



Central Station Timer and Command Decoder Interface	NO. ATM-761	REV. NO.
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Tosh

This unscheduled ATM is published to define the switching operation of the Central Station Timer and its interface with the Delayed Command Sequencer and Pulse Shaping Circuits of the Command Decoder.

Prepared by *Walter Tosh*
W. Tosh

Approved by *H. Reinhold*
H. Reinhold



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The Delayed Command Sequencer Section of the Command Decoder uses the switching functions of the Central Station Timer to generate a group of time sequenced commands which are independent of the MSFN (uplink commands). These commands have the same pulse shape and interface characteristics as the "normal" commands which are generated in response to command signals from the MSFN. In general, they can be classified as repetitive or non-repetitive.

Repetitive

1. Two commands starting about 12 hours after turn-on and repeating on a 12 hour cycle thereafter.
 - (a) One of these commands is used as a "re-set" on the receiver circuit breaker.
 - (b) The second command is routed to the PSE for short period calibration.
2. Two additional 12 hour repetitive commands are generated after a waiting period of 108+ hours have elapsed. This is Command 131 at 108 hours + 1 minute and Command 52 at 108 hours + 7 minutes: repeating at 12 hour intervals thereafter.

Non-Repetitive

Seven one time Commands are generated at 96+ hours as follows:

Commands Octal 73, 105 and 113 at 96 hours + 2 minutes
Command Octal 110 at 96 hours + 3 minutes
Commands Octal 107 and 122 at 96 hours + 4 minutes
Command Octal 110 at 96 hours + 5 minutes.

All of the above commands are redundant with the uplink commands (as backup) except the receiver circuit breaker reset (1a) and the PSE short period calibrate (1b).

They are all time sequenced by the 12 hour and 1 minute strobes, produced by Central Station Timer switch closures and suitable shaping circuits as shown in Figure 1. The time sequence of command generation is shown in Figure 2. It should be noted that the Short Period Calibrate Command (1b)



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is or'ed with Command 065 within the PSE to provide redundant short period calibration commands.

Early in the equipment design phase, some concern was expressed on Timer failure whereby switch closures (and thus commands) could be generated in a randomly repetitive manner. It should be noted that with the present timer design there is no such identifiable timer failure mode, however, to cover this contingency a protective feature was included in the design. This feature, shown in Figure 1, provides commandable control over the timer output. On power application or in response to Command Octal 032, the level on G5 (Pin 8) goes high and puts gates 1A and 1B in the Timer accept state. On reception of Command Octal 033 the state of the flip-flop is changed, that is its output (Pin 8) goes low and gates 1A and 1B are inhibited from responding to the timer switching.

Transmission of Command 033 is flagged as CRITICAL: it was intended for use only to prevent random commands from a Timer operating in an erratic manner (timer failure). Use of Command 033 is permissible if one is willing to accept the consequences. These are:

1. loss of the automatic receiver circuit breaker reset command.
2. the issuance of an "unscheduled 12 hour" command.

Whether the second item will or will not occur is dependent on when Command 033 is received. If the inhibit Command is received during the time of 12 hour switch closure (nominally 15 minutes) the unscheduled command will not occur (since the gate input is already held "low" by the 12 hour switch closure).

A third switch on the Central Station Timer is provided as shown in Figure 1. This series redundant switch provides a ground signal which is applied to the Transmitter off relay in 720 ± 30 days after starting the Timer on the lunar surface. THERE IS NO PROVISION TO INHIBIT OR RESET THIS SWITCH OPERATION.

The "power on reset" shown in Figure 1 insures that the Timer interface circuits are in the "Timer accept" mode when power is applied. This signal also initializes the counters. This may occur on switchover from Power Conditioner No. 1 to Power Conditioner No. 2 (or No. 2 to No. 1), in the Power Conditioning Unit. Therefore, this power on reset has special significance during the first 96 hours, since:



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1. Should power reset be activated the counters will be initialized and "re-start" the 96 hour count.
2. The Timer interface circuits will be in the "Accept Mode" even though Command 033 has previously been transmitted.

It should be noted that reset and Command signals on Figure 1 affect logic circuits only: they have no affect on the Central Station Timer. This component is battery powered and continues the 1 minute and 12 hour switching operations even though Command 033 is transmitted. The Timer can be reset by mechanical means only, requiring physical access to the component.

