Galdor Secotec Ltd.
Integrated Security systems

MUPDS-1000
UPDS-2000
MUPDS-3000

CMS & HWS FIELD CONTROLLERS

PRODUCTS
SPECIFICATIONS

MN-0240-45838-B
Galdor –Secotec Ltd.

February 2007

Approved by	Remarks	Date	Version
Yehuda	Rearranged	01/08/2007	45838-B

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1. General

The **UPDS** system is a unique technology that was developed for the Israel Defense Forces to counter terrorist infiltration since the 1970's.

The original models and the updated state of the art today's version system have been installed at public and private sites in Israel and many countries all over the world.

The idea of the development was to have an underground sensor which will be based on the following requirements:

- Concealed system.
- Passive system.
- Suitable to all ground and weather conditions.
- With minimum false alarms due to environment conditions.
- With 100% probability of detection for an armed intruder.

Since the 1970's the system technology was continuously developed to have better sensitivity, reliability and modern communication.

UPDS systems are the latest model comprising all proven feature with a stated of the art of signal processing and communication.

The product includes all improvements to meet **CE** standard to improve the immunity of the Field Controllers and communication hardware to meet the requirement of **EMC** (Electro Magnetic Compatibility) directive.

The outstanding system features are as following:

- Full concealed and passive.
- A wide rang of Sensor Cable Types, Rugged steel armored sensor cable or regular **NYY PVC** direct buried cable.
- Rugged Field Controller that meets all severe conditions for under ground installation.

Effective operation under any type of ground, concrete, asphalt roads, runways, vegetation, between trees and even under water, snow and ice.

- Sensor Cable with Multi Winding Configuration with different detection profile including narrow loop for on top of wall installation.
- Effective operation in mountain Terrain & underwater installation.
- Coverage of up to 1,200 m' protection by one Field Controller.
- Microprocessor based signal processing including: adaptive sensitivity, auto calibrations, smart diagnostics tools, remote test and customize configuration base on flash memory.
- Computerized Field Test Unit.
- Multiplex computerized communication by using **CMS** configuration.

Modular standard system with coverage of up to 50 km with a single computerized control center.

In **CMS** configuration there are two types of communication:
CMS with RS-485 M4000 communication **UPDS** Field Controller.
Or
CMS with Delta Modulation M4000 communication **UPDS** only.

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1.1. UPDS Field Controllers

The following are the standard **UPDS** Field Controller, Test Unit software and their types No.: **GD-9001-45967-B**

UPDS & M-UPDS Characteristics

Catalog& Item No.	Group Name. & Type no.	System Configuration	Power	Net Weig.	Test Comm.	Inhibit Comm.	Direc. In-Out
45760-B	**M-UPDS-1000**		20-48VDC 5W 20-72VDC 5W	9Kg			
1	1MUPDS650	CMS Delta Modulation Double loop 3ch' 3 Zones			Yes	Yes	Yes
2	1MUPDS630	HWS Double loop 3ch' 3 Zones			Yes	Yes	Yes
3	1MUPDS660	CMS Delta Modulation Double loop 2ch' single zone			Yes	Yes	Yes
4	1TUPDS1000	Test unit Double loop 3ch					
45693-B	**UPDS-2000**		20-48VDC 3W	2Kg			
1	1UPDS1100	HWS Single Loop 1ch' Single zone			No	Yes	No
2	1UPDS1200	CMS RS-485 Single Loop 1ch' Single zone			yes	Yes	No
3	1UPDS2000	HWS Single Loop 2ch' Two zones			No	Yes	No
4	1UPDS4000	CMS RS-485 Single Loop 2ch' Two zones			yes	Yes	No
5	1TUPDS2000	Test unit Single Loop 2ch'					
45954-B	**M-UPDS-3000**		20-48VDC 5W	2.5Kg			
1	1MUPDS800	CMS RS-485 Double loop 3ch' Two zones			Yes	Yes	Yes
2	1MUPDS900	CMS RS-485 Double loop 2ch' Single zone			Yes	Yes	Yes

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Catalog& Item No.	Group Name. & Type no.	System Configuration-Product description	Power	Net Weig.	Test Comm.	Inhibit Comm.	Direc. In-Out
3	1TUPDS3000	Test unit Double loop 3ch'					
	UPDS-Inhibitor						
1	1UPDSIN100	CMS Delta Modulation	20-48 VDC 3W 20-72 VDC 3W	7Kg	Yes	No	No
2	1UPDSIN200	HWS	20-48 VDC 3W	1.8Kg	No	No	No
3	1UPDSIN300	CMS RS485	20-48VDC 3W	1.8Kg	yes	No	No
	UPDS-MUPDS Accessories						
1		Power Protection Kit (Isolation Transformer and Burst & Surge protection unit)					
2		Power Starter Card					
3		Power Cable End of Line unit					
4		Power supply 48-VDC 3-Amp.					
5		Sensor Cable Connection Kit					
6		Data Cable Connection Kit					
7		Grounding Stake					
8							

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1.2. The Detection Loops and/or poles

The Detection Loops and/or poles, which are connected to the Field Controller detection channels, can be in three configurations:

1.2.1. Single Loop

Each single Detection Loop connected to one Field Controller detection channel to create alarm zone.

1.2.2. Double Loop Poles

Each alarm zone covered by two detection loops which are close and parallel to each other.

1.2.3. Single Poles

Each single Line Detection Pole connected to one Field Controller detection channel to create alarm zone.

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1.3. UPDS Sensor cable and Poles Optional

Option	Cable type & description	Loop configuration	Resistance of each wire (R wire Ω/km)	Max Resistance for each loop (R max. Ω)	Max. length of each loop (L loop m')	Max. cable length for each loop (L t m')	Recommended max. loop length (m')
1.	Armored 4x1.5 mm² type 4CBL1040	4 Windings (N=4) Sub loop size 4m'x1.2m' (f=2.6)	13Ω/km	Max. 100Ω	738 m'	1,920 m'	600 m'
2.	Armored 4x0.5 mm² type 4CBL1044	4 Windings (N=4) Sub loop size 4m'x1.2m' (f=2.6)	33.14Ω/km	Max. 100Ω	290 m'	754 m'	250 m'
3.	Shielded NYY cable 4x22AWG type 4CBL1049	4 Windings (N=4) Sub loop size 4m'x1.2m' (f=2.6)	53Ω/km	Max. 100Ω	181 m'	470 m'	150 m'

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Option	Cable type & description	Loop configuration	Resistance of each wire (R wire Ω/km)	Max Resistance for each loop (R max. Ω)	Max. length of each loop (L loop m')	Max. cable length for each loop (L t m')	Recommended max. loop length (m')
4.	Shielded NYY cable 6x22AWG type 4CBL1003	6 Windings (N=6) Sub loop size 4m'x0.3m' (f=2.15)	53Ω/km	Max. 100Ω	146 m'	314 m'	140 m'
.5	Shielded NYY cable 8x22AWG type 4CBL1021	8 Windings (N=8) Sub loop size 4m'x0.3m' (f=2.15)	53Ω/km	Max. 100Ω	109 m'	235 m'	100 m'
6.	Shielded NYY cable 8x22AWG type 4CBL1021	8 Windings (N=8) Sub loop size 1m'x0.1m' (f=2.2)	53Ω/km	Max 100Ω	109 m'	235 m'	100 m'

Option	Cable type & description	Loop configuration	Resistance of each wire (R wire Ω/km)	Max Resistance for each loop (R max. Ω)	Max. length of each loop (L loop m')	Max. cable length for each loop (L t m')	Recommended max. loop length (m')
7.	Pole Detection type 1MPL1003	---------	1.45 Ω/Pole	Max per zone 100Ω	-----	-----	130 m'

