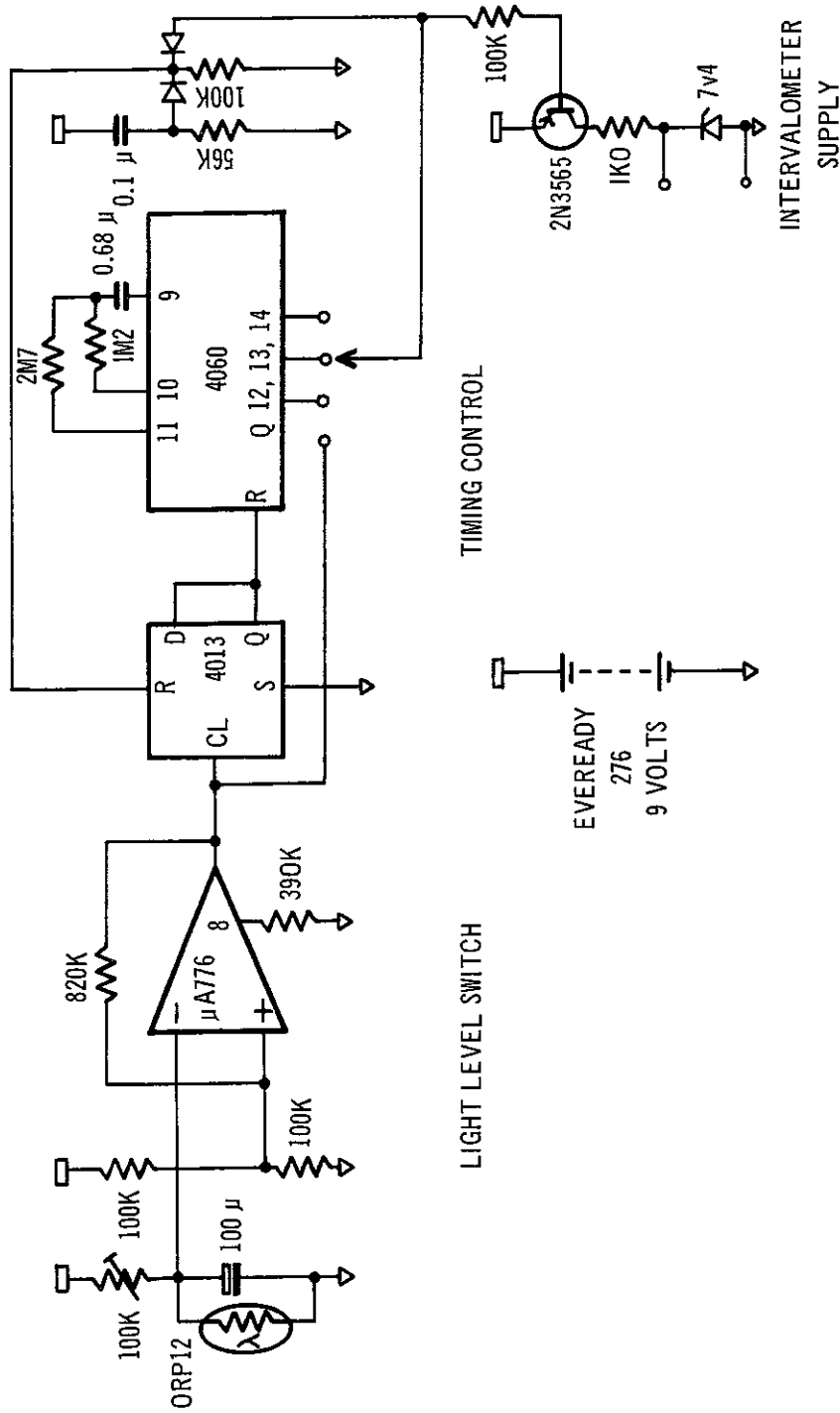


Fig 1 Control circuitry used to switch cine camera single frame controller on at sunrise and off at sunset or after 1, 2 or 4 hours duration.



Fig 2 Time lapse camera unit being rehoused after servicing

### ACKNOWLEDGMENTS

This work grew from suggestions by M. Anderson. G. Scott has been central to the successful operation of the equipment.