# DØ Cryogenic Auto Dialing Alarm system

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D0 Engineering Note
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APPROVED _____

# D0 KAYE AUTO DIALING ALARM SYSTEM

**Overview:** The Automatic Dialing system purchased by D0 is intended to help make the D0 cryogenic system operate unattended by cryogenic operating personnel. The auto dialer is completely programmable and is voice synthesized. The auto dialer was purchased with 32 bistable inputs, but is expandable to 64 bistable inputs with the purchase of more electronic cards at an approximate cost of $260 per card(8 bistable inputs). The auto dialer also has the capability for analog inputs, analog outputs, and bistable outputs none of which D0 uses or intends to use. The auto dialer can be called on its' operating phone line to describe current alarms with the proper password. The Auto Dialer can dial lab extensions, lab pagers, and any number outside the lab. It cannot dial a long distance pager.

**Operation:** The auto dialer monitors alarms and alarm conditions via the TI565 PLC, upon an alarm condition it initiates a phone calling sequence of preprogrammed lists with assigned priorities. When someone is reached, the auto dialer describes the individual alarm it is calling for, by a preprogrammed set of words for that individual alarm, spoken by a female voice. The called person then has a chance to acknowledge the alarm over the telephone, if the alarm is not acknowledged the auto dialer will disconnect and call the next person on the list. The auto dialer will continue to cycle through the list until it is acknowledged, reset, or the alarm condition no longer exists.

**Specifications:**

| | |
|---|---|
| Manufacturer: | Kaye Instruments, Inc.<br>15 DeAngelo Drive<br>Bedford, MA 01730<br>617-275-0300 |
| Service: | Ron Alphen x283 |
| Model: | ADAS 3000 , x7950 |
| Serial#: | 006361 |
| Power: | 120 vac, 60 htz, 1 amp<br>Internally Battery backed with charger |
| Fermilab extension# | x8065 |

**Programmable Parameters:**

1. Individual alarm message(300 word internal library).
2. 8 lists of 8 telephone numbers. The lower the list #, the higher the priority.
3. The priority of each alarm channel, by assigning a list to it.
4. Open/closed input on alarm.
5. Each channel enable/disable.
6. Station ID phrase.
7. Incoming telephone ring count.
8. Real time clock.
9. Message repeat count.
10. Intercall Delay (allowed acknowledge time of an alarm).
11. Calling time of day.(time dialer is allowed to operate)
12. Call back acknowledge delay.(delay between outgoing alarm calls)
13. access code.
14. Bistable alarm delay.
15. Power fail call cancel.
16. Power fail time delay.
17. Power fail calling assignment.

**Programming:** Programming of the auto dialer is done through the keypad inside the front cover. The auto dialer is internally battery backed, therefore programmed instruction are never lost even when the unit is switched off. Since there are many programmable parameters and the keystroke commands are extensive, the owners manual should be consulted when reprogramming. The manual can be found in the D0 cryogenic control room.

**Alarm handling:** Alarms are generated by the TI565 PLC. They can be of analog or digital nature. The analog and digital alarms are programmed into the ladder logic of the PLC. Both types of alarms are sent to the auto dialer by output isolated relay modules in the PLC I/O bases wired to the auto dialer inputs.

The auto dialer alarms are controlled from operator graphic pages of the DMACS control software. These pages are password protected. The digital auto dialer alarms can be enabled/disabled from this graphic page. The analog auto dialer alarms can be enabled/disabled and their threshold triggering points can be changed from this graphic page.

**Auto Dialer alarm acknowledging:** When receiving an auto dialer alarm it can be dealt with in several ways.

1. Punch 8 on a touch tone phone after the message, to acknowledge.
2. Hang up call it back, enter the password, then acknowledge the alarm. Fermilab x**8065**
3. Push the reset button on the auto dialer. **CAUTION: Doing this puts all of the auto dialer alarms in the bypass mode for the "bypass to run delay" time period.** This should only be used temporarily to stop the outgoing calls from the auto dialer while you are assessing the alarm, because you will not be notified by the auto dialer while in this mode, if another auto dialer alarm is triggered. For longer term acknowledgment for a particular alarm, it should be disabled.
4. The individual alarm that has been triggered can be disabled, while assessing the alarm. This will disable the alarm to the auto dialer also.