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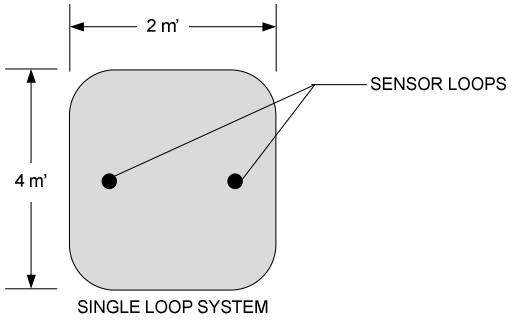
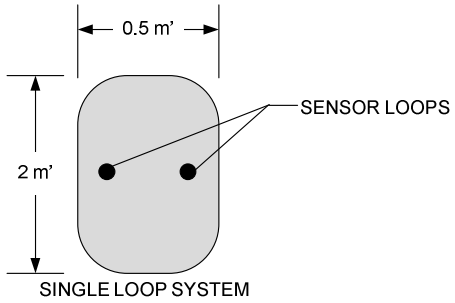
Formulas for calculations of Sensor parameters.

$$Lt\ [m'] = \frac{R\ max\ [\Omega] \times 1{,}000}{R\ wire\ [\Omega/km] \times N} \qquad L\ loop\ [m'] = \frac{L\ t[m']}{f} \qquad f = \frac{Subloop\ length\ (x2)\ [m'] + subloop\ width\ (x2)\ [m']}{Subloop\ length\ [m']}$$

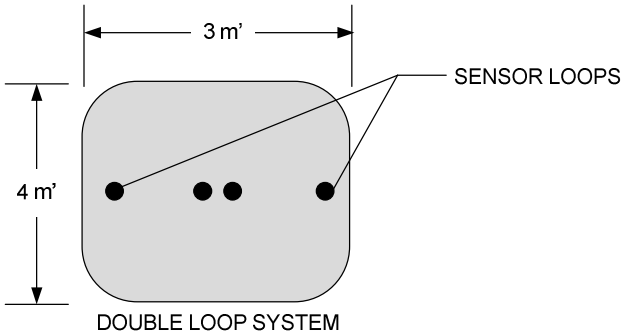
Detection Cross Section



Subloop size 4m'x1.2m'



Subloop size 4m'x0.3m'



Subloop size 4m'x1.2m'

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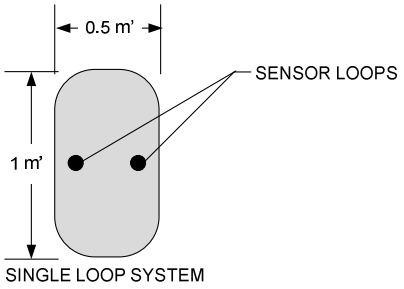

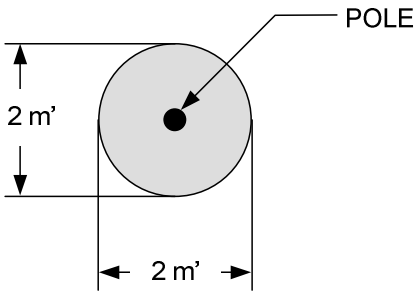

Subloop size 1m'x0.1m'

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2. Principle of Operation

The **UPDS** & **MUPDS** detection systems based on Magnetic Anomaly Detection (**M.A.D**) principle. (Fig 1, Fig 2).

The earth's magnetic field as an outstanding natural phenomenon, allows the unique electronics of **UPDS** systems to sense the change of Earth's magnetic field, due to a movement of ferro magnetic objects crossing sensor cable loops installed underground.

M.A.D permits UPDS & **MUPDS** systems to sense the signal from sensor cable loops, without any additional power except the signal that are generated in the loops due to **M.A.D** principle.

Therefore, the sensor cable loops are completely passive except when **M.A.D** principle is activated by crossing the loops with Ferro magnetic object.

M.A.D permits **UPDS** system to distinguish between actual intruders and stray animals, birds, winds, heavy rain, fog, snow, ice, sand storm and other bad weather conditions which generally trigger other intrusion systems.

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The unique electronics of the field controller to sense small signal in the level of nano volts coming from sensor loop due to **M.A.D** principle.

The **UPDS** & **MUPDS** systems essentially consists three major units:

- Detection System – Field Controller and Detection Loops or Poles.
- Data and power Cable.
- Command & control center.

3. System Description

3.1. Detection System

The detection system consists of 2 main units:

- Field Controller.
- Detection Loops.

3.2. General Description of Detection System

The Field Controller is the heart of **UPDS** system. Each Field Controller controls up to their detection channels as follows:

3.2.1. Single Loop/Pole configuration

A single **UPDS-2000** Field Controller with two detection loops will create a detection system of two zones.
A series of Field Controllers and detection loops in modular construction can create a long line of protection divided into alarm zones up to 600m' long (see the alternative types of sensor cable) .
The out come signals from the Field Controller will transmit via data cable to be displayed in the control center.

3.2.2. Field Controller

Each Field Controller consist the following main sub units: (Fig 6, Fig 7).

- Analog amplifiers and analog signal processing.
- EMI protection unit.
- Microprocessor digital analyzer unit
- **DC to DC** power unit.
- Communication unit.
- Housing and connection receptacle.

The follow are the sub-unit description:

- Analog amplifier and analog signal processing.
  The analog amplifiers and analog signal processing unit consist the following functions:
- EMI Protection
  This protection is an attenuation circuitry which will attenuate any disturbance, constant or transient in between frequencies of 20Hz and 1 GHz. This attenuation will prevent false alarms signal coming from detection loops.
- Test Stimulator
  This function is activated by a Test command coming from the microprocessor via the communication line from the control center.
  This function creates electromagnetic signal directly on the detection loop input, simulating a real intruder signal which test the entire **UPDS** system, starting with the integrity of sensor cable, through the analog amplifier, digital signal processing unit, communication interface, and communication line up to the alarm display at the control center.
- Selective Amplifier
  This function is a unique electronic circuit with ultra low noise features enable to pick up from the detection loop a signal of a few Nano volt.

- Adaptive threshold Control
  This function selects remotely and automatically the threshold signal level which above it will create an event pulse to be processed by the microprocessor.
- EMI Protection Unit
  This unit is a combination of a shielded housing and filtering elements which are encapsulated together to protect the three analog amplifiers and analog signal processing units.
  This unit protects the three analog channels from any direct EMI signal received directly into the analog channels to prevent false alarm.

3.2.3. Signal processing and setup function description

The function of the Digital Signal Processing unit is to process all signals coming from the analog channel and to distinguish between true and false alarms created in the Field Controller. The digital Signal Processing unit designed to have smart sensitivity auto calibration. The Signal processing mechanism will probe continually the sensor field condition and adjust it self to the optimum sensitivity.

3.2.4. Automatic BIT Function

The system has an automatic BIT function which covers the following:

- BIT for the detection unit.
- BIT for the system and Field Controller power supply.
- BIT for the communication line and transponder (**CMS** System).
- BIT for the alarm center (**CMS** System).

3.2.5. Manual Test Function

The system has manual test actuator located at the control room. The operator can activate through the data communication a test generator which is located in each one of the Field Controller.
This test generator generates an electromagnetic signal which is induced to the sensor cable to check the integrity of the whole system starting with the sensor cable, through the analog amplifier, digital signal processing, communication interface, communication line up to the display

3.2.6. Power Requirement

In order to give a design flexibility for optimize power cable size, the different Field Controller operate from 20VDC up to 48VDC (Vin), Which include Surge and Burst Protection. The power supply should be **CE** Standard quality with batteries power backup.

The total power required is less than 5 watt for three channels Field Controller (power required can become different depending on the type of the Field Controller **UPDS** & **MUPDS**).
The Field Controller power supply is converted by the internal **DC to DC** power unit into +/- 12VDC and 6VDC:

The 6VDC is used for the analog amplifier and analog signal processing units. Between the Vin and the internal +/- 12VDC there is a ground separation. This feature is achieved by the **DC to DC** power unit.

3.2.7. Communication Unit

The Field Controller is classified according to the type of the communication units.
Field Controller with computerized multiplex communication unit is defined as **CMS** configuration.
Field Controller with relay outputs hardwire communication unit, is defined as **HWS** configuration.

