AP41 / AP81 SERIES

TIME SWITCHES

AP41

AP81

ATS APPLIED
TECHNICAL
SYSTEMS

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THIS MANUAL COVERS THE <u>AP41</u> AND <u>AP81</u> TIME SWITCHS.

AP41 / AP81 SERIES – TIME SWITCHES
REV 09/25/08

These are two basic versions of the AP41 / AP81 Series time switches. The AP41 is a four-circuit time switch, and the AP81 is an eight-circuit time switch. This manual will reference either unit as the "AP41 / AP81" or the "Time switch" in most cases.

INTRODUCTION

The AP41 / AP81 is a multiple output, calendar programmable solid state time switch. It is used for switching electric circuits according to a pre-set time and date program. The AP41 / AP81's AUTO PROMPTING, alpha-numeric display makes programming fast and simple.   The outputs can be used to ring bells, to control audio/visual equipment or to control lighting, heating, ventilating, air conditioning and security systems with a variety of programming capabilities, ranging from a simple 7 day plan to a more complex plan utilizing its powerful, alternate annual programming features. Each has a compact wall mount enclosure. All output relays are available for timed events. The output relays are rated at 120 VAC, 15 amps resistive load.   Selected outputs can be independently programmed for momentary operation such as required for ringing bells in schools, churches or industrial facilities.

Limited options are available for the AP41/ AP81 time switches including 220 VAC power, 50 Hz power, etc.

SPECIFICATIONS

PROGRAMMING CAPABILITIES

Auto Prompting Display - Provides display information to guide the operator during programming. From a cold start it will take the operator from setting time clear through setting the basic program steps.

200 Powerful Program Steps - The AP41 / AP81 has a default set up of 1 Basic, 7 day plan and 9 Alternate, 7 day plans that can be scheduled on an annual basis for a total of 10 plans, each having 20 program steps. If more than 20-program steps are needed, they can be programmed using a keyboard-entered function.   Up to 100 steps per program can be programmed for a total of 2 plans. Each step can be programmed for all or any combination of the output relays for the specific day of the week, or for all 5 weekdays, or for both weekend days, or for everyday of the week.

20 Annual Plans - Each annual plan has a starting and ending date, and an associated Alternate Plan. This feature can be used to schedule any 1 of the 1 to 9 alternate, 7 day plans to be used by the AP41 / AP81.

Programmable Daylight Savings Time Adjustment - The AP41 / AP81 can be programmed to automatically adjust its time for Daylight savings time changes according to U. S. law, even if the law changes.

Automatic Leap Year Compensation.

Manual Override - The output relays can be manually energized or de-energized from the keyboard.   The manual override remains in effect until the next programmed step occurs.

Pulsed Output - Selected outputs can be programmed individually or as a group to operate as momentary contacts, programmable from 1 to 9 seconds.

Optional Program Transfer and Printout - The program and time from one AP41 / AP81 can be transferred to another AP Series Time switch or to a printer using the printer interface module. The optional transfer port is required.

ELECTRICAL

Power:	Standard power required is from 95 VAC to 135 VAC, 60 HZ at 5 VA maximum. Clearly labeled terminal blocks are provided on the AP41 time switches. For the AP81, connector wiring harnesses (two 48" long multi-conductor cables) are provided for all field wiring. For optional powered units (220 VAC and 50 Hz), refer to the option addenda provided.
Outputs:	AP41 - Four relays (SPDT) rated at 15A, 120 VAC or 30 VDC resistive.
	AP81 - Eight relays (SPDT) rated at 5A, 120 VAC or 30 VDC resistive.
Wiring	AP41 - Clearly labeled Terminal Blocks on the PCB assembly, or an optional 16-pin connector with the mating, 48 inch wiring harness.
	AP81 - Connector wiring harnesses (two 48" long multi-conductor cables) are provided for all field wiring.

POWER FAIL BACKUP

Non-Volatile Memory keeps time and programs for extended power outages. Outputs and display are disabled during backup. The AP41 / AP81 resumes normal operation when power returns.

ACCURACY

Time Keeping - Synchronous with the AC power line. During a power failure it is quartz crystal controlled with an accuracy of +/- .005% throughout its full temperature range.

Programmed Events - On/Off events are programmable with a one-minute resolution and occur at the zero second of that minute.

Operating Temperature Range is from 0 to 50 degrees C

PHYSICAL

AP41:   Black, painted aluminum enclosure - 4.8"W X 8"H X 1.8"D.

AP81:   Black, painted aluminum enclosure - 4.8"W X 8"H X 3.2"D.

                  Mounting holes are provided in the enclosures for easy installation.

