

The Dranetz Series 626 Universal Disturbance Analyzer...

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The Only Modular System Capable of Monitoring All Environmental Disturbances in Computer Installations, Industrial Control Systems, Telecommunications Equipment, and Medical Instrumentation.

Computers and computer-related systems now operate everywhere—from clean-room data processing centers, office environments, telephone central offices and power rooms, communication centers, and medical facilities to harsh industrial atmospheres. Common to all these applications is the need to supply AC and DC power to sensitive equipment that is free of sags, surges, under and over-voltages, and impulses. Temperature and humidity must be controlled and maintained within acceptable limits. Alarms, relays, and transfer switches must be monitored and correlated with other disturbances. Future sites must be evaluated for suitable environmental conditions. Test results must be capable of being stored, communicated, analyzed, and recorded.

The Series 626 Universal Disturbance Analyzer, with its versatile system of a portable mainframe and a series of interchangeable, plug-in monitoring modules, together with stand-alone remote monitors, accomplishes all these tasks with high accuracy, resolution, and reliability. The unique distributed processing system architecture of the Series 626, including its ability to fully

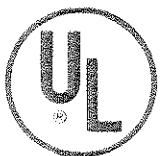
communicate with external devices, permits an operator to configure the exact analysis system required. Yet, the total system remains at all times extremely easy to use, owing to such advanced features as single-button preset programming, prompted setup of custom programs, and retention of all setups until changed by the operator—even if the system is turned off.

Each plug-in module may be added or deleted independently of others. Each is programmed and operated independently of the others. A plug-in may be located in any available mainframe slot—up to a total of five plug-in modules per mainframe—and will identify itself to the mainframe, and the operator, indicating its location and setup procedure. All plug-ins are linked to the mainframe's real-time clock for easy correlation of disturbance events using a common timebase.

In the following pages, the operating convenience and versatility of the Series 626 are fully described, along with detailed specifications and application information. For specific applications, refer to the Selection Guide.

Selection Guide

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The Dranetz Series 626 Universal Disturbance Analyzer...

**Easy to Use, Easy to Understand,
and Easy to Talk To.**

The Series 626 is designed for use by engineers and non-engineers alike. No programming skills are required. Standard factory preset or custom factory preset conditions are entered by a single pushbutton. Manual programming of threshold limits is accomplished by a series of pushbuttons and prompting LEDs. All settings, including the real time clock, are saved even when the Series 626 is turned off.

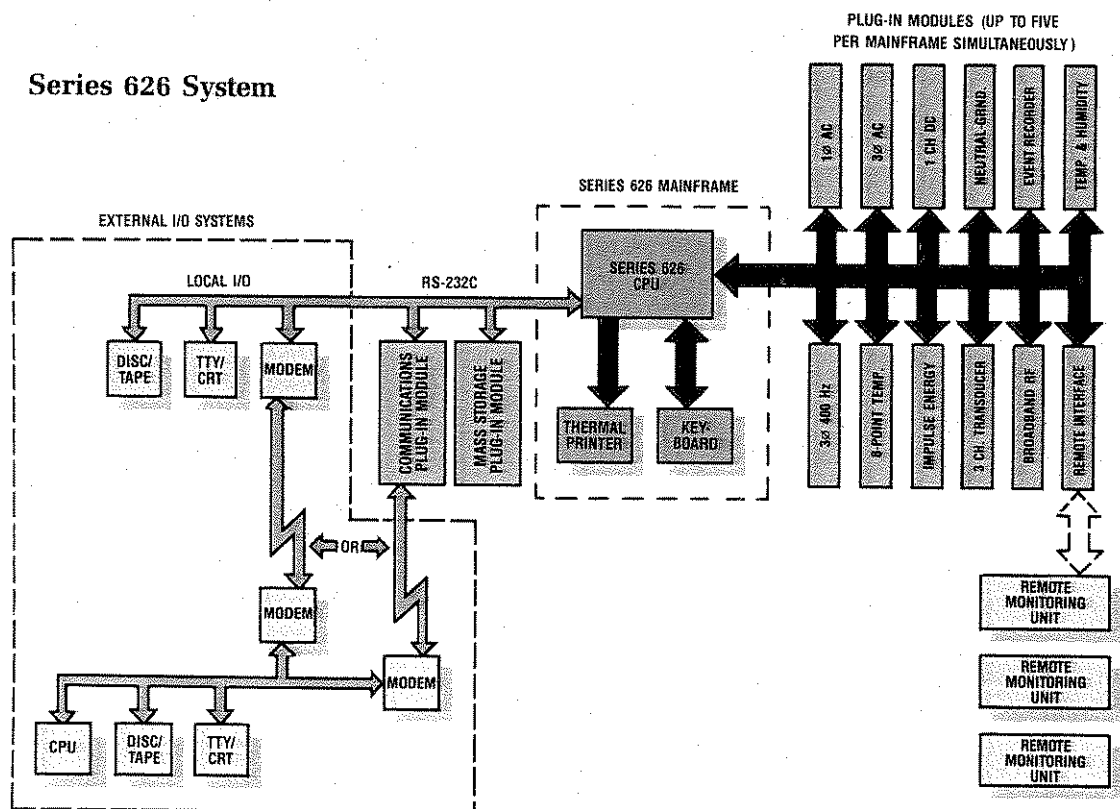
The integral thermal printer displays all time-related conditions and disturbance results with as little or as much detail as desired. Daily summary reports are automatically provided every midnight to include a summary of the entire day's data.

An integral RS232C port allows auxiliary recording of disturbance data on an external (local or remote) printer and operation of the Series 626 from an external (local or remote)

keyboard. Furthermore, by using the 626-PA-6013 Mass Storage Module (see page 17), the results of many weeks of monitoring can be easily reduced by a computer to a manageable report for formal evaluation. Alternatively, the 626-PA-6012A Communications Module (see page 17) with its built-in, auto-dial/auto-answer modem can be added to make all disturbance data instantly available at a central site for continuous or periodic monitoring.

Each plug-in module is an analysis system in its own right (sometimes under individual microprocessor control), and may be added or deleted independently of others. Each is programmed and operated independently of the others without any sort of limitation from the mainframe. A plug-in may be located in any available slot, and will identify itself to the operator (and the mainframe), indicating its location and setup procedure.

Series 626 System



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PRINT Pushbutton

A momentary pushbutton which alternately disables or enables the thermal printer. This pushbutton is active only when the RS232C port is connected and active, and may be used to send disturbance data at high speed to an external device connected to the RS232C port. With each depression of this pushbutton, the printer will echo either "PRINTER OFF" and time/date, or "PRINTER ON" and time/date. In the former case, further printout is inhibited unless one of the following occurs:

1. Device connected to RS232C port is lost.
2. Power is lost.
3. End of day produces daily accumulated summary.
4. FUNCTION switch is turned off or on.

Programming Pushbuttons

A series of 28 pushbuttons, including numeric keypad and 10 prompting LEDs, for programming and real-time clock entry.

1 Through 5 Pushbuttons

When depressed and with FUNCTION switch in PROGRAM position, selects plug-in channel for programming.

CLOCK Pushbutton

When depressed and with FUNCTION switch in PROGRAM position, enables operator to set time and calendar date.

Key-protected FUNCTION Switch

OFF: Turns off instrument.

OPERATE: Normal operating position. Programming keypads are disabled and key may be removed to prevent unauthorized tampering with instrument. However, top row of pushbuttons (ALARM, PRINT, etc.) are active.

PROGRAM: Enables user to program real time and date or thresholds of selected channel.

CLEAR DATA: Clears all daily accumulators, removing all data obtained that day, but does not affect real time, date, or program conditions.

RESET: Activates system initialization routine in the same manner as the POWER ON function. Clears all daily accumulators, but does not reset time, date, or program conditions.