3.2.7.1. C.M.S Configuration

The **CMS** configuration is based on integration between Field Controller and M4000 communication module.
The module conducts the multiplex communication between the Field Controller and the computerized center.
The M4000 system is the alarm command control for Field Controller system.
The **CMS** configuration classified according to the type of the communication as follows.

3.2.7.2. RS485 Communication

All data transmit or receive is via twisted and shielded pair of wires (data line).
Each **RS-485** communication channel can hold up to 30 Field Controller. With the distance of up to 2-4 Km with the dependency on the number of Field Controller on the Communication line, with additional **M4000 RS-485** Repeaters units or F/O link to field Interface Card the distance can be much longer.

3.2.7.3. Delta Modulation Communication
All data transmitted and received via two twisted shielded pairs.
The Delta Modulation electronic and software protocol designed to hold up to 128 field controllers on each communication channel with distance of 10km'.
Longer distances are available with additional M4000 Delta modulation repeater.

3.2.7.4. H.W.S Configuration

The **HWS** configuration is based on a direct connection between each one of the alarm outputs to a customized control center.
The connection is done via relay contact and multi-core communication cable.
The **HWS UPDS** Controller contains one relay output for each detection channel; the same relay will be activated for any other fault alarm.
The rating of the relay contact is 30VDC 100mA.

4. Electromagnetic Compatibility

Meets all requirements according to **CE** standard **E.M.C.** directive

5. Signal processing and setup function description

The field Controller designed to have smart sensitivity Auto correction. The Signal processing mechanism will probe continually the sensor field condition and adjust it self to the optimum sensitivity.

5.1. Gain control

5.1.1. CMS Configuration

A combination of remote Gain control and the Adaptive Gain mechanism, give the user the ability to control the gain of, each channel separately, to the maximum Gain sensitivity. The Adaptive Gain mechanism will setup automatically the optimum Gain Sensitivity considering of the User selected manual Gain and the System environment conditions.

5.1.2. HWS Configuration

A combination of pre defined Gain level (factory set up) and Adaptive Gain mechanism will setup automatically the optimum Gain Sensitivity.

5.2. Threshold Level Control

5.2.1. CMS Configuration

A combination of remote and pre defined Threshold Level control with the Adaptive Threshold Level mechanism, give the user the ability to control the minimum Threshold Level, for each channel separately. The Adaptive Threshold Level mechanism will setup automatically the optimum Threshold Level Sensitivity considering the User selected manual level and the System environment conditions.

5.2.2. HWS Configuration

A combination of pre defined Threshold level (Test Unit set up) and Adaptive Threshold level mechanism will setup automatically the optimum Threshold level Sensitivity.

5.3.

Event Counting

5.3.1. CMS Configuration

A combination of remote Event Counting control and the Adaptive Event Counting mechanism, give the user the ability to control the sensitivity Event Counting by changing, for each channel separately. The Adaptive Event Counting mechanism will setup automatically the optimum Event Counting Sensitivity considering the User selected manual event counting and the System environment conditions.

5.3.2. HWS Configuration

A combination of pre defined Event Counting (Test Unit set up) and Adaptive Event Counting mechanism will setup automatically the optimum Event Counting Sensitivity.

5.4.

Time Windows

5.4.1. CMS Configuration

Remote control and pre defined (Test Unit set up) united for the two channels.

5.5.

Test function

CMS Remote only

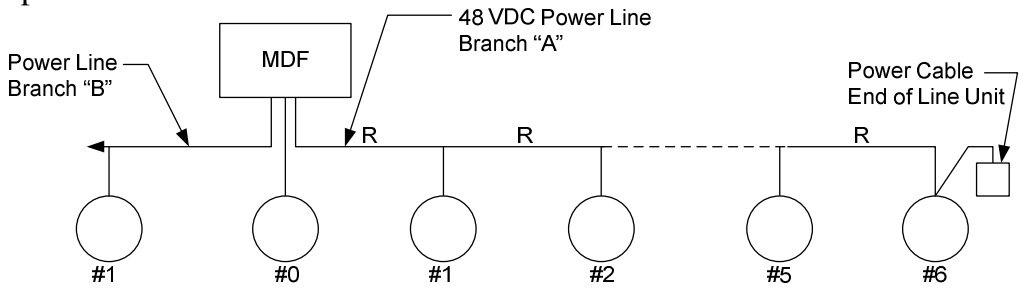
6. Power Requirement

External good quality power source of **48VDC** which include Surge and Burst Protection connected to Power & Data cable coming out of the controller.
Power below **17 VDC** will create a low voltage alarm.
Power supply at the **MDF/IDF** should be **CE** Standard quality with batteries power backup.

7. Power cable

The size of power cable depends on the type of the field controller, the distance of field controller from the MDF along the power line and the number of controllers on each branch.
The following are typical system configuration which including 48VDC, MDF, Power starter card, power line branch A & B and power cable End of Line Unit.
For each option there will be a table with the max resistance of power wires cable which connects each two field controllers – according to the actual distance between controller and the max allow resistance the cable size will be calculated.

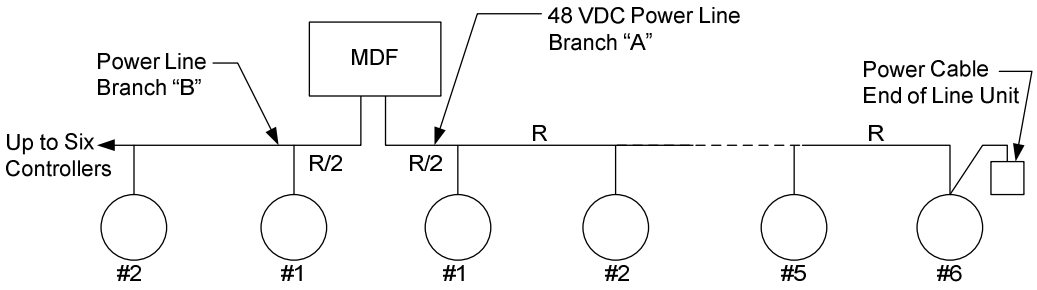
Option #1 MUPDS 3000



This option contains 13 controllers. 6 controllers on each branch and one controller connected directly to the MDF.
The following are the resistance values for a configuration of 5;4;3;2; field controllers on a branch.

No. of controllers on a branch	**Max resistance Ω (between controllers.**
6	5.9
5	7.7
4	11.3
3	17.7
2	30

Option #2 MUPDS 3000



This option contains up to 12 field controllers. 6 controllers on each branch.
The following are the resistance values for a configuration of 5;4;3;2; field controllers on a branch.

No. of controllers on a branch	Max resistance Ω (between controllers.
6	7.5
5	10
4	16
3	26
2	58

8. CMS Controller Alarm Output (M4000 System Inputs)

All alarms including intrusion alarm, electronic fault, sensor fault, Low Voltage and Tamper will be transmitted by the **M-4000 RS-485** or **Delta Modulation** communication to be presented on the color graphic display and/or on the event table.
The **UPDS** uses 2 groups of addresses for each controller. First address for the first group is selected by the user via the DIP switch and the Second address for the second group are calculate automatically by the controller, Second address = [first address + 31].
The address of each alarm event will be as following:

G	Y	A	x	x	x	Z
Plug-in	Interface Number	Comm. Channel	Controller Address			Input Number

Table 2: M4000 Input object for the UPDS outputs

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- The "G" is the M4000 communication plug-in prefix.
- The "Y" represents the number of the Interface card.
- The "A" is the Interface communication channel (can be "A" or "B").
- First 3 digits "xxx" indicate the address of controller (first or second address).
- The Z digit indicates the Input No. 1 to 8.