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INSTALLATION

AP41 / AP81 SERIES

The AP41 / AP81 should be securely mounted to a suitable mounting panel or surface according to any local codes using the mounting holes provided. Be sure the equipment is properly grounded to the panel or the facilities ground connection.

ELECTRICAL CONNECTIONS

All wiring connections are made at the clearly marked terminal blocks located on the inside of the AP41 enclosure, or with the optional connector and wiring harness assembly. For AP41's with the optional connector, and for the AP81's refer to the Wiring Table below for wiring details. Otherwise, remove the top cover of the AP41 to gain access to the terminal block.

AP41 shown with the top cover removed.

Clearly, labeled terminal blocks are provided for all field wiring.

AP81 connectors A and B are used with the 48" mating cable harnesses for all field wiring.

WIRING TABLE

CONNECTOR "A" (AP41 with connector option and AP81)

PIN#	COLOR	FUNCTION
1	Black	AC Line
2	White	AC Neutral
3	Green	Ground
4	Red	Relay 1 C
5	Yellow	Relay 1 NC
6	Violet	Relay 2 C
7	White/Violet	Relay 2 NO
8	NOT USED	
9	Orange	Relay 4 C
10	White/Yellow	Relay 1 NO
11	Blue	Relay 3 C
12	Gray	Relay 3 NC
13	White/Blue	Relay 3 NO
14	White/Brown	Relay 4 NC
15	White/Orange	Relay 4 NO
16	Brown	Relay 2 NC

CONNECTOR "B" (AP81 ONLY)

PIN#	COLOR	FUNCTION
4	Red	Relay 5 C
5	Yellow	Relay 5 NC
6	Violet	Relay 6 C
7	White/Violet	Relay 6 NO
8	NOT USED	
9	Orange	Relay 8 C
10	White/Yellow	Relay 5 NO
11	Blue	Relay 7 C
12	Gray	Relay 7 NC
13	White/Blue	Relay 7 NO
14	White/Brown	Relay 8 NC
15	White/Orange	Relay 8 NO
16	Brown	Relay 6 NC

OPTIONS

There are a variety of options available for the AP41 / AP81. For details on the installation and operation of the installed option, refer to the Addenda for those options at the back of this manual.

DISPLAY, KEYBOARD AND LABELING

ALPHANUMERIC DISPLAY - Used for displaying time, day, date, and output status, and for displaying information during programming or reviewing stored programs.

KEYBOARD - Many keys serve multiple functions. Those keys are clearly labeled with their functions to the side and top of the key. They cannot be used incorrectly, as the display will AUTO PROMPT the user as to which key to press.

AM / ON KEY [1] - Used for setting the time to AM when in the time set or programming modes and for entering the manual control mode.

PM KEY [2] - Used for setting the time to PM when in the time set or programming modes.

TIME KEY [3] - Used for entering the time set mode.

ANNUAL KEY [A] - Used for entering the annual programming mode and for stepping through the stored annual plan for review.   The annual plan contains the schedule for the alternate basic plans in calendar schedule form.

BASIC KEY [B]   - Used for entering the basic plan-programming mode and for stepping through the stored basic plans for review. The basic plans contain the daily timed events instructions.

CLEAR KEY [C] - Used for clearing all annual plans and or basic plans.

DATE KEY [D] - Used for entering the set date mode for entering date or reviewing the date.

EXIT KEY [#] - Used for exiting any of the set time, set date or program modes.

OFF KEY [0] - Used for setting the pulse to OFF when in the pulse programming mode.

ENTER KEY [*] - Used for entering all commands or for stepping through any set time, set date or program data entry.

DST KEY [7] - Used for entering the set Daylight Savings Time program mode.

DAY KEY [4] - Used for setting the day in the set time and program modes.   Also used for entering the set day mode.

OPERATION

FILLING OUT THE PROGRAM RECORD SHEET

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The AP Series Time Switches have extensive programming and control capability. In order to accurately document and enter your program the Program Record Sheet should be used. This sheet is self-explanatory. Copies are included at the back of this manual.

AUTO PROMPT DISPLAY

All AP Series Time Switches have a feature called Auto Prompt that guides the operator when programming the unit. For the most part the operator merely has to follow the display as the time switch advances through the program modes.   On a cold start (from a discharged backup system) the time switch will advance through a sequence of all the necessary settings including the basic plans.   You may exit this sequence if desired and enter the program manually from the time display. Entering a program from the Auto Prompt sequence is identical to entering one manually, except you have to enter each sequence manually.

THE CURSOR

On many of the display messages you will see a flashing square character called the cursor.   The cursor indicates that you may now enter or change the data at that position of the display.