ALARM Pushbutton

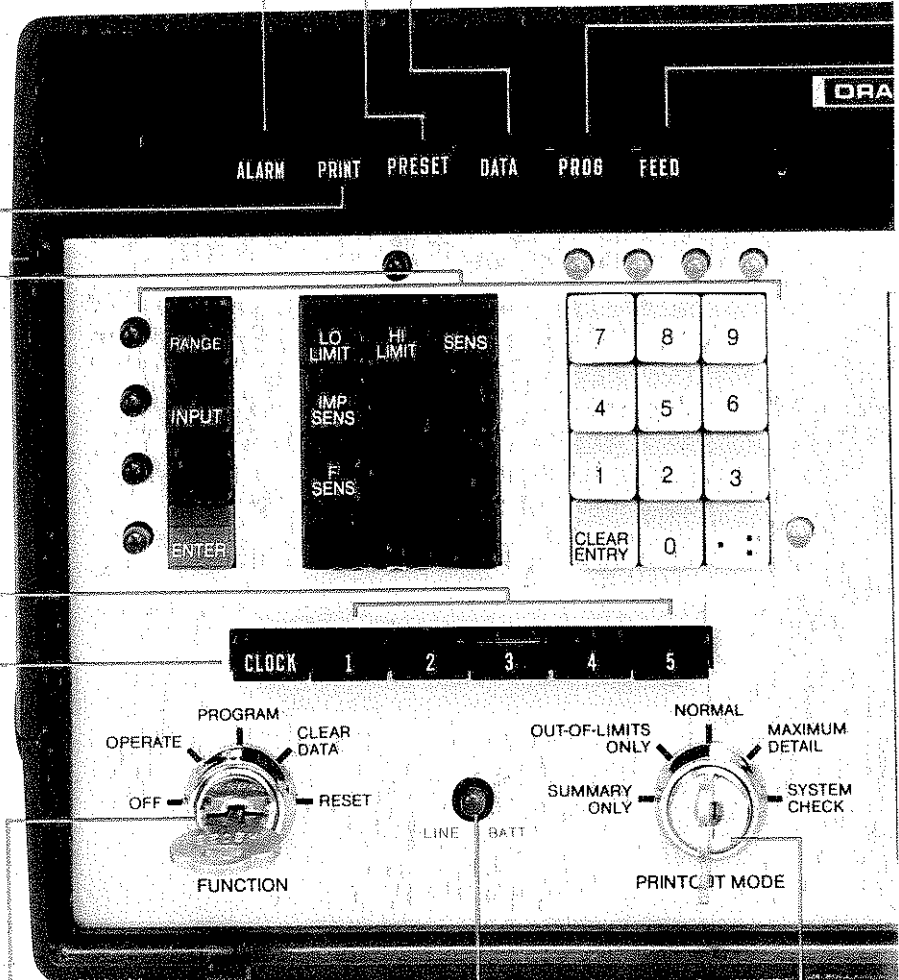
When depressed, enables alarm circuit. Disturbance events cause a 1-second audible tone.

PRESET Pushbutton

When depressed, and with FUNCTION switch in PROGRAM position, enters the factory programmed conditions for the selected plug-in.

DATA Pushbutton

When depressed, and with FUNCTION switch in OPERATE position, unit prints out a DATA SUMMARY including date, time, and contents of daily accumulators for each plug-in in sequence (1-5).



LINE-BATT Indicator

Green LINE indicator lights when instrument is operating from normal AC power. Red BATT indicator lights when power is lost and unit is automatically switched to its internal battery source.

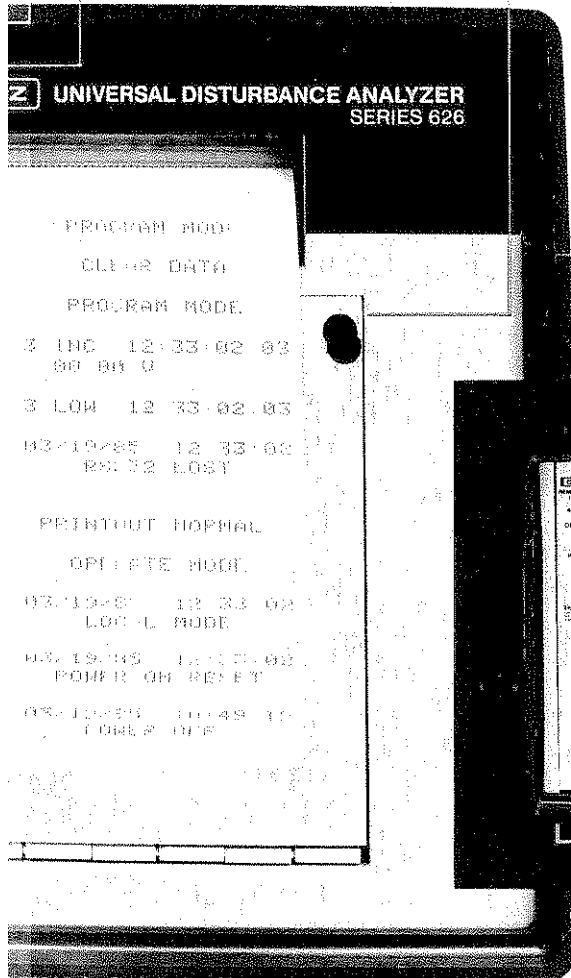
PROG Pushbutton

When depressed, and with FUNCTION switch in OPERATE position, unit prints time, date, and a listing of the programmed conditions for each plug-in in sequence (1-5).

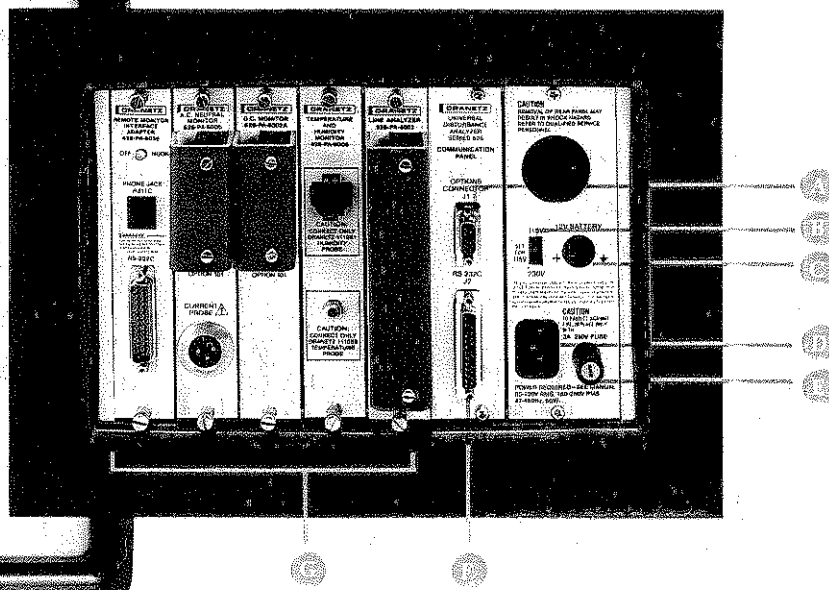
FEED Pushbutton

When held in depressed position, causes paper to feed out of thermal printer.

Thermal Printer



- A. Alarm Relay and Event Timemark Input Connector
- B. Line Voltage Selection Switch
- C. External 12 V Battery Connector
- D. Power Receptacle
- E. Fuse
- F. RS232C Compatible Port, DCE Configured
- G. Space for Five Plug-in Modules



Key-protected PRINTOUT MODE Switch

The level of printout detail decreases as switch is rotated counter-clockwise. Key may be removed in any position.

SYSTEM CHECK: Puts all channels in system check mode to verify proper operation. Printout (in sequence) is produced as response to self-contained reference signals.

MAXIMUM DETAIL: Produces detailed printout of limit crossings and variations in the measured parameters.

NORMAL: Produces detailed printout of limit crossings and variations in the measured parameters only when outside limits.

OUT-OF-LIMITS ONLY: Prints disturbance data only when a limit is crossed.

SUMMARY ONLY: Printer is inhibited. All data is still loaded into daily accumulators. Provides Daily Summary automatically at midnight.

