TAV

Aurora's Time & Attendance System

Technical Description

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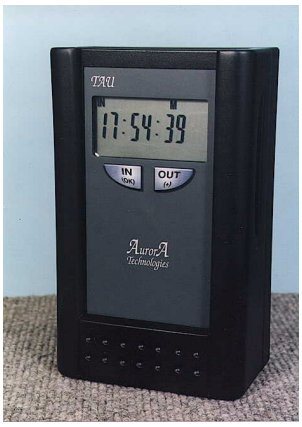
1. Introduction

The *TAU* system is a comprehensive concept for Time and Attendance data collection, based on smart card technology. It provides a complete, compact and low cost solution for collecting the necessary information relating to the incoming and outgoing of personnel. The system allows both **local processing** and support of the Time and Attendance functionalities (for use within the office or plant) as well **as remote system support via telephone lines and/or internet connectivity** (for use by firms with widely dispersed personnel or by Payroll Service Centers). This system includes all levels of supporting the Time and Attendance disciplines, at two distinct system configurations.

In the local configuration, the *TAU* system supports:

- Issuing the employee personal card;
- Recording the Time and Attendance data in the dedicated *TAU* unit.
- Discharging the Time and Attendance data at the Data Collection Center PC.
- Issuing reports of employee attendance, in accordance with several criteria (employee, date interval, etc.).
- Editing and completing recorded data.
- Creating structured files that contain the attendance record of the personnel.



The local configuration is optimal for small offices and departments that employ a small number of employees, typically 1-10 persons, and up to 15 persons per site (optionally, up to 40 persons can be comfortably supported). It is also ideal for building and construction sites, temporary locations and installations and any other situation where power and communications are unavailable.

The remote configuration allows all of the local functionalities, with the addition of the following features:

- The local data is transmitted through a communication link to the Data Processing Host. The communication link can be any form of telephone connection (line or cellular) or Internet;
- The individual personnel files may be accessed and edited remotely by the employees and their employers (applying access authorization criteria) for viewing and completion.
- The Data Processing Host can support any number of employees and firms independently.

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The remote configuration is ideal for firms that employ or hire out temporary personnel, have personnel that are widely distributed, and for Payroll Service Centers.

The attendance data in the *TAU* Unit can be discharged in one of several manners:

(a) To a dedicated Accumulator card (also a smart card) that retains a large number of attendance transactions. The Accumulator card is then discharged into a generic smart card reader connected to the Data Collection PC.
(b) By means of an interfacing cable, directly to a PC or laptop.
(c) Data is also retained in the personal card, so that it, too, may be discharged into the generic smart card reader connected to the Data Collection PC.

2. Advantages of the *TAU* System

The Tau System offers a low cost, electronic solution for Time and Attendance monitoring. The *TAU* units are independent, easily installed, battery powered and, therefore, do not require any support at all for power or communications. The PC based Data Collection software is user friendly and carries out all of the operations necessary to create the attendance records of the employees. All information is retained in non-volatile memory, and is not lost even during battery replacement.

The smart cards used in the system can be recycled and information can be modified at the Data Collection Center. The cards are more reliable than their magnetic card counterparts, and have a longer life span.

The *TAU* system is ideal for two main types of operation:

(a) Conventional Time and Attendance functions.
(b) Mobile applications: monitoring service personnel (i.e. maintenance, technical support, elderly and nursing care, etc.) at their work location.

In the conventional mode, the *TAU* Unit may be wall mounted, in the manner of a classic Time and Attendance Clock. In this mode, the *TAU* unit can:

- Replace Punch Clocks, Time Stamp machines and electronic Time and Attendance units.
- Eliminate typing and keying in of data – all data is retained and transferred electronically.
- Provide built-in backup of all attendance transactions – information is never lost.

In mobile applications, the *TAU* Unit is carried by the service provider. Each service customer has a personal card issued. Each time a service provider arrives and leaves the premises, the customer inserts his card into the service provider's *TAU* unit, thus creating a time stamp that includes information on the service provider, the customer ID, the time and date of the transaction and arrival or departure information. The time stamp is

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retained in the *TAU* unit (and on the customer card as well) until the unit is discharged at the Data Collection Center.

The *TAU* system replaces written logbooks of attendance, reducing human error and fraud and providing a friendly, automated and economical method of collecting and processing attendance data.

3. *TAU* System Components and Operation

The *TAU* system consists of several components. These include:

1. The *TAU* Unit.
2. Smart cards, serving in several functionalities, including:
   - 2.1 The Employee's Personal Time Card.
   - 2.2 A Supervisor Card.
   - 2.3 An Accumulator Card.
3. The Central Office Data Collection and Processing Center. This Center is based on a PC, including a smart card reader and incorporates Windows based software. The smart card reader can be either a *TAU* unit (augmented by an interfacing cable to the PC serial port), or a generic smart card reader optionally provided with the *TAU* system.

In general, the employees will clock in and out by inserting their Personal Cards into the Card Reader slot of the *TAU* Unit. The incoming and outgoing log will be written to both the Personal Card and to the *TAU* Unit memory. The entire operation is virtually immediate, and is as simple as "swiping" a magnetic card in a magnetic card reader. An audible beep confirms completion of the transaction.

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3.1 Retaining the Transactions

As mentioned, the transactions are retained in both the Personal Cards of the employees and the *TAU* Unit.

A Personal Card can retain up to 121 transactions. If the Personal Card is the primary data carrier, it will have to be discharged of its data before the card memory is full. Typically, the Personal card will be discharged at least once a month. In this scenario, the *TAU* Unit will serve as a secondary or backup data memory. It will cycle the information in the Unit memory, so that, at any time (until it is discharged), the Unit will retain the last transactions that took place. The Unit memory retains 1800 transactions, equivalent to about 20 man-months of typical activity. It can optionally be expanded to 36 man-months of data collection and retention. In its backup role, the Unit need not ever be discharged, as the information is derived when the individual (Personal and Supervisor) cards are discharged of their information at the Data Collection Center.