	Controller Alarm output Description	**M-4000 Event Address**
First Address (Non optional objects)		
1	Intrusion Alarm Channel A	G1AXXX 1 Momentary activated
2	Intrusion Alarm Channel B	G1AXXX 2 Momentary activated
3	Not in use	G1AXXX 3
4	Not in use	G1AXXX 4
5	Low voltage	G1AXXX 5 Constant alarm
6	Tamper Alarm	G1AXXX6 Constant alarm as long tamper is open
7	Technical Fault Channel A: Sensor Cable Cut. General Technical Fault.	G1AXXX 7 Constant or long technical fault or cut
8	Technical Fault Channel B: Sensor Cable Cut.. General Technical Fault.	G1AXXX 8 Constant or long technical fault or cut

Second address (optional objects)		
1	Adaptive Level status channel 1 (bit_0)	G1AXXX 1
2	Adaptive Level status channel 1 (bit_1)	G1AXXX 2
3	Adaptive Level status channel 2 (bit_0)	G1AXXX 3
4	Adaptive Level status channel 2 (bit_1)	G1AXXX 4
5	Adaptive Gain status channel 1 (bit_0)	G1AXXX 5
6	Adaptive Gain status channel 1 (bit_1)	G1AXXX 6
7	Adaptive Gain status channel 2 (bit_0)	G1AXXX 7
8	Adaptive Gain status channel 2 (bit_1)	G1AXXX 8

Table 3: M4000 Inputs Description for the UPDS outputs

NOTE: All second address inputs are use for reporting status of adaptive sensitivity. This address will be use only for the optional system logic.

9. CMS Controller Inputs M4000 (System Outputs)

All **M4000** Outputs including remote sensitivity control, System Test and Aux. outputs, Will be transmitted from **M4000** software via the **M4000 RS485** or **Delta Modulation** communication to the Field Controller.

The **UPDS** uses 2 addresses for each controller. First Address is selected by the user via the DIP switch or by the test unit and the Second address calculate automatically by the controller, Second address = [first address + 31].
The address of each alarm event will be as following:

G	**y**	**A**	**x**	**x**	**x**	**T**	**Z**
Plug-in	Interface Number	Comm. Channel	Controller Address			Always T for Output	Input Number

Table 4: M4000 Output object for the UPDS Inputs

- First 3 digits indicate the address of controller.
- The next fourth digit indicates the Event No. 1 to 8.

The following are the different input functions Events:

	Controller Inputs Description (M4000 Outputs)	**M4000 Event Address**
First Address (Non optional objects)		
1	Event Counting Channel A	G1AXXXT1
2	Event Counting Channel B	G1AXXXT2
3	Time Windows Channel A & B	G1AXXXT3
4	Threshold Level Channel A	G1AXXXT4
5	Threshold Level Channel A	G1AXXXT5
6	Test Command Channel A & B	G1AXXXT6 Momentary activated
7	Threshold Level Channel B	G1AXXX T7
8	Threshold Level Channel B	G1AXXXT8

Second address (optional objects)		
1	Local output 1	G1AXXXT1
2	Local output 2	G1AXXXT2
3	Not in use	G1AXXXT3
4	Gain Control Channel A	G1AXXXT4
5	Gain Control Channel A	G1AXXXT5
6	Gain Control Channel B	G1AXXXT6
7	Gain Control Channel B	G1AXXXT7
8	Reset Adaptive mechanism	G1AXXXT8

Table 5: **M4000** outputs Description for the **UPDS** Inputs

10. Default Processing Parameter for each channel A&B

	Description	Value
1	Inhibiting time after alarm	15 sec
2	Acceptable Max Event Pulse width	5 sec
3	Acceptable Min Event Pulse width	0.24 sec
4	Event pulse width for Constant Alarm output	10 sec (and longer)
5	Rejected Event Pulse	5 sec – 10 sec
6	Power up time	80 sec

Table 6: Processing Parameter

NOTE: all the above parameters can be change to meet an actual detection condition by authorized user for using Galdor computerized test unit & Setup software.

11. Detection Sensitivity Set-Up

11.1. Event Counting -Remote Control & adaptive

The event counting parameter defines how many legal events (see table #6) will be required in the time windows to create an alarm. The user can select the minimum Event counting by setup one of the **M-4000** output for each one of the channel individually (see table No.7).
The Adaptive Event Counting mechanism will setup automatically the optimum Event Counting Sensitivity considering the User choice and the System environment conditions.

XXXT1 (First Address)	**Channel A Event Counting**
OFF	2 (High Sensitivity)
ON	3 (Low Sensitivity)
XXXT2 (First Address)	**Channel B Event Counting**
OFF	2 (High Sensitivity)
ON	3 (Low Sensitivity)

Table 7: Minimum Event Counting - Remote Control Outputs for Com4000XP

11.2. Time Windows – Remote Control only

The user can select the required time windows by setup one of the **M-4000** output. With this output the user will control from remote witch one of the two (2) time windows is active, the selection is between 6 sec up to 9 sec and will set it on the two channels.

XXXT3 (First Address)	**Channels A&B Time WINDOWS**
ON	6 sec (Low Sensitivity)
OFF	9 sec (High Sensitivity)

Table 8: Time Windows - Remote Control Outputs for M4000

11.3. Threshold Level – Remote Control & Adaptive:

The user can select remotely the minimum Threshold level by setup Combination of two (2) **COM-4000** outputs for each channel individually.
The selected Threshold level will be the minimum Threshold Level only for the maximum gain selected by the user.
The Adaptive Threshold Level mechanism will setup automatically the optimum Threshold Level Sensitivity considering the User choice and the System environment conditions.
If the Gain will move down by the adaptive mechanism the Minimum Threshold level will be change automatically accordingly.

XXXT4 (First Address)	**XXXT5 (First Address)**	**Channel A Event Level**
OFF	OFF	1 (High Sensitivity)
ON	OFF	2
OFF	ON	3
ON	ON	4 (Low Sensitivity)
XXXT7 (First Address)	**XXXT8 (First Address)**	**Channel B Event Level**
OFF	OFF	1 (High Sensitivity)
ON	OFF	2
OFF	ON	3
ON	ON	4 (Low Sensitivity)

Table 9: Minimum Threshold Level - Remote Control Outputs for M4000

11.4. Detection Gain Control– Remote Control & Adaptive:

A combination of remote Gain control and the Adaptive Gain mechanism, give the user the ability to control, for each of the Separate channel, the maximum Gain sensitivity. The Adaptive Gain mechanism will setup automatically the optimum Gain Sensitivity with consideration of the User choice and the System conditions.
The user can select the maximum Gain level by setup Combination of two (2) **M-4000** outputs for each channel individually, these two (2) outputs will give the user four (4) Levels of gain option.

	Outputs Address (controller Second Address) Channel A	
Gain Control	**XXXT4**	**XXXT5**
100% Max	OFF	OFF
75% ⇕ Mid 1	ON	OFF
60% Mid 2	OFF	ON
50% Min	ON	ON
	Outputs Address (controller Second Address) Channel B	
Fine Gain Control	**XXXT6**	**XXXT7**
100% Max	OFF	OFF
75% ⇕ Mid 1	ON	OFF
60% Mid 2	OFF	ON
50% Min	ON	ON

Table 10: Detection Gain Control - Remote Control Outputs for M4000

12. CMS Address

Each controller has two (2) addresses "First address" and "Second Address". First address is selected by the user via DIP switch #S1. The address will be defined by 5 switches (1-5) in binary code to give total of 31 addresses 000 up to 030.

The Second Address calculates automatically by the controller by adding 32 to the First address, total sum of 31 addresses 031 up to 061.

The following table shows for each one of the First address its Dip switch #S8 setup and the automatically value of Second Address.

First Address	**Address on #S1.**					**Seconded Address**
	1	2	3	4	5	
0	0	0	0	0	0	31
1	1	0	0	0	0	32
2	0	1	0	0	0	33
3	1	1	0	0	0	34
4	0	0	1	0	0	35
5	1	0	1	0	0	36
6	0	1	1	0	0	37
7	1	1	1	0	0	38
8	0	0	0	1	0	39
9	1	0	0	1	0	40
10	0	1	0	1	0	41
11	1	1	0	1	0	42
12	0	0	1	1	0	43
13	1	0	1	1	0	44
14	0	1	1	1	0	45
15	1	1	1	1	0	46
16	0	0	0	0	1	47
17	1	0	0	0	1	48
18	0	1	0	1	0	49
19	1	1	0	0	1	50

20	0	0	1	0	1	51
21	1	0	1	0	1	52
22	0	1	1	0	1	53
23	1	1	1	0	1	54
24	0	0	0	1	1	55
25	1	0	0	1	1	56
26	0	1	0	1	1	57
27	1	1	0	1	1	58
28	0	0	1	1	1	59
29	1	0	1	1	1	60
30	0	1	1	1	1	61

Table 11: Controller address setup

13. Test unit

The UPDS & MUPDS Test Unit Type **1STSU110** enables the user to test, monitor and update detection parameters of the Field Controller.
(See Test unit user manual document MN-0522-45013-C).