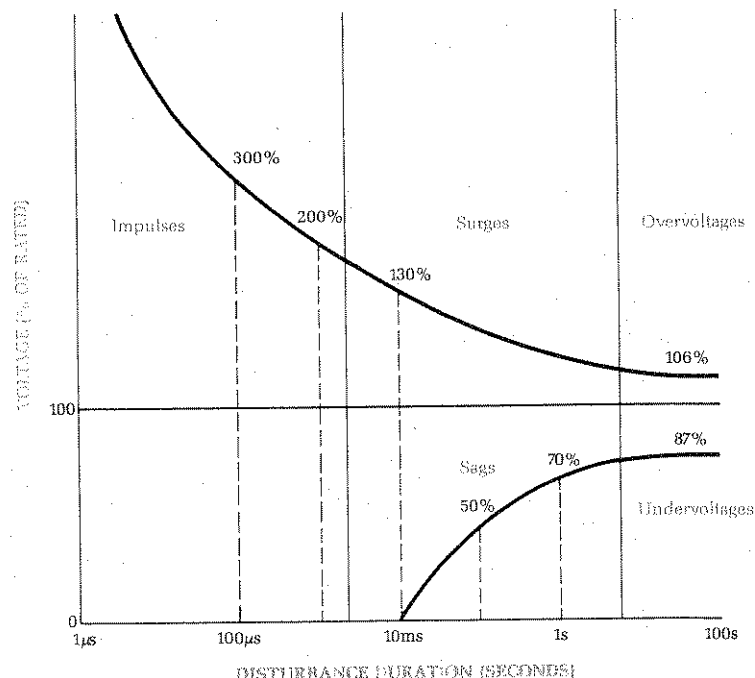
AC Voltage Monitors

Detailed, accurate, and comprehensive analysis of AC power line disturbances is essential for pre-installation site surveys, correlating malfunctions of electronic equipment with power line disturbances, specifying corrective equipment, and monitoring the effectiveness of power line conditioning equipment. Only by assuring the overall quality of the AC power before sensitive equipment is installed, taking early corrective action if necessary, and continually monitoring to detect changes in the AC power distribution can operational problems due to power line disturbances be permanently avoided.

Four AC plug-in modules are available to provide the most complete, accurate, and reliable monitoring of any electrical distribution system up to 600 VAC, including single-phase, split-phase, three phase wye or delta, 45 to 65 Hz or 370 to 450 Hz. Impulses, sags, surges, undervoltages, overvoltages, and frequency variations can all be detected, compared with user-selectable thresholds, and recorded with the amplitude, duration, and exact time of occurrence. For 50/60 Hz power systems, options are available to determine impulse direction (Source or Load) and strength (volt-seconds). Impulse direction measurements on an incoming power line will determine whether the impulses originated outside of the facility or internally. If internal sources are detected, movement of the monitor probes among various points in the distribution system can pinpoint the offending equipment.

The 626-PA-6003 Three-Phase AC Monitor analyzes three channels of 50/60 Hz AC voltage. It is normally connected phase to phase or phase to neutral. The 626-PA-6001 Single Phase AC Monitor analyzes a single channel of 50/60 Hz AC voltage. The 626-PA-6006 Neutral-Ground Monitor is recommended for use whenever a neutral is present in the distribution system. The 626-PA-6006 is used to detect common mode impulses and can identify improper grounding conditions. Both the 626-PA-6001 and the 626-PA-6006 plug-in modules are capable of determining impulse direction when equipped with Option 101 or 102. Finally, the 626-PA-6009 Three Phase 400 Hz Monitor is available to analyze disturbances in shipboard, aircraft, large CPU, and other 400/415 Hz power systems. Since all plug-in modules share a common time base, they can be easily configured for integrated disturbance analysis on virtually any AC electrical distribution system.

Although there are no firm industry standards to define "acceptable" AC power, various equipment manufacturers have developed internal guidelines for the design and reliable operation of computer and other microprocessor-based equipment. The plot shown is a typical susceptibility profile for a particular piece of electronic equipment. Power line disturbances outside of the boundaries are "unacceptable" and can be expected to cause equipment malfunction or damage.



AC POWER SUSCEPTIBILITY PROFILE

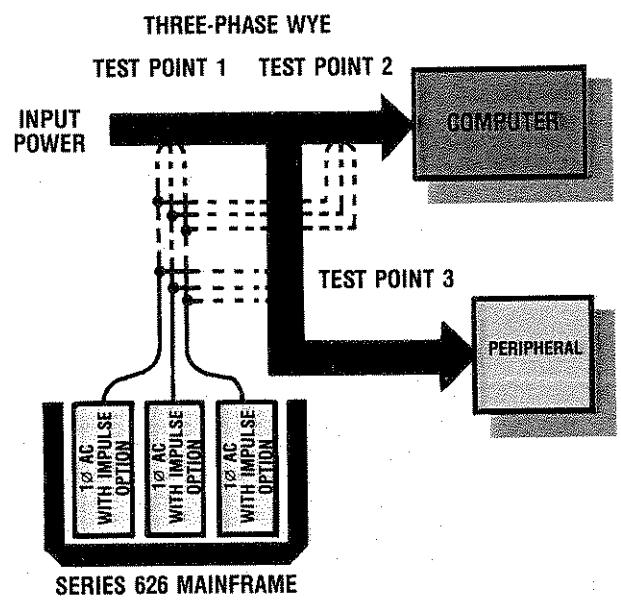
Impulses represent disturbances lasting less than 2 milliseconds. Sags and surges are disturbances with durations from several milliseconds to 2.5 seconds. Undervoltages and overvoltages have durations greater than 2.5 seconds. Impulses, also commonly known as transients, spikes, noise, and sometimes surges, are the most troublesome and potentially damaging types of power line disturbance. Impulse voltages may occur between phases or between phase and neutral. Such impulses are generally described as normal, differential, or transverse mode. Impulse voltages, referenced to earth ground, which are common to all phase lines or

common to phase and neutral lines, are known as common or series mode. Both types of impulses must be analyzed to provide a complete picture of power integrity.

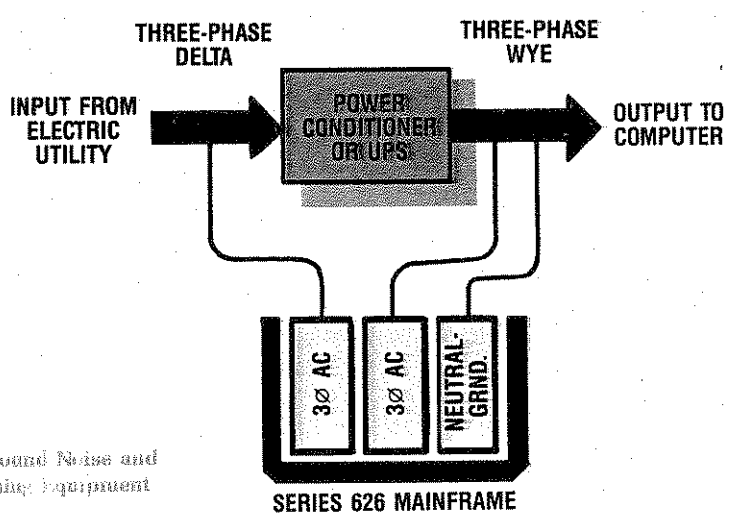
For further information concerning AC voltage disturbances, ask for our three application bulletins as follows:

- Understanding Power Line Disturbances* TP-103955
- How to Identify Power Line Disturbances* TP-103956
- How to Correct Power Line Problems* TP-103957

Modular Construction Provides Application Versatility



Locating the source of impulses

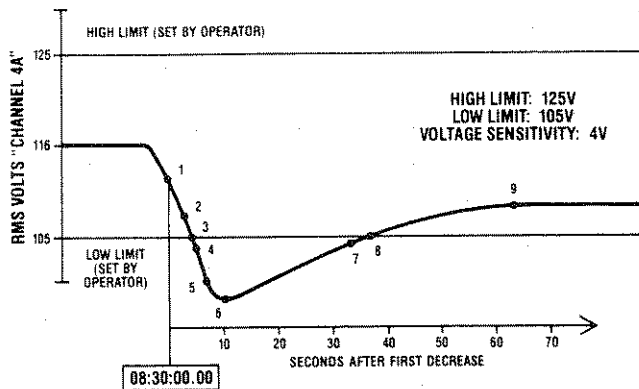


Monitoring Ground Noise and Line Conditioning Equipment



Typical AC Disturbances and Printouts

Choice of Printout Detail



Depending on a user's requirement, the appropriate degree of printout detail can be selected from MAXIMUM DETAIL, NORMAL or OUT OF LIMITS ONLY Modes. Referring to the above graph, corresponding printouts for each mode are illustrated below. Note that MAXIMUM DETAIL calls out all points, while in NORMAL, the events occurring within the high and low limits are omitted. Only the limit crossings and worst case voltage are recorded in OUT OF LIMITS ONLY.