If the *TAU* Unit is the primary data carrier, it must be discharged of its data before its memory is full. The number of retained transactions is the same as described above. In this scenario, the Personal Card serves as a backup and does not need to be discharged. It will cycle the information, so that at any time, the Personal Card will retain the last 121 transactions recorded into it.

3.2 Discharging the Transactions

Discharging the transactions involves transferring the incoming and outgoing records of the employees from the primary data carrier to the Data Collection PC in the Data Collection Center.

Data can be discharged to a Data Collection Center in one of the three methods described above. In all three cases, the outcome of a successful discharging session will involve creation of (or adding to) a transaction file in the Data Collection PC and clearing the information in the primary data carrier.

3.2.1 Discharging the *TAU* Unit to the Data Collection PC

If the *TAU* Unit serves as the primary data carrier, it needs to be discharged before its memory becomes full.

The standard *TAU* unit retains 1800 transactions, approximately equivalent to 2average man-months of activity. In the case where the *TAU* Unit data is discharged (downloaded) bi-weekly or weekly, the effective number of employees retained per *TAU* Unit will be doubled or quadrupled. For example, a standard *TAU* Unit, that can nominally

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retain 20 man-months of activity, will support 20 employees when discharged monthly, 40 employees when discharged bi-weekly, 80 employees when discharged weekly and approximately 400 employees when discharged daily.

3.2.2 Discharging the *TAU* Unit Through an Accumulator Card

In this mode of discharging the data, an Accumulator Card is inserted into the *TAU* Unit. The data in the Unit is discharged into the Accumulator Card. At this time, the data records are transferred to the Accumulator Card. An Accumulator Card will retain 488 transactions. If there are more transactions in the *TAU* Unit than can be stored in the memory of a single Accumulator Card, additional Accumulator Cards will be inserted and filled until all of the Unit transactions will have been transferred. At this time the *TAU* Unit memory will be cleared.

The Accumulator Card (or Cards) is, thereafter, sent to a Data Collection Center. There, the Cards will be inserted into either a *TAU* Unit or a generic Smart Card Reader.

At the Data Collection Center PC, the *TAU* Processing program is invoked in the Card Discharge mode. It discharges the data from the Accumulator Cards into the PC, one card at a time. The order of inserting the Accumulator Cards for discharging at the Data Collection Center is of no consequence. After each Accumulator Card is successfully discharged, it is cleared for reuse.

3.2.3 Discharging the Employee Card at the Data Collection Center

The third method of discharging transaction data to the Data Collection Center PC is by inserting the Employee Card into either a *TAU* Unit or another, generic, Smart Card Reader connected to that PC. This method of discharge is most commonly applied when the backup information in the Personal Card is called for.

3.3 Supervisor Functions

The Supervisor Card will be issued to persons with the proper authority. It has two main functions:

1. It will be required in order to set the time and date in the *TAU* Unit on site. Every time a Supervisory Card is used to perform the time and date correction, that information is stored both on the Supervisor Card and in the *TAU* Unit. This recorded information will thereafter be forwarded to the Central Office. This will discourage any tampering with the *TAU* Unit time settings by unauthorized persons. Time and Date can also be set when the *TAU* unit is communicating with the Data Collection Center.

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2. The Supervisor Card will also be used for entry confirmation of employees whose status requires this confirmation.

3.3.1 The Supervisory Confirmation Feature

When an Employee Card is issued, it is marked with a special Supervisory Confirmation Required status flag. This status flag determines whether the Employee can clock in without restriction, or whether he requires supervisory confirmation of his entry, exit or both.

If the employee Personal Card requires supervisory confirmation, a supervisor must insert his Supervisor Card prior to insertion of the employee's Personal Card. Only then will the attendance transaction be registered.

4. Card Types and Characteristics

The *TAU* System employs four functionally different memory cards. These are the Personal Card, the Supervisor Card, the Accumulator Card and the Setup Card. The Setup Card is only used by authorized technical personnel, and will not be described in this document.

An Anti-tear functionality is implemented on all cards. This function provides protection and recovery from situations wherein the card was removed from the reader before the data update was completed. This situation is a potentially hazardous condition for the integrity of the information and calls for special handling techniques.

5. *TAU* Unit Characteristics

The *TAU* Unit includes:

- A CPU.
- Non-Volatile Read/Write Memory.
- A Real Time Clock (RTC).
- A one-line LCD display.
- Two pushbutton keys for operator interaction.
- A Smart Card Reader.
- A Battery Pack for normal powering of the unit elements.
- An audible Buzzer.

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5.1 Packaging

The *TAU* Unit is packaged in an enclosure similar to a handheld remote control unit. The card reader slot is on the right side of the unit, and the LCD on its face. This handheld unit can be placed in a desk mounted housing or in a wall mounted retainer.

5.2 The TAU Unit Power Supply

The *TAU* Unit is powered by two "AA" size batteries. All relevant parameters and transactions are retained in a non-volatile memory. Thus, when the batteries are exchanged, only the current time and date need to be updated. No other information relating to unit configuration or accumulated transactions is lost due to removal of the unit batteries.

5.3 TAU Communications

The *TAU* communicates with a PC through a special interfacing cord, connected to the PC serial port. The PC serial port should be set up to the following specifications:

- 9600 Baud
- 8 Bit characters
- No Parity
- 1 Stop Bit

The *TAU* communicates by means of a proprietary protocol. No hardware or software handshakes are required nor supported.

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