ENTERING DATA

As data is entered the time switch constantly checks for a valid entry. For example, you cannot enter 13 for a month when setting the date.   After entering valid data to a position on the display, the cursor will advance to the next position. If you have tried to enter invalid data, the cursor will remain at the same position, indicating you must re-enter the data.   Simply re-enter the data on top of the existing data and press ENTER. Generally data is entered two digits at a time.

EXITING THE AUTO PROMPT SEQUENCES

Any time during a set time, date or programming mode, you may wish to exit the Auto Prompt sequence. Simply press the EXIT key. The time switch will advance to the time display.   From this display you may enter any of the sequences manually. This manual will assume you have exited the Auto Prompt sequence after entering the time. If you had remained in the Auto Prompt sequence, all the sequences covered in the section on ENTERING, REVIEWING OR EDITING TIME AND PROGRAMS would automatically be invoked.

APPLYING POWER

Before power is applied be sure all installation and wiring is completed to all local codes.

Upon first applying power the display will come up with a brief sign on message showing the model and version numbers:

```
AP41 / AP81 TIME SWITCH
Version  2.XX
```

After a few seconds the first Auto Prompt message will appear. If this message does not appear, go to the ENTERING, REVIEWING OR EDITING TIME AND PROGRAMS section.

```
UNIT POWER FAIL
Press "3" key
```

Simply press key [3].   The display will prompt with the set time display.

```
Time? 00:00 AM
Hrs. (HH), ENTER
```

From this point forward you can exit the Auto Prompt sequence at any time, if desired, by pressing [EXIT]. However, the programming is simpler if you do not exit.

You will notice that every numeric field is zero.   On a cold start all memory is cleared in the time switch including time, date, and program steps.   The cursor will be flashing in the hour's digits. The bottom line indicates that you need to enter 2 digits (HH) for hours. Simply enter the hours then press the [ENTER] key. Two digits are required for the hours. Example: 01 instead of 1. If you try to enter an invalid number for the hours, the cursor will remain flashing in the hour's digits. You must then re-enter the correct hours. If you have entered a valid number for the hours, the cursor will advance to the minute's digits. The bottom line again gives you additional information on how to enter the minutes.   Now enter the desired two digits for the minutes and press [ENTER]. The cursor will advance to the AM position.   Press the AM or PM key as desired and then press [ENTER].   Time keeping begins the instant you press [ENTER].   Time can be accurately set to the second by pressing the [ENTER] key at the instant you desire.

After the time is set, the display will advance to the set date display.   The time switch will continue to Auto Prompt all of the programming modes, except pulse, as data is entered.

ENTERING, REVIEWING OR EDITING TIME AND PROGRAMS

This section will explain how to change or review the existing time, date or programs previously stored, or to totally program the unit. If you have exited from the Auto Prompt sequence, it describes how to manually invoke each mode. If you did not exit the Auto Prompt sequence, ignore the first few instructions that explain how to invoke each mode.

ENTERING, REVIEWING OR EDITING TIME [3] [ENTER]

You must be in the time display before you can enter time. Press the EXIT key to be sure. The display should look similar to the following:

```
 Mon 01:18:00 PM           Mon 01:18:00 PM
 Relays: 1 2 3 4     OR    Relays: 1 2 3 4 5 6 7 8
```

Press the TIME key [3]. The display will respond with:

```
 Command? 03
 Press ENTER
```

Press [ENTER]. The display will respond with:

```
 Time? 12:34 AM
 Hrs. (HH), ENTER
```

It may be showing the correct time or some other incorrect time previously stored. It may even be showing all 0's if you exited the auto prompt sequence.

The cursor will be flashing in the hour's position. The bottom line will give you additional information on how to enter the data. Enter the desired two digit number for hours and press [ENTER]. If the hours are correct simply press [ENTER]. The cursor will move to the minute's position. Do not press [EXIT] part way through editing the time, date or any program steps unless you want to abort the editing. If you exit part way through, any changes made prior to the current position will be ignored. Enter the desired two digits for the minutes and press [ENTER]. The cursor will move to the

AM/PM position. Before pressing [ENTER], you may wish to synchronize this time switch to some other reference clock. The instant you press [ENTER], the time keeping will begin. Therefore to synchronize with another reference clock, wait until it is ready to change to the desired time and press [ENTER] at that instant.

ENTERING, REVIEWING OR EDITING THE DATE   [D] [ENTER]

You must be in the time display in order to enter the date. Press the DATE key [D]. The display will respond with:

```
Command? 0D
Press ENTER
```

Press [ENTER]. The display will respond with:

```
Date? 12-29-98
Month (MM), ENTER
```

It may be showing the correct date or some other date stored previously. It may even be showing all 0's if you exited from the auto prompt sequence.

