

1410 DATA PROCESSING SYSTEM BULLETIN

PROGRAM ADDRESSABLE CLOCK

THE Program Addressable Clock for the IBM 1410 Data Processing System provides a method of establishing an accurate log of system usage time. Under stored program control, the immediate time registered by the clock can be obtained for recording or processing.

Possible applications of the program addressable clock are:

- 1. Time monitoring--determining processing time, system setup time, program testing time, system maintenance time, and system idle time.
- 2. System cost distribution--more accurate job charges to departments or users of the system.
- 3. System use scheduling--better control of system use time resulting in more timely output.
 - 4. Time log for messages in IBM Tele-processing® systems.

The program addressable clock is located on the IBM 1415 Console and is powered from a voltage source not affected by the normal power off controls of the 1410 system. Emergency power off does remove power from the clock.

The clock indicates the time of day in continental (24 hour) notation to hundredths of an hour. For example, the time 3:26 PM is indicated as 15:43, where 15 represents the 15th hour of the day (3:00 PM) and 43 represents the fraction of the hour in hundredths past the 15th hour. Although the clock advances once per minute, it counts in hundredths of an hour. The units position of the hundredths of an hour is expressed by the values 0, 2, 3, 5, 7, or 8. See Figure 1.

The clock can be manually set by using three reset levers: one lever for the hours, and one each for the tens and units positions of the hundredths of an hour. The time registered by the clock can be viewed through three apertures, one above each reset lever.

Read-out of clock time is accomplished by a store address register instruction G (CCCCC) T in the stored program. This instruction places four digits representing clock time and a special identifier digit in core storage, beginning at the location specified by the C address. The five digits are stored right to left, beginning with the units position of the hundredths of an hour. The identifier digit is stored to the left of the last time digit. Any zones or word marks present in these core storage positions are not affected.

Clock time data may be obtained except while the clock is stepping to the next time increment (busy time is 345 ± 115 milliseconds). If the clock is not stepping when time data are requested, the four time digits are followed by a zero identifier digit; if the clock is stepping, the four time digits and the identifier digit are all nines. If any position of

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TIME		TIME		TIME		TIME	
Minutes	Hundredths	Minutes	Hundredths	Minutes	Hundredths	Minutes	Hundredths
01	02	16	27	31	52	46	77
02	03	17	28	32	53	47	7 8
03	05	18	30	33	55	48	80
04	07	19	32	34	57	49	82
05	08	20	33	35	58	50	83
06	10	21	35	36	60	51	85
07	12	22	37	37	62	52	87
08	13	23	38	38	63	53	88
09	15	24	40	39	65	54	90
10	17	25	42	40	67	55	92
11	18	26	43	41	68	56	93
12	20	27	45	42	70	57	95
13	22	28	47	43	72	58	97
14	23	29	48	44	73	59	98
15	25	30	50	45	75	00	00

Figure 1. Time Derivation Table

of the clock fails to read out when time data are requested, a nine is stored as the data for the position failing to read; nines are also stored as the data for all following positions and for the identifier digit.

Program use of the addressable clock should provide for the possibility that the clock will be stepping when the desired time data are requested. One way to determine when the clock has finished stepping is to test the identifier digit character position of the clock data with a branch if character equal instruction—B (I) (B) 9. If the identifier character position of the clock data contains a nine, the program branches to the I-address specified in the branch if character equal instruction. The I-address is the starting address of the original G (CCCCC) T instruction.