MAXIMUM DETAIL

NORMAL

OUT OF LIMITS ONLY

4A RMS 08:31:00.23	9	116.0 V	4A RMS 08:31:00.00	8	116.0 V
4A RMS 08:30:30.00	8	116.0 V	4A RMS 08:30:30.00	6	102.0 V
4A RMS 08:30:20.00	6	102.0 V	4A RMS 08:30:20.00	7	102.0 V
4A RMS 08:30:15.00	7	102.0 V	4A RMS 08:30:15.00	5	102.0 V
4A RMS 08:30:10.00	5	102.0 V	4A RMS 08:30:10.00	4	102.0 V
4A RMS 08:30:05.00	4	102.0 V	4A RMS 08:30:05.00	3	102.0 V
4A RMS 08:30:00.00	3	102.0 V			
4A RMS 08:30:00.00	2	102.0 V			
4A RMS 08:30:00.00	1	116.0 V			

Numbers refer to points labeled on above graph

↑ READ UP

↑ READ UP

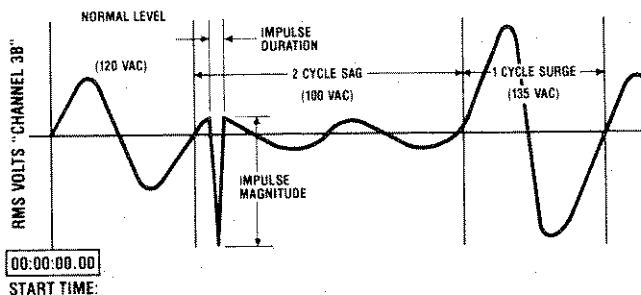
System Check to Verify Operation

At 8:22:14 on 10/22/85 a System Check was done on a 626-PA-6003 3 ∅ AC plug-in module in channel 1 of a 626. A 200 VAC, 60 Hz signal was applied to each phase, along with a negative 3000 volt impulse with a 400 μsec duration. Readouts for each phase are well within tolerances, so the plug-in is operating normally.

```

10/22/85 08:22:14
SYSTEM CHECK
IMP - 297.6V 0.914A
AC VOLTS 199.7V
PH C
IMP - 298.2V 0.906A
AC VOLTS 200.0V
PH B
IMP - 298.5V 0.907A
AC VOLTS 199.8V
PH A
FRQ 60.0 HZ
N26-PA-6003
CH
10/22/85 08:22:14
SYSTEM CHECK
    
```

↑ READ UP



Interpretation

00:00:00.00	←	ONE CYCLE SURGE ENDS
00:00:00.00	←	SURGE BEGINS
00:00:00.00	←	2 CYCLE SAG ENDS
00:00:00.00	←	IMPULSE
00:00:00.00	←	SAG BEGINS
00:00:00.00	↑	READ UP

OUT OF LIMITS ONLY

DAILY SUMMARY

In addition to printing each disturbance as it occurs, the 626 will provide a summary of all disturbances. By pushing the DATA button, a DATA SUMMARY of all disturbances occurring since midnight is provided. Also, a DAILY SUMMARY is automatically provided every midnight to include the entire day's data.

Single-Phase 2 ∅ Plug-in Module

```

10/22/85 08:22:14
DATA SUMMARY
IMP - 297.6V 0.914A
AC VOLTS 199.7V
PH C
IMP - 298.2V 0.906A
AC VOLTS 200.0V
PH B
IMP - 298.5V 0.907A
AC VOLTS 199.8V
PH A
FRQ 60.0 HZ
N26-PA-6003
CH
10/22/85 08:22:14
DATA SUMMARY
    
```

Two top lines show present frequency and voltage. Below are minimum and maximum frequencies. Then there is a summary of impulses, sags, and other disturbances.

Date and time at which data summary was requested.

↑ READ UP

Designation	Three-phase AC, 50/60 Hz	Three-phase AC, 60 Hz	AC Neutral-ground, 60/60 Hz	Single-phase AC, 50/60 Hz
Part Number	626-PA-6003-() ¹	626-PA-6009	626-PA-6006-() ¹	626-PA-6001-() ²
Function	Monitor and record impulses, sags, surges, undervoltages, overvoltages, and frequency variations (channel A only) on three channels of AC voltage. Impulse duration measurement included as standard.		Monitor & record impulses, surges & overvoltages between neutral & ground on an AC power system. Measurement ranges & functions optimized for neutral-to-ground monitoring, including common mode transients. Factory installed options (see below) also record impulse direction & duration or strength.	Monitor and record impulses, sags, surges, undervoltages, overvoltages, and frequency variations on a single channel of AC voltage. Factory installed options (see below) also record impulse direction and either impulse duration (Option 101) or impulse strength (Option 102).
Voltage Input Type	2-wire differential			
Impedance	40 MΩ with 40 pF (each side to ground)			
Range	50-600 VAC, 45-65 Hz	50-600 VAC, 370-450 Hz	2-50 VAC, 45-65 Hz	50-600 VAC, 45-65 Hz
Full Scale	600 V		50 V	200, 400 & 600 V, selectable
Selectable Thresholds Upper Limit	51-600 V		3-30 V	21-200 V, 200 V fs 42-400 V, 400 V fs 84-600 V, 600 V fs
Lower Limit	50-599 V		Not Applicable	20-199 V, 200 V fs 40-398 V, 400 V fs 80-596 V, 600 V fs
Sensitivity	2-60 V		1-9 V	1-15 V, 200 V fs 2-30 V, 400 V fs 4-60 V, 600 V fs
Line Voltage Accuracy	± 1% rdg ± 0.2% fs			
Resolution	0.2 V			0.2 V, 200 V fs 0.4 V, 400 V fs 0.8 V, 600 V fs
Impulse Voltage Range	50-4000 V peak		25-4000 V peak	
Full Scale	4000 V		1000, 2000 and 4000 V, determined by threshold	1000 V, 200 V fs 2000 V, 400 V fs 4000 V, 600 V fs
Selectable Thresholds	50-4000 V		25-4000 V	25-1000 V, 200 V fs 50-2000 V, 400 V fs 100-4000 V, 600 V fs
Duration Range	1-2000 μsec	1-100 μsec	1-2000 μsec	
Accuracy	± 10% rdg ± 1% fs for half sinewave impulses 5-50 μsec, typically -50% at 1 μsec and 2 msec.	± 10% rdg ± 1% fs for half sinewave impulses 5-25 μsec, typically -50% at 1 μsec and 100 μsec.	± 10% rdg ± 1% fs for half sinewave impulses 5-50 μsec, typically -50% at 1 μsec and 2 msec.	
Line Frequency Range	45-65 Hz	370-450 Hz	Not Available	45-65 Hz
Resolution	0.1 Hz			0.1 Hz
Selectable Limits	0.2-3.0 Hz in 0.1 Hz increments	1-9 Hz in 1 Hz increments		0.2-3.0 Hz in 0.1 Hz increments
Accuracy	± 0.1 Hz			± 0.2 Hz
Load Rating*	4		2 (3 with Option 101 or 102)	
UL Listed	Yes			
Factory Installed Options	Not Available		Option 101: Impulse Duration and Direction. Option 102: Impulse Strength (Volt-Sec.) and Direction.	
Duration Measurement	Standard		Option 101 Required	
Range	1-2000 μsec	1-100 μsec	1-1023 μsec	
Accuracy	± 10% rdg ± 1% fs, 5-50 μsec, >100 V	± 10% rdg ± 10% fs, 5-25 μsec, >100 Vpk	± 6% rdg ± 0.3% fs for half sinewave impulses 1-100 μsec and greater than 10% of fs impulse voltage.	
Strength Measurement Range	Not Available		Option 102 Required 0.0002 to 0.2046 V-Sec.	Option 102 Required 0.0002 to 0.2046 V-Sec, 200 V fs 0.0004 to 0.4092 V-Sec, 400 V fs 0.0008 to 0.8184 V-Sec, 600 V fs
Accuracy	Not Available		± 10% rdg ± 0.1% fs for half sinewave impulses 1-100 μsec and greater than 10% of fs impulse voltage.	
Direction Measurement	Not Available		Option 101 or 102 Required	
Indication	Not Available		Source or Load	
Minimum Impulse Current	Not Available		1 Amp for 0.1 μsec before and after measurement	
Optional Cables	P/N 110, 480-G2: Eight foot (2.4 m) mating cable with connector at one end & three battery clips at the other.	Not Available	P/N 110, 487-G2: Eight foot (2.4 m) mating cable with connector at one end and three battery clips at the other.	P/N 110, 480-G2: Eight foot (2.4 m) mating cable with connector at one end and three battery clips at the other.