The cursor will be flashing in the month's position. The bottom line will give you additional information on how to enter the data. Enter the desired two digit number for the month and press [ENTER]. If the correct two digits are already there, simply press [ENTER]. The cursor will move to the day position. Enter the desired two digits for the day and press [ENTER]. The cursor will move to the year position. Enter the desired two digits for the year and press [ENTER]. The time switch will go back to the time display. To review your entry press the DATE key [D] and [ENTER]. The date display will appear. You can edit the date again if you wish or press [EXIT] to return to the time display. Remember that if you edit any part of the time, date or any program steps, you must not exit. Press [ENTER] until all positions of the display have been edited or you have accepted the default information in each display.

ENTERING, REVIEWING OR EDITING THE DAY   [4] [ENTER]

You must be in the time display. Press the DAY key [4]. The display will respond with:

```
Command? 04
Press ENTER
```

Press [ENTER]. The display will respond with:

```
Day?  Sun
DAY key, ENTER
```

It may be showing the correct day or some other day stored previously. Press the DAY key [4] until the desired day is shown on the display and then press [ENTER]. The display will return to the time display.

ENTERING, REVIEWING OR EDITING DAYLIGHT SAVINGS TIME   [7] [ENTER]

You must be in the time display. Press the DST key [7]. The display will respond with:

```
Command? 07
Press ENTER
```

Press [ENTER]. The display will respond with the default entries for the current U.S. law as follows:

```
S DST M=04 SUN=1
F DST M=10 SUN=L
```

The top line is for the Spring DST and the bottom line is for the Fall DST. The S indicates the Spring DST and the F indicates the Fall DST.   The cursor will be flashing in the month position. Enter the desired two digits for the month you wish the Spring DST adjustment to be made (04 for current US law) and then press [ENTER].   The valid Spring months are 00, 03, 04, and 05. Enter 00 for the month if you wish to not use the automatic DST feature and the time switch will return to the time display.   After a valid month is entered, the cursor will advance to the L in the Sunday position. Enter a 1 for the first Sunday (current US law), 2 for the second, 3 for the third, 4 for the fourth or L for the last Sunday. L is the same as key 5.   The change will be made at 02:00 AM on the Sunday you choose.

After the Spring DST data is entered, the cursor will advance to the Fall DST line.   If you have entered a Spring DST, you must enter a Fall DST as well. Failure to do so will erase the Spring DST and then there will be no DST compensation.

In the same manner as the Spring DST, enter the desired month and Sunday you wish the adjustment to be made.   Current US law for Fall DST is the last Sunday in October. So enter 10 for the month and L (key 5) for the Sunday.   The valid months for the Fall DST are 09, 10, and 11. The valid Sundays for the Fall DST are 1, 2, 3, 4 and L. L is the same as key 5.   The change will be made at 02:00 AM on the Sunday you choose.

ENTERING, REVIEWING OR EDITING THE BASIC PLAN PROGRAM   [B] [ENTER]

If the basic program was not entered during the cold start auto prompt sequence, it can be entered by entering the basic program mode. This mode allows the operator to program the daily timed events. Before entering your program be sure to write it out on a program record sheet. You may need to change the size of your basic program. See CHANGING THE BASIC PROGRAM SIZE section for more detail. Press BASIC [B]. The display will respond with:

```
Command? 0B
Press ENTER
```

Press [ENTER]. The display will respond with:

```
BASIC Plan #0
Step #00
```

The cursor will be flashing on the zero for plan #0. Plan #0 is the first of 10 Basic Plans, each of which contains a 7-day plan. Plan #0 is the main 7 day plan and plans 1 through 9 are alternate, 7 day plans that can be scheduled on an annual basis (more on this in the Annual Programming sections). Press [ENTER] to select plan #0. The cursor moves to the Step #00 position. Step #00 is the first step of 20 steps in plan #0. Press [ENTER] to select step #00 and the display will read as follows:

```
#00 WDY 00:00 AM
Relays: - - - -
```
OR
```
#01 WDY 00:00 AM
Relays: - - - - - - - -
```

If you have selected a secondary clock correction mode other than mode 0, be sure not to use relays 3 and 4. When the desired relay numbers appear on the bottom line, press [ENTER]. The first step 00 is now programmed.