**Kaye Auto Dialer Weakness:** The Kaye Auto Dialing alarm system is designed to work on a touch tone dialing or a pulse dialing phone line. When it dials a number, the first digit is sent out as a tone. If there isn't a gap of a few milliseconds after the tone, the Auto Dialer assumes that the phone line is a pulse dialing line.

The Auto Dialer could not dial outside the Fermilab phone network because the Centrex phone system used is extremely fast. There is no gap in the dial tone after dialing a 9 to get an outside line. The Auto Dialer would then proceed to dial the number over using pulse dialing which would of course be the wrong number, since the first digit would be dialed twice. The Auto Dialer with a touch tone line, at Fermilab is limited to lab pagers and lab extensions.

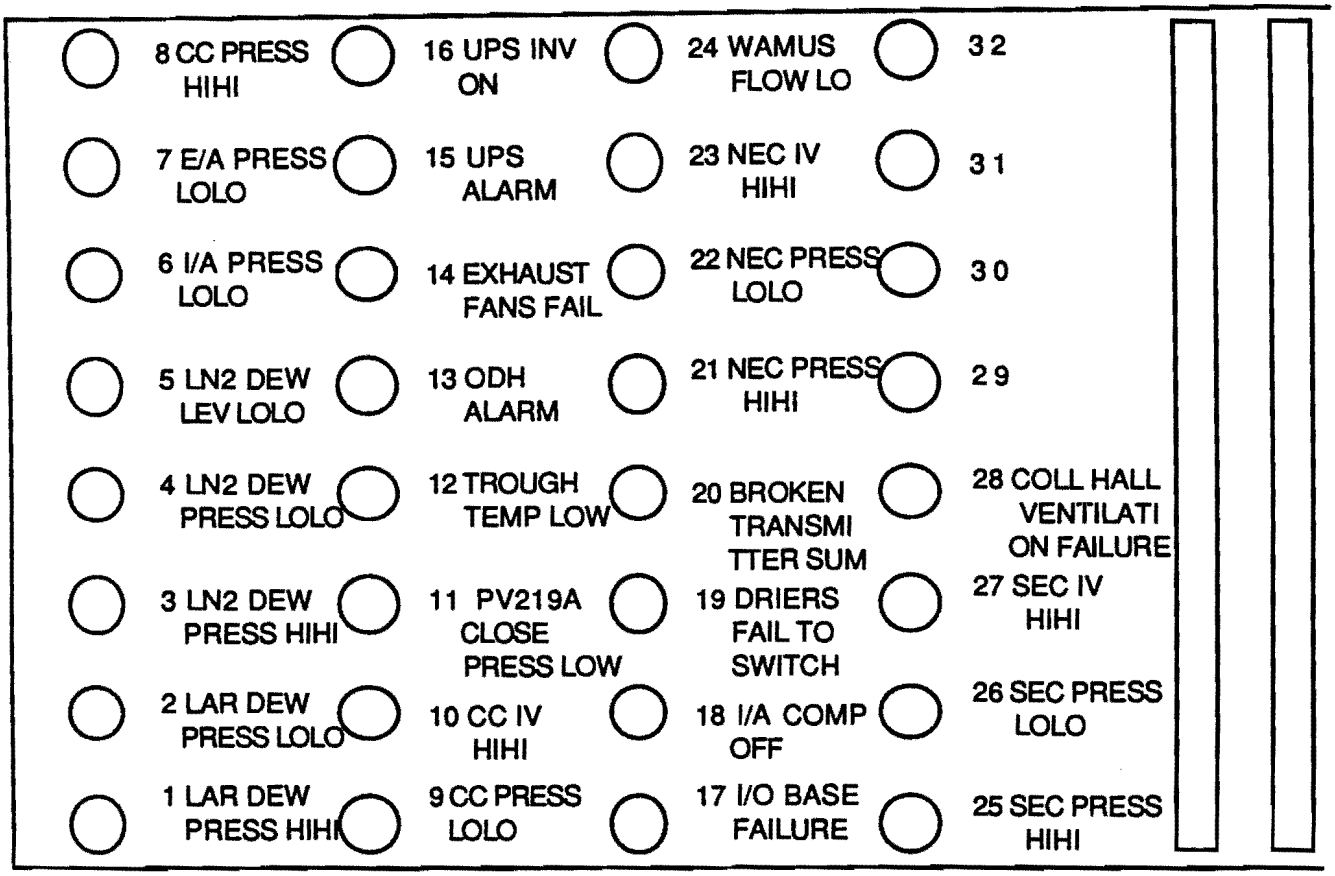
This dialing problem was solved by having Illinois Bell change the phone line to a pulse dial only. Everytime the Auto Dialer dials a number it switches to pulse dialing after the first digit is dialed. Now that the first tone digit is invisible to the phone network, redialing of the number in pulse dialing works correctly.