This reset feature permits adjustment of the time at which the 2 year switch will close. It can be set backward or forward, i. e. to lengthen or shorten the nominal 720 ± 30 day delay from Timer start until operation of the switch. This resetting in no way affects the 1 minute and 12 hour switch cycles.

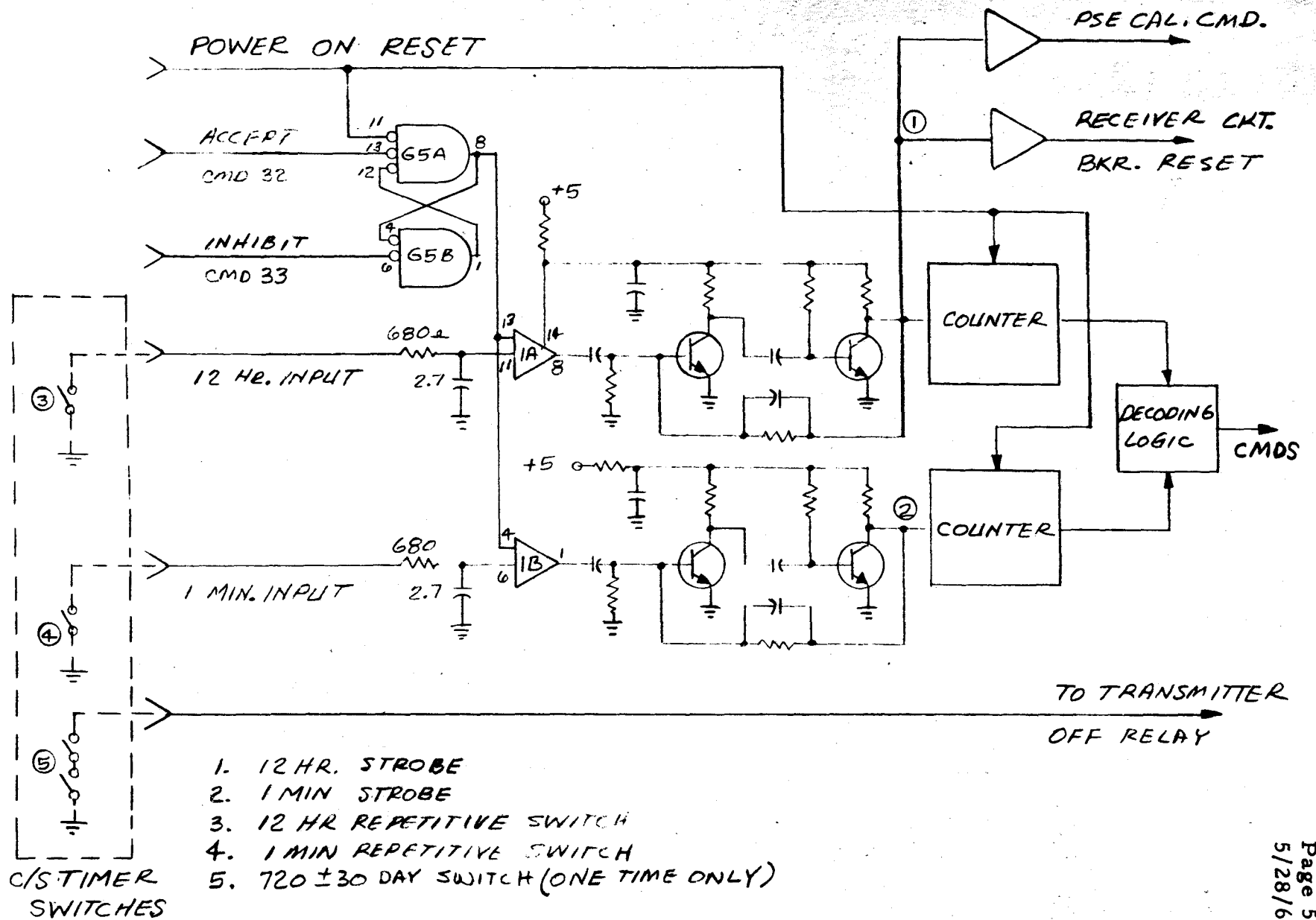
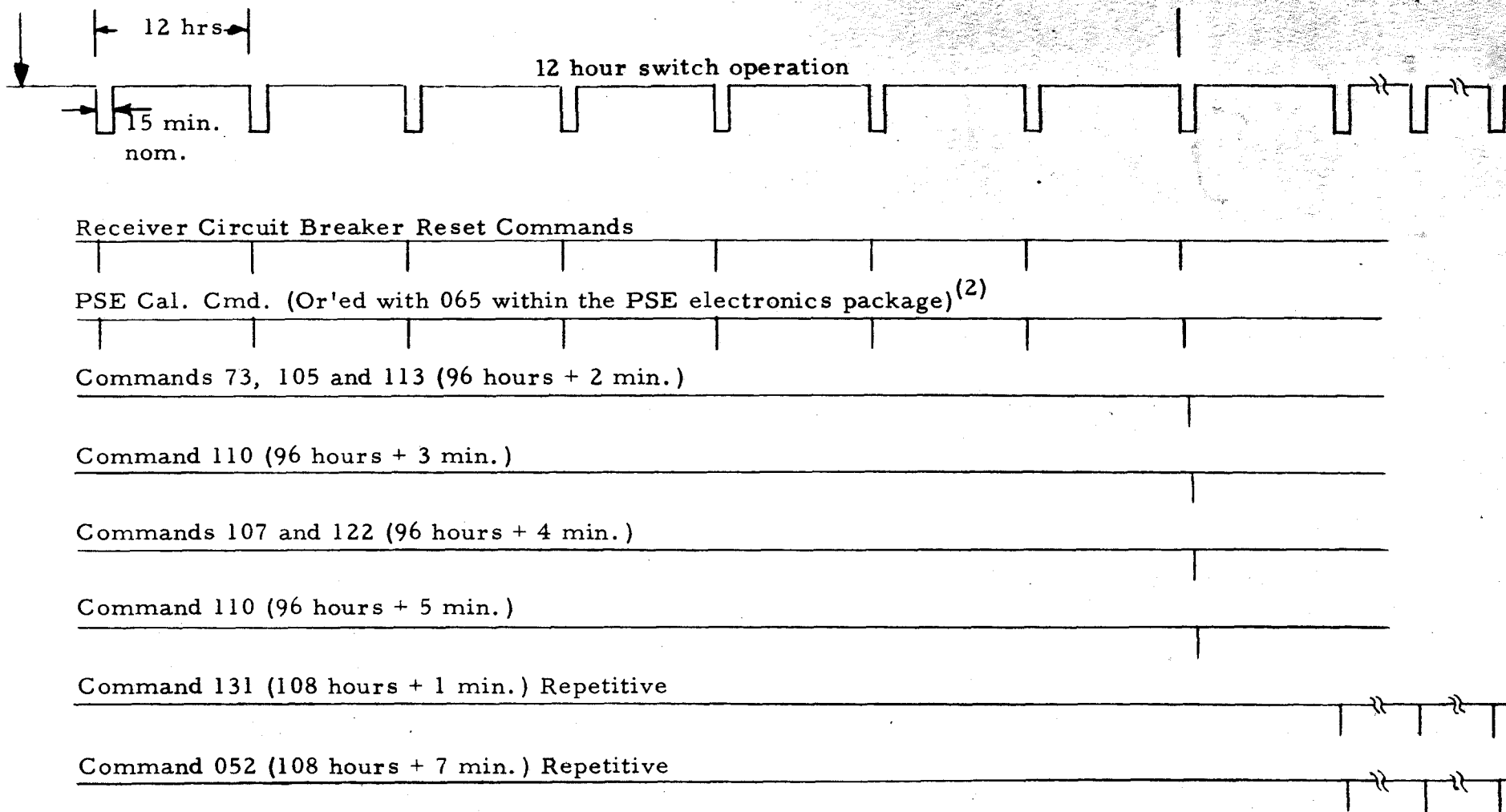


FIG. 1

Time
Start

(1)
96 hrs.



NOTES:

- (1) "96 hour point" = 96 hours - (Accrued timer operation following previous switch closure)
Max. = 96 hours
Min. = 96 - 12 = 84 hours
- (2) In PSE Central Station Electronics, subsequent to Qual Model, this command is also or'ed with Command 173.
- (3) All delayed commands will be repeated in 96 hours following each activation of the Power Reset circuit.

Figure 2 - Command Time Sequence