The #00 indicates that this is step 00 being displayed. The cursor will be flashing on the W of WDY. WDY stands for weekday. Program steps may be programmed for individual days, such as Mon or Tue, or for groups of days such as WDY for weekdays (Mon through Fri), EDY for everyday (Sun through Sat.) or WND for weekends (Sat & Sun). Press the DAY key to advance to the desired day or group of days. The display will update as you press the DAY key. Once the desired day or group of days is displayed, press [ENTER]. The display will advance to the hour's position. Enter the desired two digit hour at which this step is to be activated and press [ENTER]. The display will advance to the minute's position. Enter the desired two digits for minutes and press [ENTER]. The display will advance to the AM/PM position. Press the [AM] or

[PM] key as desired and then [ENTER]. The display will advance to the first position after the word RELAY. Enter the number of the relays you wish to be energized by this program step. The relay numbers will appear on the bottom line as you press the appropriate number. Pressing the same number again will remove the relay number from the bottom line. This is useful when editing a program step. The following display shows an example of all relays being turned ON on Weekdays at 10:00 AM.

```
#00 WDY 10:00 AM
Relays: 1 2 3 4
```
OR
```
#00 WDY 10:00 AM
Relays: 1 2 3 4 5 6 7 8
```

When the desired relay numbers appear on the bottom line, press [ENTER]. The first step 00 is now programmed. The display will be prompting you for the next step 01.

```
#01 WDY 00:00 AM
Relays: - - - -
```

OR

```
#01 WDY 00:00 AM
Relays: - - - - - - - -
```

Enter the data for program step 01 the same as you did for step 00.   Continue on until all your program steps are entered up to step 19 (the 20th step) or until you have entered the last step of your program.   After entering your last step, press [EXIT] and the time switch will advance to the following display:

```
BASIC Plan #1
Step # 00
```

The time switch is now prompting you to enter the first of 9 alternate plans, plan #1, if desired. Plans 1 through 9 are entered the same as plan 0.   If you are not using alternate plans 1 through 9, or if you have just entered your last alternate plan, press [EXIT]. The time switch will advance to the main time display:

CLEARING PROGRAM STEPS

To clear a program step, press BASIC [B], then [ENTER].

```
BASIC Plan #0
Step # 00
```

The display will be prompting you for a plan #. Choose the basic plan in which the step you wish to clear is located, then press [ENTER].

The display will then be prompting you for a step #.   Choose the # of the step you wish to clear, then press [ENTER].   The chosen step and its program contents will be displayed.

The cursor will be on the S in Sun.   Press [ENTER].   The cursor will go to the hour's position.   Enter 00 for the hours to clear this specific step and press [ENTER].   The display will move to the next step allowing you to edit it as well.   If you are finished press [EXIT]. The display will read:

```
BASIC Plan #1
Step # 00
```

You can now choose another plan to edit or press [EXIT] again to return to the main time display.

The display will return to the main time display. If you wish to erase all the program steps see the section on Clearing the Annual and Basic Programs.

ENTERING, REVIEWING OR EDITING THE ANNUAL PLAN PROGRAM [A] [ENTER]

The annual program allows the time switch to be programmed to select any 1 of the 9 alternate basic plans. This feature is useful for applications that require a different 7-day plan at different times into the future.   There are 20 Annual Program Plans, each of which has a starting and ending date, and an associated, alternate Basic Plan.   The selected alternate plan will begin at 12:00 AM on the start date and will end at 12:00 AM on the day after the end date. Basic Plan 0 takes over at the end of any Alternate plan.   To enter the annual program mode press the ANNUAL [A] key. The display will respond with:

```
Command? 0A
Press ENTER
```

Press [ENTER]. The display will respond with:

```
ANNUAL #00
BASIC #1
```

The cursor will be prompting for an Annual Plan number. #00 is the first Annual Plan. Press [ENTER]. The cursor will then prompt for the desired Basic Plan to select with this Annual. Enter the desired Basic Plan number, then press [ENTER].   The display will read:

```
Start? 00-00-00
End?  00-00-00
```

There may be a date already in the start date from a previous program. It is not necessary to erase this old date. You simply enter new data in each field.   To erase an annual skip plan see sections Clearing the Annual and Basic Program and Clearing an Annual Plan. The cursor will be flashing in the month's position. Enter the desired two digits for the month at which this Annual Plan will start and press [ENTER]. The display will advance to the day's position.   Enter the desired two digits for the day and press [ENTER].   The display will advance to the years position. Enter the desired two digits for the year and press enter.   The cursor will advance to the end date line.   Now you enter the end date in the same manner as the start date.   If your Annual Plan is only for one day, you do not need to enter an end date. Just press [ENTER] to enter the 00 in the months and the display will advance to the next Annual Plan.

```
ANNUAL #01
BASIC #1
```

Repeat the same procedure for Annual 01 as you did for Annual 00, or press [EXIT] to return to the time display.