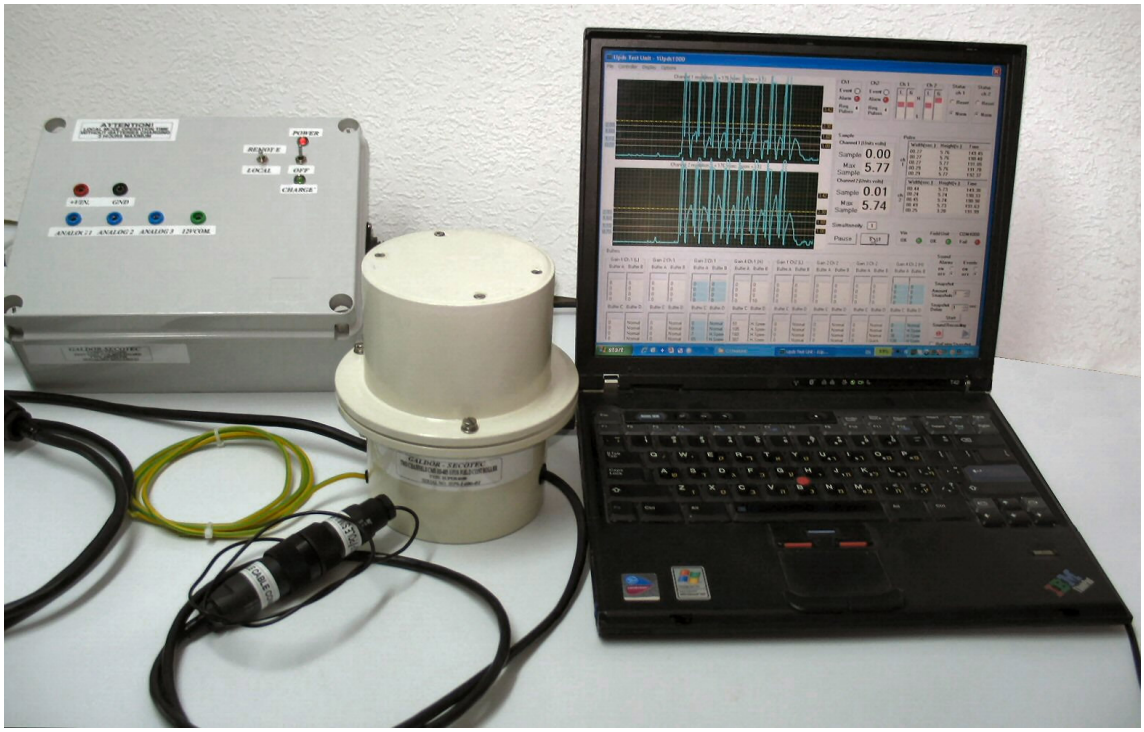

Figure 1: Test Unit Test Setup

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13.1. Test Unit Main Features

Simple connection of Field controllers via operating box to the Test Unit PC serial port enable the user to do all the necessary sensitivity set up while controller is in full system operation. (See Figure 1).

The Test Unit includes up to three channels Real Time Analog & Digital Detection signal display which eliminate the need of voltage measuring device such as DVM or Scope.
The Test Unit enables the user to operate and/or measure the following parameters:

- Voltage – Vin & Internal power (OK/ Fault).
- Real time sample of analog detection signals channel 1 and 2.
- Minimum/Maximum of Analog Detection signals channel 1 and 2.
- Event Pulse channel 1 and 2.
- Alarm channel 1 and 2.
- Faults channel 1 and 2.
- Communication status with the **UPDS**
- View of legal event information.
- Adaptive sensitivity status.
- Activate Test Command.
- Reset the adaptive sensitivity mechanism to Max sensitivity.
- Test unit screen snapshot – manually or by setup of automatic trigger.
- Template: download to controller Microprocessor predefine detection parameters.
- Select operation mode and setup the automatic sensitivity functions of the controller.

14. Test unit PC requirements

The following are minimum PC requirements to install the **UPDS** Test Unit software:

- MS Windows 2000 operating system or higher
- Pentium 4 type processor, 1500 + MHz
- 256 MB RAM
- 20 MB of available hard disk space
- Microsoft Framework 1.1
- DirectX 9

15. Test Command XXXT6 output

Activation of output XXXT6 of the **First address** for duration of 3 up to 6 seconds will activate Test Routine at the controller microprocessor.

16. Drawings

The following drawings are attached:

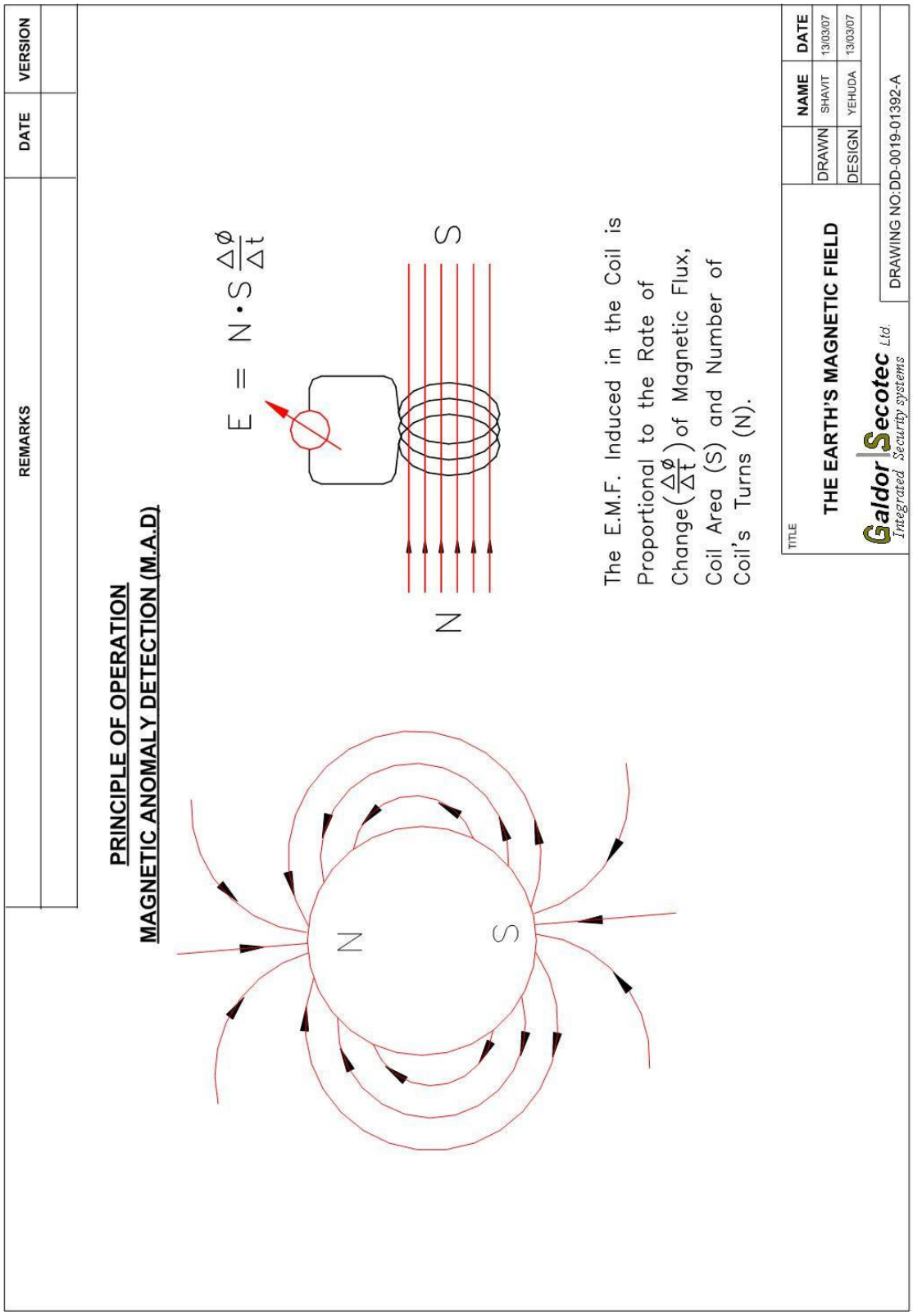

Fig 1: M.A.D Principle of Operation

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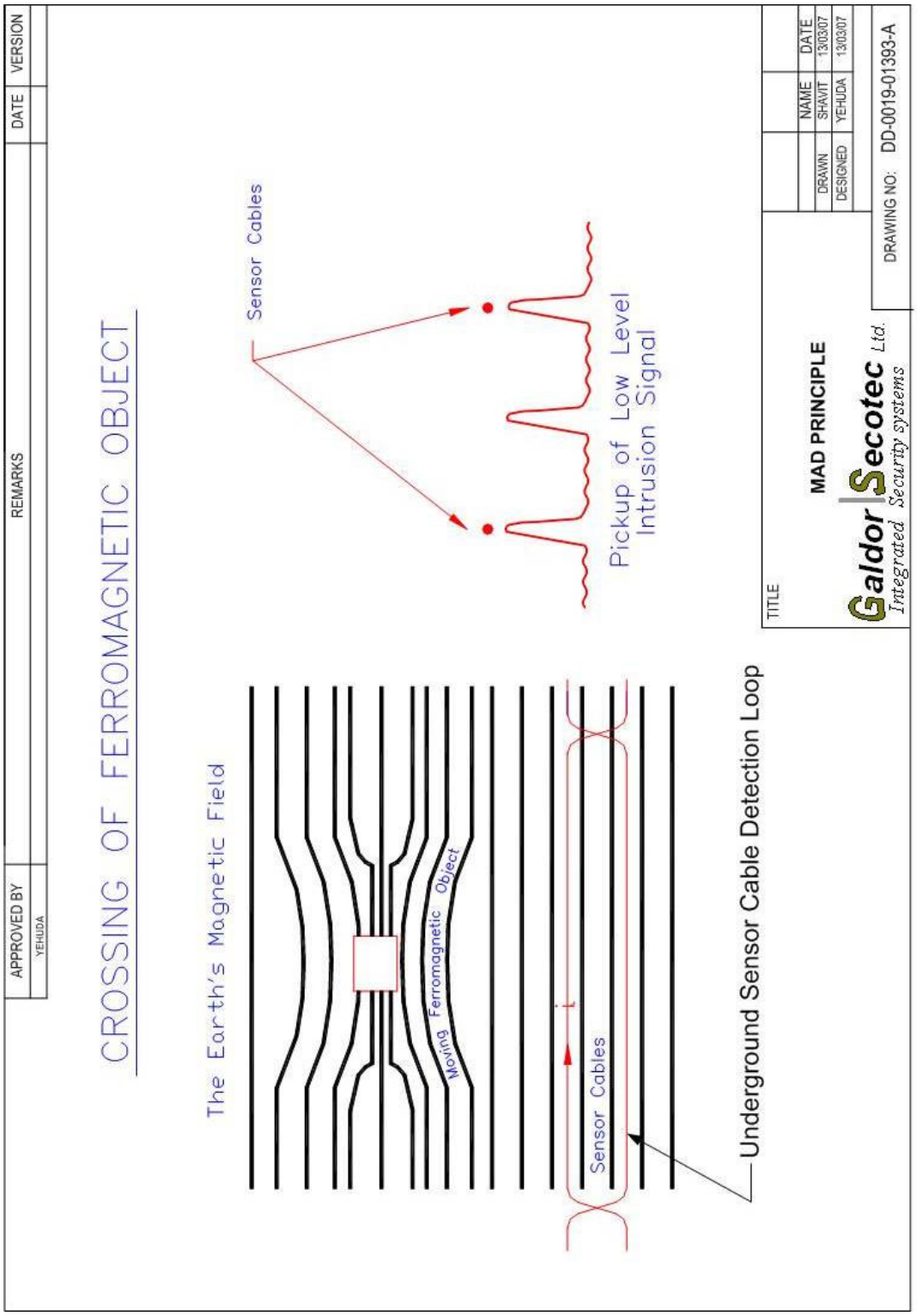

Fig 2: Crossing of Detection Loop by ferromagnetic object

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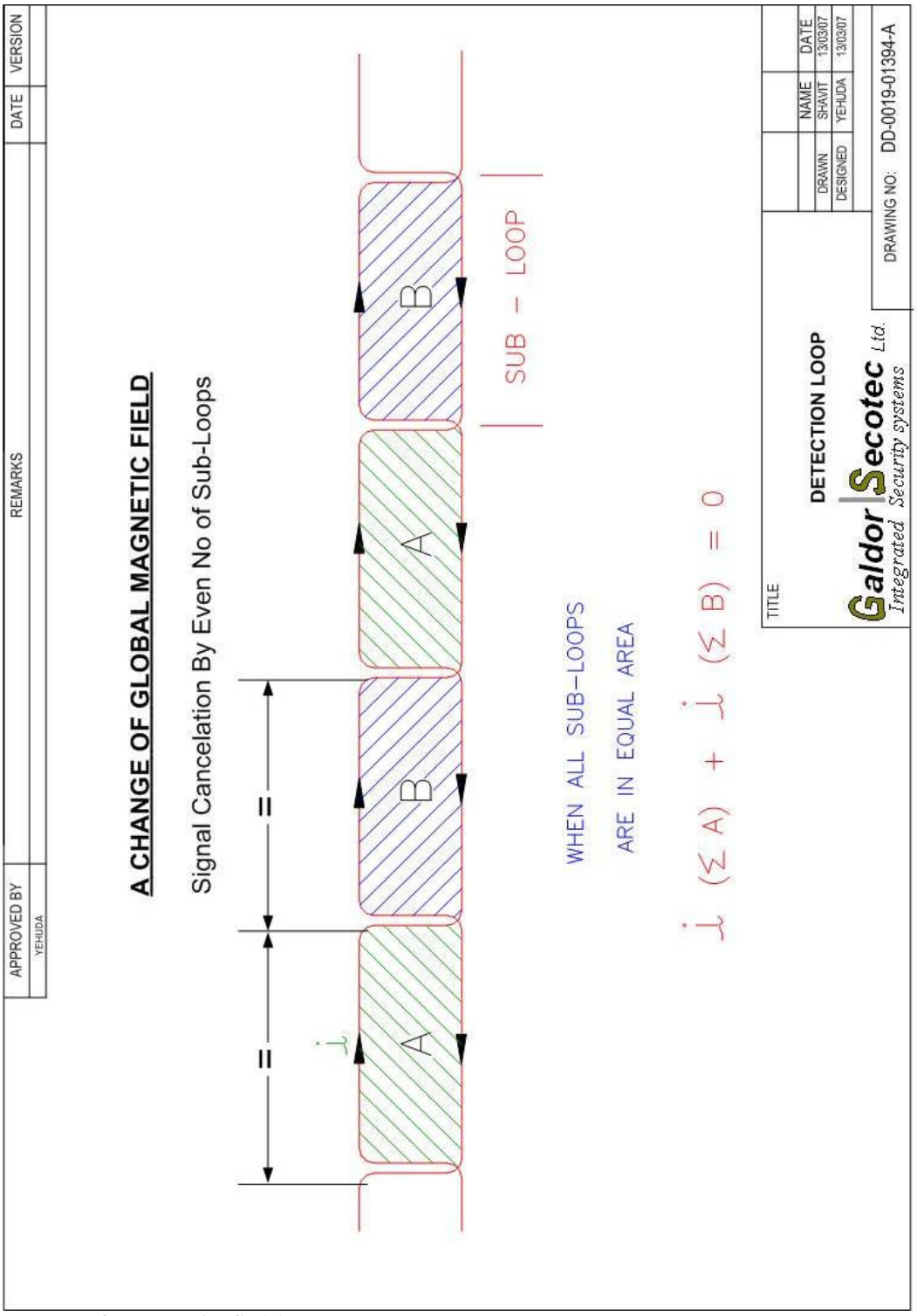