The Auto Dialer can now dial lab pagers, lab extension, and any number outside the lab with a pulse dialing telephone line. The Auto Dialer cannot dial a long distance pager. The long distance pager requires a touch tone dialing system in order to work.

## Currently Programmed Auto Dialer Messages:

| CH # | Voice Synthesized Message |
|---|---|
| 1. | L A R tank pressure high. |
| 2. | L A R tank pressure low. |
| 3. | L N 2 tank pressure high. |
| 4. | L N 2 tank pressure low. |
| 5. | L N 2 tank level low. |
| 6. | Compressor air pressure low. |
| 7. | Emergency air pressure low. |
| 8. | C C tank pressure high. |
| 9. | C C tank pressure low. |
| 10. | C C I V pressure high. |
| 11. | Cold valve pressure low. |
| 12. | Temperature device cold.(Trough Temperature) |
| 13. | O D H alarm. |
| 14. | Air flow device failure. (Ventilation) |
| 15. | U P S alarm. (Parameter Alarm) |
| 16. | U P S power on. (Inverter On) |
| 17. | I O base failure. (Blown Fuse) |
| 18. | Air compressor failure. (Off) |
| 19. | Air Treatment failure. (Air Drying System) |
| 20. | Analog fault. (Transmitter Failure) |
| 21. | North tank pressure high. |
| 22. | North tank pressure low. |
| 23. | North IV pressure high. |
| 24. | Detector gas flow low. |
| 25. | South tank pressure high. |
| 26. | South tank pressure low. |
| 27. | South IV pressure high. |
| 28. | Building air flow failure. |
| 29. | Unused. |
| 30. | Unused. |
| 31. | Unused. |
| 32. | Unused. |

# DØ AUTO DIALER




**CALL LISTS**

CRYO

1) DM PAGE
2) RR PAGE
3) KK PAGE
4) CDF PAGE
5) DM HOME
6) RR HOME
7) KK HOME
8) DØ C.R.

WAMUS

1) DØ C.R.
2) CDF PAGE
3) KK PAGE
4) DM PAGE
5) JB HOME
6) RP HOME
7) KK HOME
8)

**CURRENT SETTINGS**

1) MESSAGE REPEAT=2
2) INTERCALL DELAY=60MINS
4) BYPASS TO RUN=60MINS
5) CALLING HOURS=24
6) ACCESS CODE=1,2,3,4
7) POWER FAIL MON=DISABLED
8) TIME BETWEEN CALLS=5MINS

**PRIORITY**

1) ODH
2) CC PRESS HH +LL
2) CC IV PRESS HH
3) ALL THE REST
4) WAMUS GAS SYS

**TO ACKNOWLEDGE AN ALARM**

1) ON PHONE PUNCH "8" WHEN ASKED FOR ACKNOWLEDGEMENT
OR
2) CALL UP BETWEEN OUT CALLS. (840-8065)WHEN THE LINE
OR RINGS IT'S ACKNOWLEDGED
3) PUNCH "RESET"(PUTS IN BYPASS)
DON'T FORGET TO PUT IN RUN MODE WHEN
CONDITION CLEARS. IT WILL AUTOMATICALLY
GO BACK TO RUN MODE IN 60MINS IF YOU DON'T.