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Notes: 1. Specify suffix 1 or 2

1. Terminal strip (barrier type) input
2. Connector input (includes mating cable)

*Mainframes with 30 W power supplies (manufactured prior to January, 1983) will support up to 13 load units at one time. Mainframes with 50 W power supplies manufactured after January, 1983 will support up to 20 load units at one time.

2. Specify suffix 1, 2, 3 or 4

1. 60 Hz Calibration with terminal strip input
2. 60 Hz Calibration with connector input (includes mating cable)
3. 50 Hz Calibration with terminal strip input
4. 50 Hz Calibration with connector input (includes mating cable)

DC Voltage Monitors

Since electronic circuitry operates from DC voltage levels, it is important to monitor and record DC voltage disturbances. Simultaneous monitoring of the AC input and DC output of equipment power supplies provides direct correlation between AC power line disturbances and disturbances to the DC logic bus. The 626-PA-6002A Low Range DC Monitor records impulses, sags, surges, undervoltages, and overvoltages on a single channel of DC voltage. When used with AC voltage monitoring plug-ins, the 626-PA-6002A proves useful for troubleshooting power supplies and correlating AC input disturbances with DC output disturbances.

Higher DC voltage levels (50-600 V DC) may be monitored with the 626-PA-6002C High Range DC Monitor. These DC voltages are found in uninterruptible power supplies

(UPS) and station batteries used by telephone and electric utilities. The 626-PA-6002C measures and records impulses, sags, surges, undervoltages, and overvoltages on a single channel of DC voltage.

When precision monitoring of multiple DC voltage levels is desired, the 626-PA-6015 Three Channel Transducer Monitor is a versatile and powerful tool. The 626-PA-6015 monitors and records changes in DC voltage levels on three 10 V DC channels. It is an excellent choice for monitoring multiple output power supplies. In addition, programmable scale factors and a choice of 20 commonly used engineering units enhance the plug-in's versatility by enabling it to monitor any transducer with a 0-10 V DC output.



Specification	Low Range () ¹	High Range (C)	Three Channel (6015)
Part Number	626-PA-6002A-() ¹	626-PA-6002C	626-PA-6015
Function	Monitor and record impulses, sags and surges, under and over voltages on a single dc channel. Factory options (see below) record impulse duration (option 101) or impulse strength (option 102).		Precisely monitor & record variations in up to 3 independent dc channels. Programmable scale factors & engineering units provide convenient monitoring of transducer outputs.
Voltage Input Type	2-wire differential		
Impedance	10 MΩ with 500 pf (each side to ground)	40 MΩ with 40 pf (each side to ground)	>10 MΩ
Range	0.5-80 VDC	25-600 VDC	0-10.23 V, each of 3 channels
Full Scale	20, 40 and 80 V, selectable	150, 300 and 600 V, selectable	10 V
DC Voltage Accuracy	± 1% rdg ± 0.5% fs		
Resolution	0.04 V, 20 V fs 0.08 V, 40 V fs 0.16 V, 80 V fs	0.2 V, 150 V fs 0.4 V, 300 V fs 0.8 V, 600 V fs	0.1% of fs
Decimal Point	Fixed		User-selected, X.XX00 to XXX00, where XXX=9.99 V input
Engineering Units	Not Available		User-selected; V, A, OHM, % RH, C, F, PSI, W/M, BTU, CFM, RPM, FTC, KG, LB, PPM, PH, FT, M, WHR, MV.
Selectable Thresholds Upper Limit	0.6-20.0 V, 20 V fs 1.2-40.0 V, 40 V fs 2.4-80.0 V, 80 V fs	25-150 V, 150 V fs 52-300 V, 300 V fs 104-600 V, 600 V fs	0.1% to 99.9% fs
Lower Limit	0.5-19.9 V, 20 V fs 1.0-39.8 V, 40 V fs 2.0-79.6 V, 80 V fs	25-149 V, 150 V fs 50-298 V, 300 V fs 100-596 V, 600 V fs	0.000 to 99.8% fs
Sensitivity	0.1-20.0 V	1-60 V	0.001-9990
Impulse Measurements Voltage Range (1-2000 μsec)	0.5-80 V peak	25-4000 V peak	
Selectable Thresholds	0.5-20 V, 20 V fs 1.0-40 V, 40 V fs 2.0-80 V, 80 V fs	25-500 V, 150 V fs 50-1000 V, 300 V fs 100-2000 V, 600 V fs	Not Available
Accuracy	± 10% rdg ± 1% fs for half sinewave impulses of 5 to 50 μsec duration. Typically -50% at 1 μsec and 2000 μsec.		
Duration	Factory installed Option 101 Required		
Range	1-1023 μsec		
Accuracy	± 6% rdg ± 0.3% fs for half sinewave impulses up to 100 μsec duration. Typically -10% at 200 μsec, -20% at 400 μsec, and -50% at 1000 μsec.		
Strength (V-sec)	Factory installed Option 102 required		
Range	0.000004-0.016368	0.0002-0.8184	Not Available
Accuracy	± 10% rdg ± 0.1% fs for half sinewave impulses up to 100 μsec duration, typically -20% at 200 μsec, -50% at 500 μsec.		
Load Rating*	2 (3 with option 101 or 102)		
UL Listed	Yes		

1 Specify suffix: 1. Terminal strip (barrier type) input. 2. Connector input (includes mating cable)

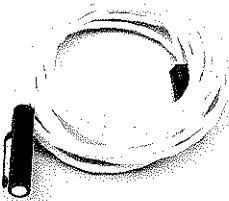
*Mainframes with 30W power supplies, manufactured prior to Jan. 1983, will support up to 13 load units; Mainframes with 50W supplies, manufactured after Jan. 1983, will support up to 20 load units.

Temperature and Humidity Monitors

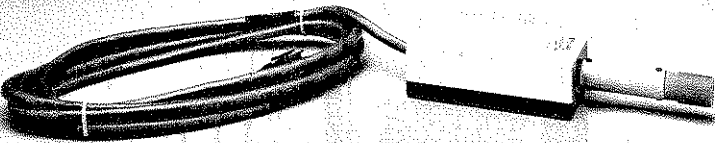
Computers, peripherals, and other electronic equipment are highly sensitive to variations in temperature and humidity. Manufacturers typically recommend that ambient temperatures be held to 18 - 24°C and relative humidity to 40 - 60% RH. Excessive temperature variations can lead to component failures. Excessive humidity can result in damage to magnetic storage media and faulty printer operation. Low humidity increases static electricity, a major source of catastrophic and latent failures in electronic components.

Two plug-in modules are available to detect temperature and humidity problems. The 626-PA-6008 Temperature and Humidity Monitor analyzes the performance of air conditioning systems by monitoring one channel of temperature and one channel of humidity. Besides recording variations outside of user-selected limits, together with the exact time of occurrence, the 626-PA-6008 will accumulate and report total out-of-limit times over 24 hour periods. The 626-PA-6014 8-Channel Temperature Monitor records temperature variations at up to eight

points with individual high and low limits and sensitivities. It is ideal for analyzing temperature gradients among several pieces of computer related equipment, checking air distribution within equipment cabinets, and locating blocked air ducts.