of magnetic field

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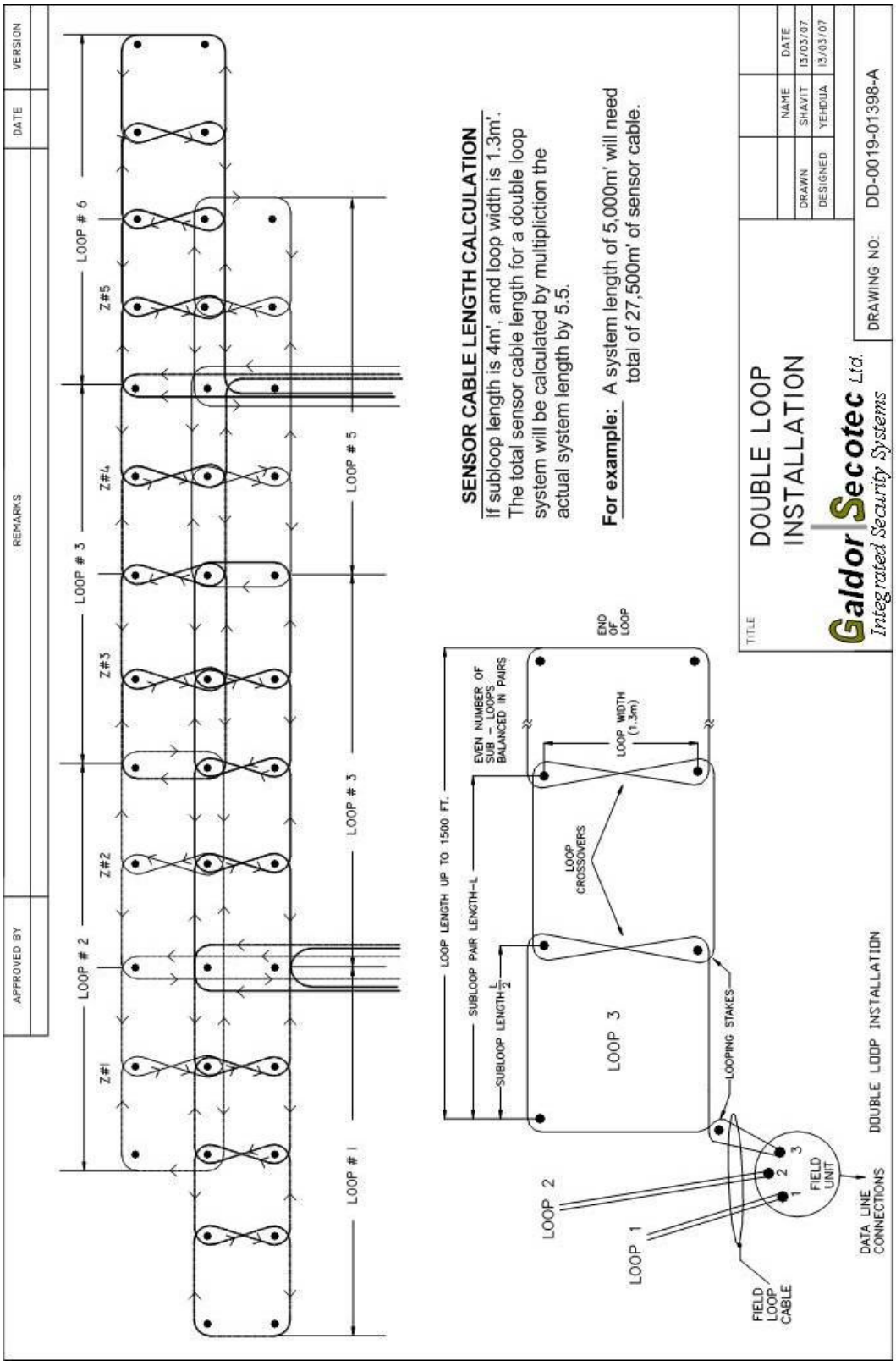

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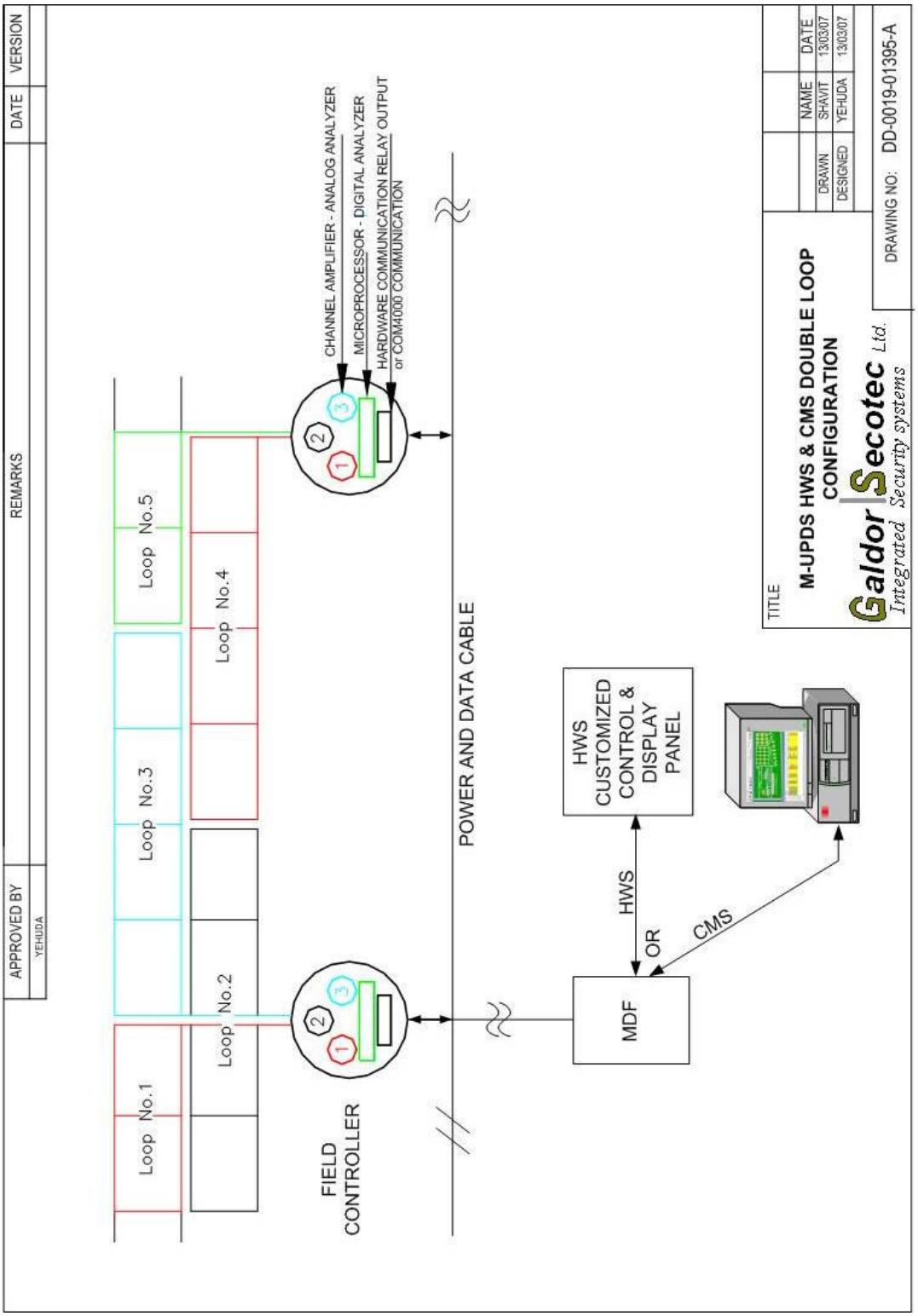