CLEARING AN ANNUAL PLAN

If you need to clear an Annual Plan, press the ANNUAL [A] key and then [ENTER]. The display will respond with:

```
ANNUAL #00
BASIC #1
```

Enter the desired Annual Plan number you wish to clear and press [ENTER] twice. The display will show the contents of that Annual Plan.

```
Start? 12-19-98
End?   01-01-99
```

Enter 00 for the Start month and press [ENTER].   The plan will be cleared.   There is no need to clear the end date once the start date has been cleared. If you wish to clear all the Annual Plans see the section on Clearing the Annual and Basic Programs. If you are programming the clock from a cold start, the annual and basic program steps will be cleared already. If you are re-programming a previously programmed clock you will need to erase any previous programs as they could conflict with your new program. To clear all program steps, press the CLEAR [C] key.   The display will respond with:

```
Command? 0C
Press ENTER
```

Press [ENTER]. The display will respond with:

```
Clear buffers:
A=ANNUAL B=BASIC
```

You have the option now to clear either the annual or the basic program.   To clear the annual, press [A], the same as the ANNUAL [A] key. The display will return to the time display. If it was the basic program you wished to clear, press the [B] or BASIC key instead of the [A]. Since there are 10 basic plans the time switch will give you the option to clear any 1 or all of the basic plans.   See the following display:

```
Press 0-9 or "A"
for all sets
```

At this point you enter the desired Basic Plan number you wish to clear or press [A] to clear all Basic Plans.

If you wish to clear both the annual and basic programs, repeat the process a second time. Only one can be cleared at a time.

SPECIAL FUNCTIONS

MANUAL OPERATION OF THE OUTPUT RELAYS   [1] [ENTER]

The output relays can be manually controlled from the keyboard.   Before doing this be sure it is okay to operate the loads connected to the time switch. Also be sure the unit is in the time display mode.

To turn the output relays on press the manual [1] key.   The display will respond with:

```
Command? 01
Press ENTER
```

Press [ENTER]. The display will read:

```
Manual Control
Relays: - - - -
```
OR
```
Manual Control
Relays: - - - - - - - -
```


Choose the desired relays that you would like to manually control by keying in the number of the respective relays.   You will notice the numbers of the relays chosen will show up on the bottom line of the display.   If a relay number is shown on the bottom line that you do not wish to turn on, you can remove it by keying that number in.   You will notice that relay number is no longer on the display.   Once the desired relays are showing on the display, press [ENTER].   The output relays chosen will be energized and the display will return to the time display.   They will remain on until the next program step instructs them to turn off or on, or until they are manually operated again.

ENTERING, REVIEWING OR EDITING THE PULSE [5] [ENTER]

The pulse is normally set to zero for programming steady state ON and OFF events.   A pulsed output may be desired for applications requiring a momentary output such as ringing school bells.   You must be in the time display.   Press key [5].   The display will respond with:

```
Command? 05
Press [ENTER].
```

Press [ENTER]. The display will read:

| Pulse = OFF | | Pulse = OFF |
| Relays: - - - - | OR | Relays: - - - - - - - - |

The cursor will be flashing on the "O" in OFF indicating that you may change the pulse. If pulsed output is not desired, press OFF [0] and then [ENTER]. The time switch will return to the main time display. If pulsed output is desired on 1 or more output relays, enter the number of seconds duration for this pulse from 1 to 9 seconds and press [ENTER].

| Pulse = 3 seconds | | Pulse = 3 seconds |
| Relays: 1 2 3 4 | OR | Relays: 1 2 3 4 5 6 7 8 |

The cursor will move to the first position after the word relay. Simply enter the number of the relay or relays to pulse.   The display above shows an example of all 4 relays set to pulse for 3 seconds.

MANUAL SELECTION OF ALTERNATE PLANS   [2] [1] [ENTER]

Alternate Plans can be selected by the keyboard in addition to being selected by the ANNUAL PROGRAM.

To select an Alternate Plan type [2] [1] [ENTER]. The display will read:

| Select |
| New Basic: 0 |

Enter the desired Basic Plan number, then press [ENTER]. The time switch will now run the program contained in the Basic Plan you have selected. The time switch will automatically go back to Basic Plan 0 after 12:00 AM. Also if any of the following changes are made, the time switch will go back to Basic Plan 0:

> Entering a new time.
> A power failure of any duration.
> Entering a new date.
> Modifying the Annual programs.
> Clearing the Annual programs.

Use special function 90 to check status if necessary.

SETTING THE MAXIMUM NUMBER OF STEPS PER PLAN [3] [1] [ENTER]

The time switch has a default setup of 10 Basic Plans with 20 Program Steps each for a total of 200 steps. These plans are numbered Plan 0 through Plan 9. Plan 0 is the main Plan that will repeat itself every 7 days. Plans 1 through 9 are Alternate Plans that can be scheduled by the Annual Program, or they can be called up manually using the Manual Selection function as described above.