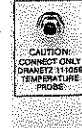


Temperature Probe



Humidity Probe

Description	626-PA-6008	626-PA-6014
Part Number	626-PA-6008	626-PA-6014
Function	Monitor and record variations in one temperature channel and one humidity channel and accumulate times of over and under limit conditions.	Monitor and record variations in 8 temperature channels, each with individual high and low limits and sensitivities.
Temperature Range	0-100°C	- 50 to + 150°C
Accuracy	± 1°C	± 2°C, 0-100°C
Response Time (typical) to 20°C change	3 minutes to 90% of final value	
Cable Length	10 ft. (3m) standard, 90 ft. (27m) extension cable available	
Cable Temperature	105°C max.	200°C max.
Temperature Thresholds		
High Limit	1-102°C	1-150°C
Low Limit	0-101°C	0-149°C
Sensitivity	1-20°C	1-20°C
Humidity Range	0-80% RH at specified accuracy. Useable to 100% RH at reduced accuracy.	Not Available
Accuracy	± 3% ± 0.05% (T-20°C) ± 0.02% rdg	
Response Time (typical to 20% RH Change)	2 minutes to 90% of final value	
Cable Length	10 ft. (3m) standard, 90 ft. (27m) extension cable available	
Cable Temperature	105°C max.	
Humidity Thresholds		Not Available
High Limit	1-100% RH	
Low Limit	0-99% RH	
Sensitivity	1-20% RH	
Load Rating*	2	1
UL Listed	Yes	
Included Accessories	Temperature Probe (P/N 111059) Humidity Probe (P/N 111061)	8 Temperature Probes (P/N 111059) If fewer than 8 Temperature Probes are needed, specify 626-PA-6014A plus the quantity (1-8) of Temperature Probes (P/N 111059) desired.
Optional Accessories	P/N 111055: Humidity Probe extension cable for total length of 100 ft. (30m) P/N 111056-G2: Temperature Probe extension cable for total length of 100 ft. (30m) P/N 111058: Extension Cable Set (1 each of P/N 111055 and P/N 111056-G2).	P/N 111056-G2: Temperature Probe extension cable for total length of 100 ft. (30m)



Event Monitors

Many computer-based systems feature internal system monitoring with provisions for alarm or warning output signals. These outputs, usually situated on the computer's backplane, may indicate AC power failure, DC power failure, diagnostic faults, CPU reset, or other occurrences. Besides monitoring internal system alarms, it is frequently desirable to monitor external alarms or event sequences. Alarm events could include fire, security, room entry, UPS bypass, or any parameter that can be converted to an ON/OFF signal. The 626-PA-6007 Event Monitor and the 626-PA-6011 Event Time Accumulator both provide eight channels for detecting alarm-type (ON/OFF) signals. By monitoring these signals while simultaneously monitoring power and environmental disturbances, cause and effect

relationships may be established, operation of conditioning equipment verified, and equipment malfunctions directly identified.

In other applications it may be useful to correlate utilization rates of equipment with environmental disturbances or accumulate utilization times to implement preventive maintenance procedures. In addition to monitoring eight channels of event state changes, the 626-PA-6011 Event Time Accumulator records accumulated ON/OFF times per day.

Both modules are TTL and CMOS-compatible and each input channel can be programmed to accept either the ON or OFF state as normal. Sensitivity, or minimum validation times, are also programmable over a wide range.

Description	Eight Channel Event Sequence	Eight Channel Event Time Accumulator
Part Number	626-PA-6007	626-PA-6011
Function	Monitor and record the state and time of change of up to 8 event inputs. Provides accurate time sequence information from logic voltage signals or relay contacts. Series 626 Mainframe Option 102 enables operation from dry contacts.	Monitor and record the elapsed on/off times per day, state, and time of change of up to 8 event inputs. Provides accurate elapsed time information for logic voltage signals or relay contacts. Series 626 Mainframe Option 102 enables operation from dry contacts.
Voltage Input Type	2-wire differential	
Impedance	1 M Ω min., each side to ground	
"On" State	2.30 V dc max.	
"Off" State	1.80 V dc min.	
Hysteresis	0.10 V dc min.	
Maximum Input	\pm 200 V dc to ground	
State Change Response Validation (Debounce) Times	5, 10, 20, 40, 80, 160 or 320 msec, selectable	
Time Resolution	10 msec	
Minimum Response Time	1.2 msec	
On/Off Polarity	Normally open or normally closed, selectable	
Load Rating	1	
UL Listed	Yes	
Included Accessories	8 connectors (AMP 1-350352-9), 24 connector pins (AMP 640545-1). Instruction Decal, P/N 110289	

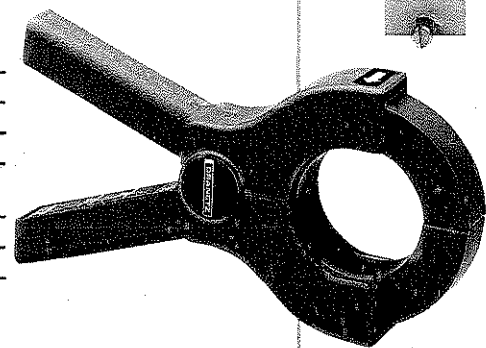


AC Current Monitor

The 626-PA-6005 plug-in module detects, measures, and records disturbances in AC current. Monitored disturbances include impulses, sags, surges, undercurrent, and overcurrent. All recorded measurements are true rms with the exception of impulses, which are measured in peak Amperes. The AC Current Monitor is ideal for monitoring inrush currents associated with switching of

inductive loads, recording current transients, monitoring neutral and ground currents, detecting 3-phase imbalance, and identifying faulty circuit breakers. The module connects to the monitored circuit with a clamp-on current transformer (300 A rms maximum), eliminating the need to break the circuit during installation.

Description	AC Current Monitor
Part Number	626-PA-6005
Function	Monitor and record impulses, sags, surges, and high and low currents on a single channel of AC current
True RMS Ranges	75, 150, and 300 A, selectable
Frequency Range	45-65 Hz
Maximum Crest Factor (Peak/RMS)	2 at 100% fs 4 at 50% fs 7 at 30% fs
True RMS Current Accuracy	± 2% rdg ± 0.5% fs
True RMS Current Resolution	0.2, 0.4, and 0.8 A
Impulse Ranges (2 µsec to 1 msec)	500, 1000, and 2000 A peak, selectable
Impulse Accuracy	± 10% rdg ± 1% fs for half-sinewave impulses 5-50 µsec, typically -50% at 2 µsec and 1 msec durations
Load Rating	2
UL Listed	Pending
Included Accessories	Clamp-on Current Probe (TR-2019) with 2 in. (5 cm) diameter opening and 10 ft. (3m) cable, overall dimensions 8 in. x 4 in. (22 cm x 11 cm)



TR-2019 Current Probe



Impulse Energy Analyzer

Impulse energy, in Joules, is the most critical parameter for determining the susceptibility of electronic equipment to damage by high energy, power line transients. The 626-PA-6018 Impulse Energy Analyzer records the energy content of impulse disturbance events. In addition, the plug-in module measures and records peak voltage, peak current, duration, direction, and time

of occurrence of the impulse disturbance. The Impulse Energy Analyzer is ideal for specifying and testing transient protection devices and for monitoring tests made with transient simulation equipment. A clamp-on current transformer, rated to 300 A rms, is included for connection to the monitored power line.

Description	Impulse Energy Analyzer
Part Number	626-PA-6018
Function	Monitor and record peak voltage and current, impulse energy, duration, and direction on a single AC power or ground line
Impulse Ranges	1000, 2000, and 4000 V peak, selectable; 500, 1000, and 2000 A peak, selectable; 50, 100, 200, 400 and 600 Joules, 1-1000 µsec
Impulse Thresholds	25 to 2000 V; 12 to 1000 A
Nominal Input Range	0-600 V rms; 0-300 A rms; 45-450 Hz
Accuracy Voltage	± 5% rdg ± 1% fs for half-sinewave impulse >10 µsec duration. Typical, -50% at 1 µsec
Current	± 5% rdg ± 1% fs for half-sinewave impulse >10 µsec duration. Typical, -50% at 1 µsec
Duration	± 5% rdg ± 0.3% fs
Energy	± 10% rdg ± 1% fs for half-sinewave impulse >10 µsec duration. Typical, -50% at 2 µsec
Load Rating	4
UL Listed	Pending
Included Accessories	Clamp-on Current Probe (TR-2019) with 2 in. (5 cm) diameter opening and 10 ft. (3m) cable, overall dimensions 8 in. x 4 in. (22 cm x 11 cm)

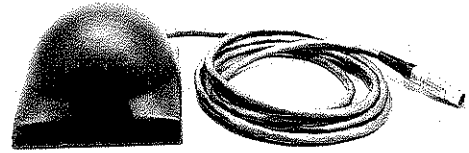


Broadband RF Monitor

Computer-based electronic equipment exhibits varying degrees of susceptibility to radio frequency interference (RFI). Significant RFI field strengths are commonly produced by handheld walkie-talkies, broadcast activity, faulty ignitions, etc. This RF energy couples into electronic equipment through the enclosure or power line, which acts like an antenna at radio frequencies, thereby creating equipment malfunction. The random, intermittent, and broadband nature of RF interference makes this form of environmental disturbance among the most difficult to identify as the cause of equipment malfunctions.