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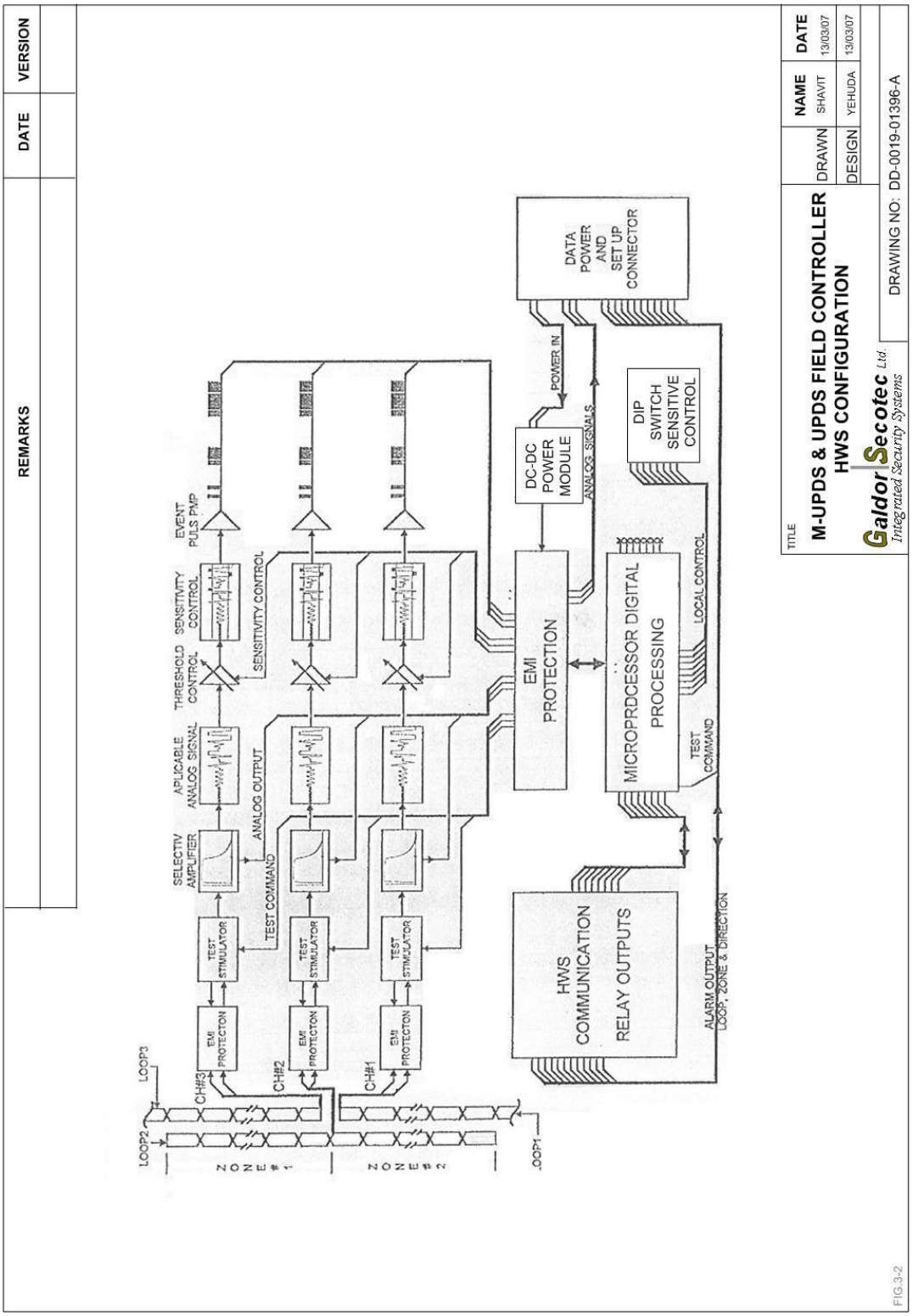

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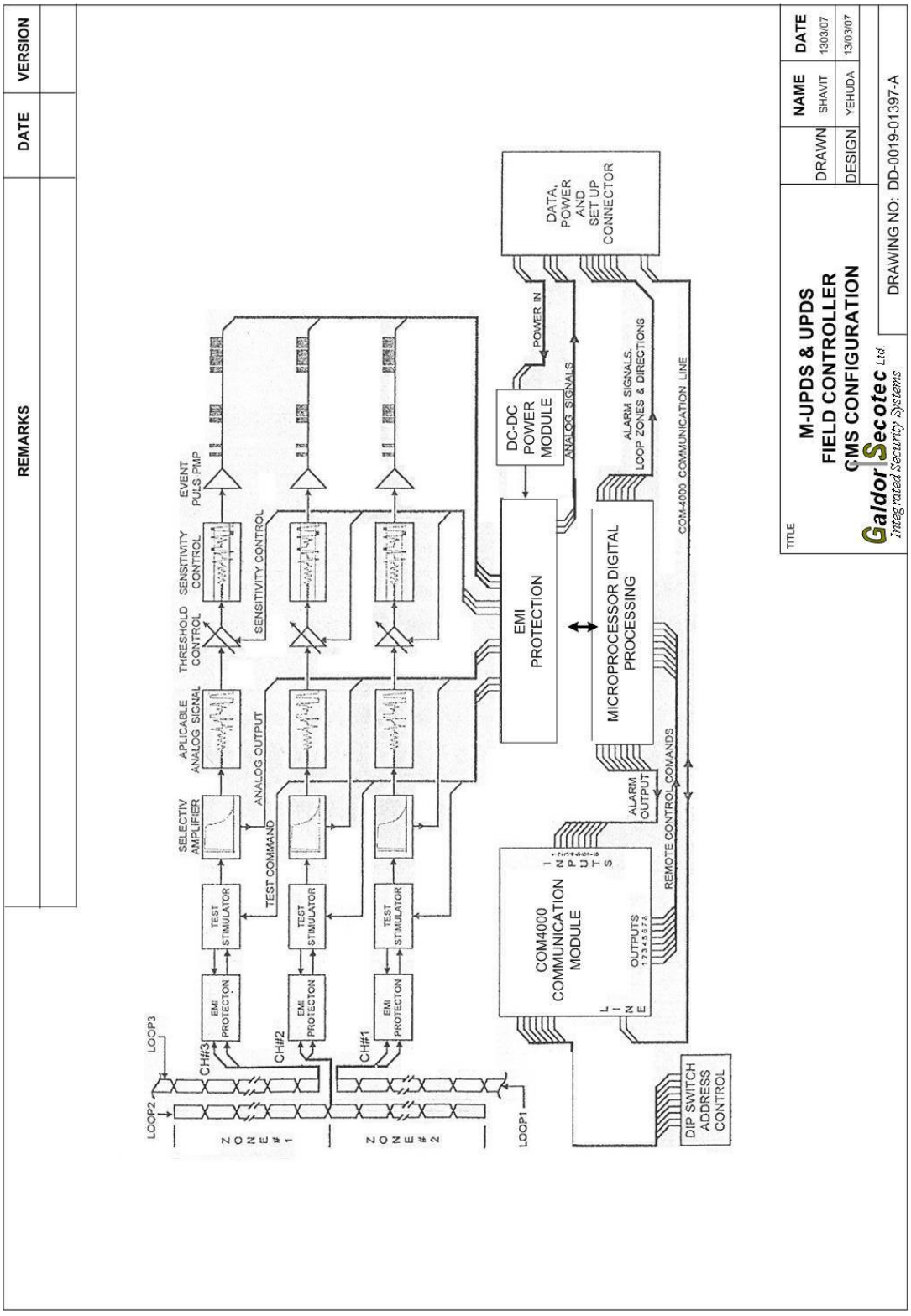

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