For applications requiring more than 20 Steps per Plan, the time switch can be reconfigured to the desired number of Steps per Plan. Special function Command 31 is used to set the desired number of Steps required from 20 to 100 Steps per Plan. The number of Alternate Plans will automatically be adjusted to fit the maximum number of 200 Steps available. If you will need to change the maximum number of Steps per Plan, it should be done prior to entering your program.

To set the number of Steps type [3] [1] [ENTER]. The display will read:

```
Max. Step No: 19
(0-99), ENTER
```

The cursor will be flashing on the maximum Step number prompting you to enter the desired maximum Step number. Since all Step numbers begin with 0, a maximum number of 19 represents 20 Steps. If your application requires 26 Steps, you can enter 25 for the maximum Step number, then press [ENTER].

The display will respond as follows:

```
Max. Buffer No.
= 6 (Press EXIT)
```

Since the Basic Plans begin with Plan 0, this means there are a total of 7 Plans available. Each will have 26 Steps. To go back to the main time display, press [EXIT].

DISPLAY BLANKING   [9] [8] [ENTER]

The time switch display will automatically blank if the keyboard has not been used for 5 minutes or more. To override this feature press [9] [8] and [ENTER]. To change it back press [9] [8] and [ENTER] again.

STATUS   [9] [0] [ENTER]

The time switch has a status check capability. Press [9] [0] then [ENTER] to check status. The display will read:

```
Unit Status: T=N
B=0 A=XX BK=N
```

T status is for factory use only. It should always be "N". "B" status tells you which Basic Plan is in effect. "A" status tells you which Annual Plan is in effect.   "XX" indicates no Annual Plan in use at this time. "BK" status tells you if the display blanking is on or off.

FORCING A RESTART   [7] [7] [ENTER]

For training purposes or clearing all information from the time switch, you can do a cold start. Press [7] [7] [ENTER]. The display will show the UNIT POWER FAIL message.

SOFTWARE VERSION   [9] [9] [ENTER]

To check the version of the software installed in your time switch press [9] [9] [ENTER]. The display will read:

```
AP41 / AP81 TIME SWITCH
Version 2.XX
```

After 5 seconds the display will return to the time display.

PROGRAMMING SUMMARY

Read the sections on Programming Instructions before using the PROGRAMMING SUMMARY.

SET TIME - Press TIME [3] key then [ENTER].   Enter the hours, press [ENTER]. Enter the minutes, press [ENTER].   Press [AM] or [PM], press [ENTER].   Timing begins the instant you press [ENTER] after entering the [AM] or [PM].

SET DATE - Press DATE [D] key then [ENTER].   Enter month, press [ENTER]. Enter day, press [ENTER]. Enter year, press [ENTER].

SET DAY - Press the DAY [4] key then [ENTER].   Press the DAY [4] key until desired day is displayed, then press [ENTER].

SET DST DATES - Press DST [7] key then [ENTER]. Enter month for Spring DST, press [ENTER].   Enter the desired Sunday for Spring DST, press [ENTER].   Enter month for Fall DST, press [ENTER].   Enter the desired Sunday for Fall DST, press [ENTER].

SETTING THE MAXIMUM NUMBER OF STEPS PER PLAN - Press [3] [1] then [ENTER].   Enter the desired number of steps per plan, up to 99, then press [ENTER]. Press [EXIT] after reviewing the display.

ENTERING THE BASIC PLAN PROGRAM - Press the BASIC [B] key then [ENTER]. Enter the desired step number, press [ENTER].   Press the DAY [4] key until desired day or group of days is displayed, press [ENTER]. Press [AM] or [PM], press [ENTER]. Enter the desired relays to turn ON, press [ENTER].   The step is now programmed and ready for the next step.   Repeat this process until entire program is entered then press [EXIT].

ENTERING THE ANNUAL PLAN PROGRAM - Press the ANNUAL [A] key then [ENTER].   Enter the desired Annual Plan number, press [ENTER].   Enter the start month, press [ENTER]. Enter the start day, press [ENTER]. Enter the start year, press [ENTER].   Enter the end month, press [ENTER].   Enter the end day, press [ENTER]. Enter the end year, press [ENTER]. The first skip plan is now programmed and ready for the next skip plan.   Repeat this process until entire skip plan program is entered, then press [EXIT].

MANUAL SELECTION OF ALTERNATE PLANS - Press [2] [1] then [ENTER]. Select desired alternate plan (Basic Plan 1 to 9) then press [ENTER].

MANUAL OPERATION - Press MANUAL [1] then [ENTER].   Enter desired relays to manually control then press [ENTER].   The chosen relays will energize.

CLEARING THE ANNUAL AND BASIC PROGRAMS - Press CLEAR [C] then [ENTER].
Press ANNUAL [A] to clear annual program or BASIC [B] to clear the basic program.
Choose the desired sets buffer to clear.