CALL IN CODES

RUNMODE=(2,7)
BYPASS =(2,2)
PREVIOUS
MODE =(2,3)
VERIFY =(*)
PROGRAM=(#)
DIAL OUT=(3)

**TO PUT IN SERVICE PUNCH "RUN" ON KEYPAD**

Mon 08/03 13:18  Answering Incoming Call
Mon 08/03 13:19  System Placed In Remote Mode
Mon 08/03 13:24  System Placed In Run Mode
Mon 08/03 13:24  Terminating Incoming Call
Mon 08/03 13:25  System Placed in Bypass Mode
System: ADAS 3000 - V4.0
Date & Time: Mon 08/03 13:25
Answer Delay: 02 rings
Message Repeats: 02
Call Acknowledge Delay: 05 min.
Intercall Delay:  0060 min.
[illegible] to Bypass Delay: 01 hrs.
Calling Time:  0000 until  2359
Access Code: 1234
Station ID Phrase: 135 --- 000
Bistable Alarm Recognition Delay:  0005 sec.
Power Fail Recognition Delay:  0012 sec.
System Configuration:
    Discrete Channels: 32
    Analog Channels:  0
    Output Channels:  0
    Remote Telephone Access
    Touch-Tone Dialing
    Local Printer

| List | Phonenumber | |
|---|---|---|
| 1.1 | 72992// | D.M PAGE |
| 1.2 | 72527// | RR PAGE |
| 1.3 | 721509// | KK PAGE |
| 1.4 | 721387// | CRYO PAGE |
| 1.5 | 918157411521 | D.M HOME |
| 1.6 | 918153933314 | RR HOME |
| 1.7 | 98304009 | KK HOME |
| 1.8 | 8800 | MAIN CR |
| 2.1 | 72992// | |
| 2.2 | 72527// | |
| 2.3 | 721509// | |
| 2.4 | 721387// | |
| 2.5 | 918157411521 | |
| 2.6 | 918153933314 | |
| 2.7 | 98304009 | |
| 2.8 | 8800 | |

| | | |
|---|---|---|
| 3.1 | 72992// | |
| 3.2 | 72527// | |
| 3.3 | 721509// | |
| 3.4 | 721387// | |
| 3.5 | 918157411521 | |
| 3.6 | 918153933314 | |
| 3.7 | 98304009 | |
| 3.8 | 8800 | |
| 4.1 | 8800 | MAN C.R. |
| 4.2 | 72387// | CRYO PAGE |
| 4.3 | 72509// | KK PAGE |
| 4.4 | 72992// | D.M. PAGE |
| 4.5 | 92327105 | JB Home |
| 4.6 | 99040035 | RP Home |
| 4.8 | 98304009 | KK Home |
| 6.7 | ~~97597955~~ | |

Power Fail Status

List CC

Bistable Status

| ## | List | CC | Phrase |
|---|---|---|---|
| 1 | 3A | Y | 184 095 233 268 225 039 |
| 2 | 3A | Y | 184 095 233 268 225 043 |
| 3 | 3A | Y | 184 204 002 268 225 039 |
| 4 | 3A | Y | 184 204 002 268 225 043 |
| 5 | 3A | Y | 184 204 002 268 189 043 |
| 6 | 3A | Y | 129 100 225 043 |
| 7 | 3A | Y | 146 100 225 043 |
| 8 | 2A | Y | 116 116 268 225 039 |
| 9 | 2A | Y | 116 116 268 225 043 |
| 10 | 2A | Y | 116 116 173 282 225 039 |
| 11 | 3A | Y | 127 283 225 043 |
| 12 | 3A | Y | 269 070 127 |
| 13 | 1A | Y | 210 135 168 030 |
| 14 | 3A | Y | 100 157 070 154 |
| 15 | 3A | Y | 276 216 245 030 |
| 16 | 3A | Y | 276 216 245 050 076 |
| 17 | 3A | Y | 173 210 110 154 |
| 18 | 3A | Y | 100 129 154 |
| 19 | 3A | Y | 100 273 154 |
| 20 | 3A | Y | 086 038 |
| 21 | 2A | Y | 207 268 225 039 |
| 22 | 2A | Y | 207 268 225 043 |
| 23 | 2A | Y | 207 173 282 225 039 |
| 24 | 4A | Y | 162 157 043 |
| 25 | 2A | Y | 261 268 225 039 |
| 26 | 2A | Y | 261 268 225 043 |
| 27 | 2A | Y | 261 173 282 225 039 |
| 28 | 2A | Y | 115 100 157 154 |
| 29 | 1A | Y | 038 020 009 |
| 30 | 1A | Y | 038 021 |
| 31 | 1A | Y | |
| 32 | 1A | Y | 038 021 002 |