The 626-PA-6020 Broadband RF Monitor provides a convenient technique for correlating the presence of excessive levels of RF field strengths, including bursts as short as 1 μsec ., with malfunctions of computer-based electronic equipment. A broadband, omnidirectional antenna is used to measure electric field strength. If the RF field strength exceeds user-selected limits for continuous wave (CW) or burst signals, the

6020 module records the electric field strength, duration, and time of occurrence of the RF disturbance. RF disturbance events are also summarized for later printout with the Series 626 daily summary.



Antenna Unit

Description	Broadband RF Monitor
Part Number	626-PA-6020
Function	Monitor and record peak electric field strengths, CW or burst, above user-selected thresholds.
Frequency Range	1 MHz to 1 GHz
Polarization	Vertical
Directivity	Omnidirectional
Accuracy	± 1.5 dB at calibration frequency
Frequency Response	± 6 dB, 1 MHz to 800 MHz
Minimum Burst On Time	1 μsec
Field Strength Range	0.5 to 8.0 V/meter
High Limit Thresholds	0.6 to 8.0 V/meter
Burst Sensitivity Thresholds	1.0 to 8.0 V/meter
CW Sensitivity Thresholds	0.5 to 4.0 V/meter
Load Rating	4
UL Listed	Pending
Included Accessories	Antenna Unit with 10 ft. (3 m) cable, 6 in. x 6 in. x 4 in. high (15 cm x 15 cm x 11 cm)



Communication and Mass Storage Modules

Two plug-in modules are available to store disturbance data from the RS 232C communications port of the Series 626 mainframe for later use. The 626-PA-6012A Communications Module will store up to 960 disturbance events and transmit them, on demand, or at programmed time intervals, via a built-in, auto-answer/auto-dial modem. The 626-PA-6013 Mass Storage Module can store up to 960 disturbance events for later transmission to a terminal or printer or, via an external modem, to another site.

Both modules use the Series 626 battery backup to prevent loss of data in the event of a power failure. Both modules can be programmed to transmit immediately upon the occurrence of any event, whenever an operator, on-site or remote, requests a transmission, on a periodic basis every X hours, or when memory is almost full. A rear panel LED indicates data transmission activity.

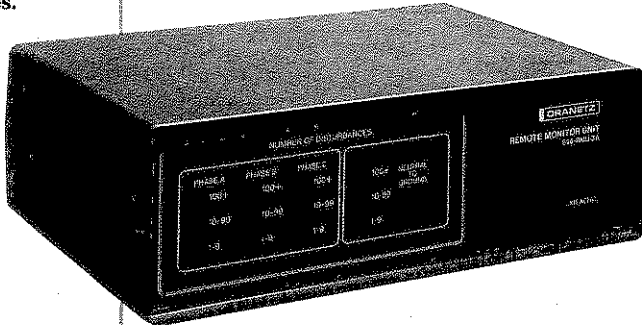
Description	Communications Module	Mass Storage Module
Part Number	626-PA-6012A	626-PA-6013
Function	Accepts and stores data from RS-232C port of Series 626 Mainframe for later transmission by built-in auto-answer/auto-dial modem.	Accepts and stores data from RS-232C port of Series 626 Mainframe for later analysis, printing, or transmission by computer or external modem.
Memory Capacity Event Capacity	960 disturbance events at 32 characters/event	
Data Stack	30 K, non-volatile	
External Communications Interface Type	Bell 103 compatible, RJ 11C connector	RS-232C, DCE configuration
Baud Rate	300	300, 1200, 2400, 4800, 9600, selectable
Data Transmission Protocol	Asynchronous (ISO 1745), full duplex	
Internal Dialer Type	Pulse, 10 pps	Not applicable
Maximum Digits	16 digits, including Wait for Dial Tone	
Maximum Wait for Dial Tone	2 seconds typical	
Maximum Wait for Answer Back	12 seconds	
Maximum Retries	128, 2 seconds (typical) between retries	
Make/Break Ratio	61% low, 39% high	
Programmable Features Memory Dump Mode	Upon Request, Every XX Hours, Every XX Hours or Overflow, Every Event, Stack Full, Never	
Station Identification	0 to 99	
Phone Number	16 digits, including Wait for Dial Tone	Not applicable
Baud Rate	300	300, 1200, 2400, 4800, 9600, selectable
Load Rating	3	2
UL Listed	Pending	
Included Accessories	P/N 110540: RS-232C interface cable to connect Series 626 Mainframe to Module	
	P/N 110709: 25 ft. (7.5m) telephone cable with RJ 11C jacks	Not available
Optional Cable	Not available	P/N 2212-0-1110: 12 ft. (3.6m) RS-232C interface cable with "D" connectors



Remote Monitoring Units

Inexpensive Remote Monitor Units (RMU) extend the basic power line disturbance analysis of the Series 626 to multiple unattended sites, remote or within a local network. RMUs can be used effectively to perform pre-installation site surveys by determining the adequacy of existing power lines intended to support critical electrical equipment. They can determine the effect of power system operation on equipment malfunction by storing time-referenced disturbance data which then can be correlated with equipment errors, outages, and damage. And they can be used for on-going, preventive maintenance. With their low cost, they can be permanently installed to record disturbance data in the event that intermittent power line problems are later suspected.

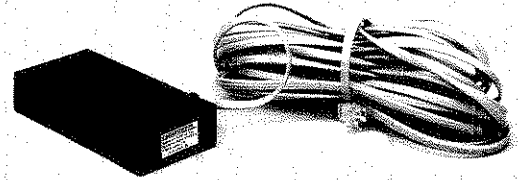
Although designed for unattended operation, RMU front panel annunciators provide a summarized indication of stored disturbances.



RMUs record power line sags, surges, high and low voltages, and impulses, as well as voltage peaks occurring between neutral and ground. The 626-RMU-1 is designed for single phase power line monitoring; the 626-RMU-3A is for three-phase lines, either line to neutral or line to line. The three-phase 626-RMU-3 adds the ability to monitor one DC voltage channel for high and low voltages and impulses, as well.

Each RMU relies on the Series 626 mainframe, equipped with a 626-PA-6036

Remote Interface Adapter, for programming and data readout. Programming can be accomplished from the Series 626 front panel by direct connection of the RMU to the 626-PA-6036 Remote Interface Adapter, or by telephone line using the DM-C15 Cartridge Modem and Option 101 of the 626-PA-6036



Cartridge Modem

Remote Interface Adapter. Once programmed, as many RMUs as required can be installed at various sites to monitor and record power line disturbances independent of the Series 626 mainframe. After disturbance data has been collected, each RMU again may be connected directly, or by telephone line, to the Series 626 mainframe for data printout.

RMU data is stored in a battery-backed, non-volatile memory and is available in three groupings. A sequential report lists the most recent 64 disturbances in chronological sequence. Stored information, includes date and time of occurrence, type of disturbance, amplitude, phase and, for sags and surges, the duration. A summary report for each channel lists the total number of each disturbance type and individually describes the ten worst disturbances of each type with date and time of occurrence, type of disturbance, amplitude, and, for sags and surges, the duration. Finally, a unit history report is available to list the 32 most recent operator actions and errors, including the time of reprogramming, data clears, diagnostic failures, and power on/off.