REVIEWING BASIC PLAN PROGRAM - Press BASIC [B] key then [ENTER]. Press
BASIC [B] key again repeatedly to review each step. Press [EXIT] when done.

REVIEWING THE ANNUAL PLAN PROGRAM - Press ANNUAL [A] key then [ENTER].
Press ANNUAL [A] key again repeatedly to review each skip plan.

OPTIONS

OPTIONAL PROGRAM TRANSFER   [7] [8] [ENTER]

The Program Transfer feature allows you to transfer time and program from one time
switch to another. It is useful for applications where several units will have the same or
a similar program, or where closely synchronized times are required from unit to unit.
The optional transfer port and a transfer cable are required.

To transfer, connect the transfer cable from the I/O port of one time switch to the other.
Press [7] [8] and then [ENTER] on the master unit. The display will read:

```
┌──────────────────────┐
│  Connect Cable       │
│  Then press ENTER    │
└──────────────────────┘
```

If you have not already connected the cable, do so now then press [ENTER].   The
displays will read:

MASTER	REMOTE
| ```
Sending Program
* Please Wait *
``` | ```
Storing Program
* Please Wait *
``` |

After transfer is complete (about 10 seconds), both units will return to the time display.
If transfer was unsuccessful the master unit will display the following:

```
┌──────────────────────┐
│  TRANSFER ERROR      │
│  Press "EXIT"        │
└──────────────────────┘
```


OPTIONAL PROGRAM PRINTOUT   [9] [1] [ENTER]

The program printout feature allows the time switch to dump its program contents to a standard parallel printer using the time switch Printer Interface Module.   Program transfer option is required for the program printout feature.   This works similar to the Transfer feature.

To print from the time switch, connect the Printer Interface Adapter to your parallel printer and connect the transfer cable from time switch I/O port to the Printer Adapter. Enter [9] [1] then [ENTER].   The display will read:

```
Connect Printer,
Then Press ENTER
```

The display will read:

```
Printing Report,
Please Wait . . .
```

If the printout is unsuccessful the time switch will give a TRANSFER ERROR message. Check your cables and be sure the printer was on line.

BASIC PLAN PROGRAM RECORD SHEET

LOCATION _____   **DATE** _____

PULSED OUTPUT _____OFF   _____ **SECONDS (1-9 SECONDS)** _____

RELAYS PULSED _____   **SECONDARY MODE** _____   **SEE NOTE 1**

BASIC PLAN # _____   **# OF STEPS / PLAN** _____

STEP	DAYS	HH:MM	A/P	R E L A Y S							
				1	2	3	4	5	6	7	8

NOTE 1: When modes other than 0 are selected, relays 3 & 4 are dedicated to correction outputs.

Make copies as required for Alternate Basic Plans.

ANNUAL PLAN PROGRAM RECORD SHEET

LOCATION _____   DATE _____

ANNUAL #	BASIC #	START DATE MM-DD-YY	END DATE MM-DD-YY
00			
01			
02			
03			
04			
05			
06			
07			
08			
09			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			

**** SPECIAL FUNCTIONS ****

01	MANUAL OPERATION	78	TRANSFER (OPTIONAL)
05	SET PULSE	90	UNIT STATUS
20	SET SECONDARY CLOCK MODE	91	PRINT (OPTIONAL)
21	SELECT ALTERNATE BASIC PLAN		
31	SET NUMBER OF STEPS/PLAN	98	TOGGLE DISPLAY BLANKING
77	COLD BOOT (RESTART)	99	DISPLAY VERSION

93   TOGGLE LED DISPLAY BACKLIGHT (OPTIONAL)

TECHNICAL SUPPORT

For any questions concerning installation and operation of this product, contact our factory at:

PHONE (800) 444-7161
OR
FAX (318) 797-4864

SERVICE POLICY

It is recommended that all service for this product be done by the factory or by a factory authorized service representative. Applied Technical Systems will provide ongoing service support in and out of warranty. Send your repairs to:

APPLIED TECHNICAL SYSTEMS
849 KING PLACE
SHREVEPORT, LA 71115

APPLIED TECHNICAL SYSTEMS
WARRANTY POLICY

ATS warrants its products to be free of defects in material and workmanship for a period of 24 months from the date of purchase. ATS will repair or replace any product returned to its authorized factory service center within the warranty period so long as there is no evidence that the product has been abused, misused, damaged by lightning, overloads of any kind or water, or altered in any way.

Products returned for warranty must be returned with freight prepaid. ATS will pay normal freight charges to return the product to the customer. Special premium freight requested by the customer will be charged to the customer.

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