# AUTO DIALER

| | | | | |
|---|---|---|---|---|
| 1)ARGON DEW PRES | HH | 20.0 | 23.0 | ENA |
| 2)ARGON DEW PRES | LL | 20.0 | 18.0 | ENA |
| 3)LN2 DEW PRES | HH | 50.8 | 70.0 | ENA |
| 4)LN2 DEW PRES | LL | 50.8 | 38.0 | ENA |
| 5)LN2 DEW LEVEL | LL | 43.7 | 20.0 | ENA |
| [illegible] | LL | 98.8 | 76.0 | ENA |
| [illegible] | LL | 1393 | 1000 | ENA |
| 8)CC PRESSURE | HH | 20.0 | 22.0 | ENA |
| 9)CC PRESSURE | LL | 20.0 | 19.0 | ENA |
| 10)CC INSULVAC | HH | 0.4 | 0.6 | ENA |
| 21)MEC PRESSURE | HH | 20.0 | 22.0 | ENA |
| 22)MEC PRESSURE | LL | 20.0 | 19.0 | ENA |
| 23)MEC INSULVAC | HH | 0.4 | 0.6 | ENA |
| [illegible] | HH | 20.0 | 22.0 | ENA |
| [illegible] | LL | 20.0 | 19.0 | ENA |
| [illegible] | HH | 0.4 | 0.6 | ENA |

| | | |
|---|---|---|
| 13) ODH | NORMAL | ENABLED |
| 12) TROUGH TEMPERATURE | NORMAL | ENABLED |
| 13) EF6 (LARGE FAN) | NORMAL | ENABLED |
| 14) EF7 (SMALL FAN) | NORMAL | ENABLED |
| 15) UPS PARAMETERS | NORMAL | ENABLED |
| 16) UPS INVERTER SIGT | OFF | ENABLED |
| 11) PV219A HE PRESSURE | CLOSE | ENABLED |
| 17) I/O BASE/MODULE | NORMAL | ENABLED |
| 18) I/O COMPRESSOR | OFF | DISABLE |

| 20) BROKEN TRANSMIT | | | | |
|---|---|---|---|---|
| CC | LN2 DEW | LARD | NORMAL | ENABLED |
| ECN | ECS | I/A | | |
| 19) DRYER SWITCHING | | | NORMAL | ENABLED |
| 29) COLLISION AVOIDANCE | | | NORMAL | ENABLED |

Refreshing display, please wait...

Enter new value/data:

DISP: AD

ENABLE

I/O MAP, 7/30/92

| BASE | SLOT/PT | I/O TYPE | ADDRESS | TAG | DESCRIPTION | J.B. R/C | SEX |
|---|---|---|---|---|---|---|---|
| 1 | 8/1 | RELAY OUT | Y737 | | ODH ALARM - AUTO DIALER CH 13 | DIRECT | CLS ON ALARM |
| 1 | 8/2 | RELAY OUT | 738 | | EXHAUST FANS FAIL - AUTO DIALER CH 14 | DIRECT | CLS ON ALARM |
| 1 | 8/3 | RELAY OUT | 739 | | UPS ALARM - AUTO DIALER CH 15 | DIRECT | CLS ON ALARM |
| 1 | 8/4 | RELAY OUT | 740 | | UPS INVERTER ON - AUTO DIALER CH 16 | DIRECT | CLS ON ALARM |
| 1 | 8/5 | RELAY OUT | 741 | | BROKEN TRANSMITTER ALARM - AUTO DIALER CH 20 | DIRECT | CLS ON ALARM |
| 1 | 8/6 | RELAY OUT | 742 | | DRIERS FAILED TO SWITCH - AUTO DIALER CH 19 | DIRECT | CLS ON ALARM |
| 1 | 8/7 | RELAY OUT | 743 | | I/A COMPRESSOR OFF - AUTO DIALER CH 18 | DIRECT | CLS ON ALARM |
| 1 | 8/8 | RELAY OUT | 744 | | I/O BASE FAILURE - AUTO DIALER CH 17 | DIRECT | CLS ON ALARM |
| 1 | 9/1 | RELAY OUT | Y745 | | CC PRESSURE LOLO - AUTO DIALER CH 9 | DIRECT | CLS ON ALARM |
| 1 | 9/2 | RELAY OUT | 746 | | CC IV HIHI - AUTO DIALER CH 10 | DIRECT | CLS ON ALARM |
| 1 | 9/3 | RELAY OUT | 747 | | PV219A CLOSE PRESSURE LOW - AUTO DIALER CH11 | DIRECT | CLS ON ALARM |
| 1 | 9/4 | RELAY OUT | 748 | | TROUGH TEMPERATURE LOW - AUTO DIALER CH 12 | DIRECT | CLS ON ALARM |
| 1 | 9/5 | RELAY OUT | 749 | | PV119A CLOSE PRESSURE LOW - AUTO DIALER CH 24 | DIRECT | CLS ON ALARM |
| 1 | 9/6 | RELAY OUT | 750 | | NEC IV HIHI - AUTO DIALER CH 23 | DIRECT | CLS ON ALARM |
| 1 | 9/7 | RELAY OUT | 751 | | NEC PRESSURE LOLO - AUTO DIALER CH 22 | DIRECT | CLS ON ALARM |
| 1 | 9/8 | RELAY OUT | 752 | | NEC PRESSURE HIHI - AUTO DIALER CH 21 | DIRECT | CLS ON ALARM |
| 1 | 10/1 | AO 4-20ma | Y753 | | LN2 DEWAR LEVEL LOLO - AUTO DIALER CH 5 | DIRECT | CLS ON ALARM |
| 1 | 10/2 | AO 4-20ma | 754 | | I/A PRESSURE LOLO - AUTO DIALER CH 6 | DIRECT | CLS ON ALARM |
| 1 | 10/3 | AO 4-20ma | 755 | | E/A PRESSURE LOLO - AUTO DIALER CH 7 | DIRECT | CLS ON ALARM |
| 1 | 10/4 | AO 4-20ma | 756 | | CC PRESSURE HIHI - AUTO DIALER CH 8 | DIRECT | CLS ON ALARM |
| 1 | 10/5 | AO 4-20ma | 757 | | SEC PRESSURE HIHI - AUTO DIALER CH 25 | DIRECT | CLS ON ALARM |
| 1 | 10/6 | AO 4-20ma | 758 | | SEC PRESSURE LOLO - AUTO DIALER CH 26 | DIRECT | CLS ON ALARM |
| 1 | 10/7 | AO 4-20ma | 759 | | SEC IV HIHI - AUTO DIALER CH 27 | DIRECT | CLS ON ALARM |
| 1 | 10/8 | AO 4-20ma | 760 | | PV319A CLOSE PRESSURE LOW - AUTO DIALER CH 28 | DIRECT | CLS ON ALARM |
| 1 | 11/1 | RELAY OUT | Y761 | | LAR DEWAR PRESSURE HIHI - AUTO DIALER CH 1 | DIRECT | CLS ON ALARM |
| 1 | 11/2 | RELAY OUT | 762 | | LAR DEWAR PRESSURE LOLO - AUTO DIALER CH 2 | DIRECT | CLS ON ALARM |
| 1 | 11/3 | RELAY OUT | 763 | | LN2 PRESSURE HIHI - AUTO DIALER CH 3 | DIRECT | CLS ON ALARM |
| 1 | 11/4 | RELAY OUT | 764 | | LN2 PRESSURE LOLO - AUTO DIALER CH 4 | DIRECT | CLS ON ALARM |