Remote Interface Adapter

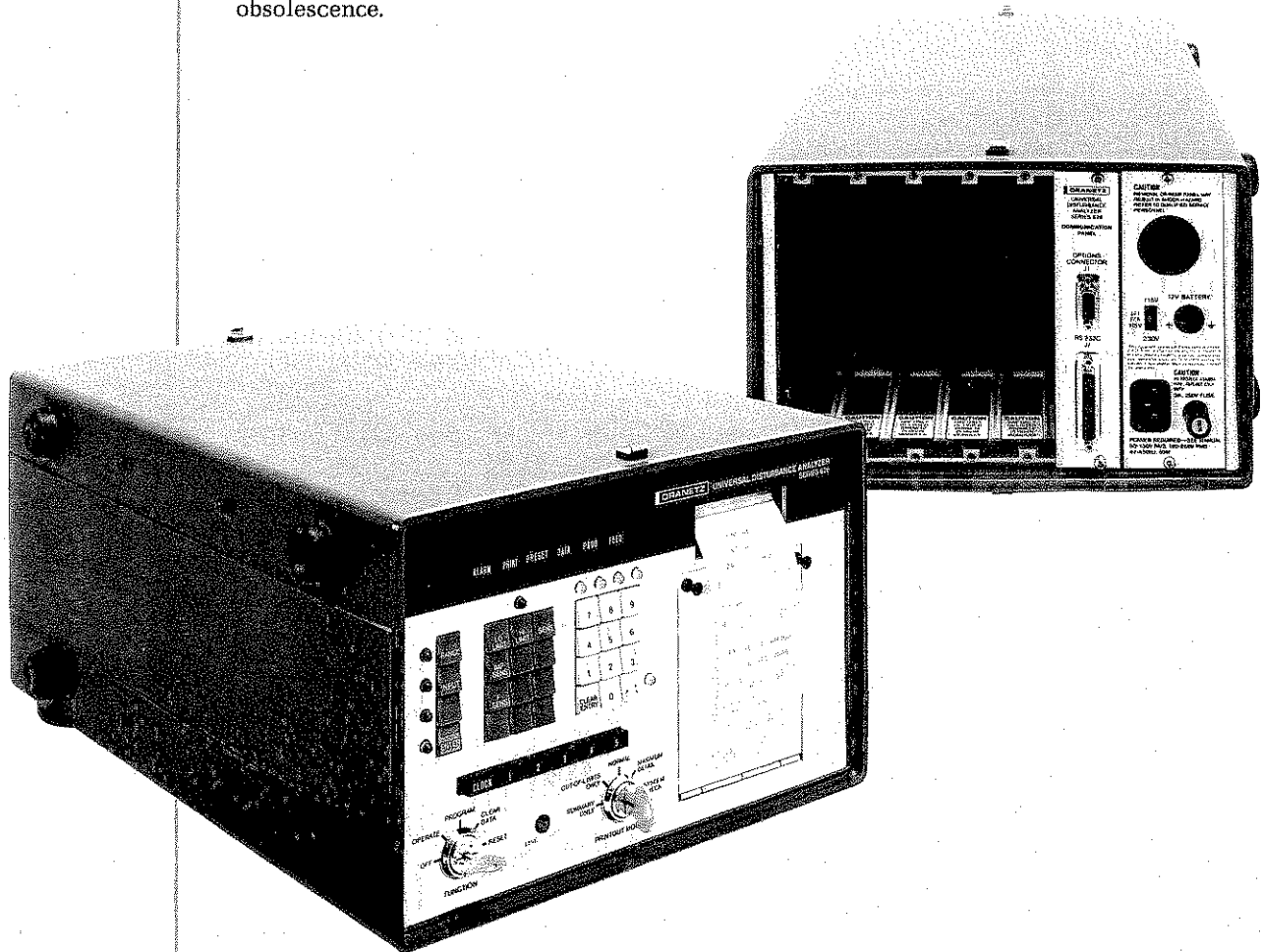
Description	Remote Interface Adapter
Part Number	626-PA-6036
Function	Interfaces Series 626 mainframe with Remote Monitoring Unit(s) for programming and readout of disturbance data
Load Rating	1
UL Listed	Yes
Factory Installed Option Option 101	Adds direct connect, 300 baud, Bell 103 compatible, auto-dial modem. Supplied with 25 foot cord for RJ 11 jack.

Description	Remote Monitoring Unit		
Part Number	626-RMU-1	626-RMU-3	626-RMU-3A
Function	Monitors power disturbances at remote location. Records sags, surges, high and low voltages, and impulses occurring between line and neutral on single-phase AC power lines. Also records voltage peaks occurring between neutral and ground.	Monitors power disturbances at remote location. Records sags, surges, high and low voltages, and impulses occurring on three-phase AC power lines, either line to neutral or line to line. Records voltage peaks occurring between neutral and ground. Also records high and low voltages and impulses on one DC voltage channel.	Monitors power disturbances at remote location. Records sags, surges, high and low voltages, and impulses occurring on three-phase AC power lines, either line to neutral or line to line. Also records neutral to ground voltage peaks using separate differential input channel.
AC Voltage Range	90-130 V, or 180-250 V rms, selectable	50-320 V rms	
Frequency	47-63 Hz		
Accuracy	± 1% of reading ± 0.5% fs		
Resolution	1 V		
Input Impedance	10MΩ and 100 pF, each terminal to ground		
AC Impulse Voltage Range	50-2000 V peak, 1-1000 μsec		
Accuracy	± 10% of reading ± 1% fs, 5-50 μsec, typically -50% at 1 μsec and 1 msec		
Resolution	2 V		
Neutral-Ground Voltage Range	5-200 V peak		
Frequency	DC-250 kHz		
Accuracy	± 10% of reading ± 1% fs, dc-100 kHz; typically -50% at 250 kHz		
Resolution	1 V		
Isolated Input Connection	No		Yes
DC Voltage Range	Not Available	1.0-25.0 V	Not Available
Accuracy		± 3% of reading ± 0.5% fs	
Resolution		0.1 V	
Input Impedance		10 MΩ and 100 pf, each terminal to ground	
DC Channel Impulse Range		1.0-25.0 V peak, 1-1000 μsec	
Accuracy		± 10% of reading ± 1% fs for half-sinewave impulse of 5-50 μsec duration. Typically -50% at 1 μsec and 1 msec	
Power Requirements Voltage	90-130 or 180-250 V, switch selectable		
Frequency	47-63 Hz		
Consumption	20 W, maximum		
Fuse	3/16A, 250 V Slow Blow		
Internal Battery Type	Rechargeable NiCd		
Carryover Time	1 month, typical		
Charge Time	2 days from complete discharge		
Packaging Dimensions	4 in. x 11 in. x 8 in. (10 cm x 28 x 20)		
Weight	6 lbs. (2.7 kg)		
Environmental Temperature	+ 10 to + 40°C, operating; -40 to +55°C, storage		
Humidity	10 to 90% RH, non-condensing		
UL Listed	Yes		
Optional Accessories Modem Cartridge DM-C15	Direct connect, 300 baud, auto-answer, Bell 103 compatible. Plugs into the rear panel of any RMU. Supplied with 25 ft. cord for RJ11 jack.		
Reuseable Shipping Container (P/N 111 223)	Heavy duty, polycarbonate case with custom foam insert for one RMU and related accessories.		

Series 626 Mainframe

The modular capability of the Series 626 Universal Disturbance Analyzer, as provided by the Mainframe and an ever growing number of plug-in monitoring modules, is the key to the versatility of the instrument. Plug-ins are available to monitor many different types of disturbance events. When these events are correlated by the common clock housed in the mainframe, cause and effect analysis becomes a simple task. Modular capability means the instrument can be configured, and reconfigured, to meet the requirements of many applications—whether these applications involve a computer environment, industrial control system, telecommunications equipment, or computer-based medical instrumentation, or any combination. In addition, modular capability means that as new plug-ins are developed, or special plug-ins designed, they can be added without compromising existing plug-ins. With its modular architecture, the Series 626 is easy to repair and defies obsolescence.

The mainframe houses up to five plug-in modules and provides all necessary supply voltages and operating controls. The mainframe CPU identifies the type of module installed in each slot and controls plug-in operation. An internal, rechargeable battery provides full operation in the event of a power failure for 10 to 40 minutes and maintains the mainframe's clock and memories for several months without AC power. The mainframe also contains an integral thermal printer for disturbance data recording and an RS 232C communications port for data output and remote programmability. Mainframe optional accessories include a rack mounting kit and a shipping container with extra room for paper, cables, and accessories.



Description	Series 626 Mainframe
Function	Provides the mainframe, into which up to 5 plug-in modules can be installed, and all common functions, including microprocessor control, memory, time base, battery backup, and power for all plug-ins. All operating controls, a thermal printer, and RS 232C communications port are located on the mainframe.
Controls 6 Upper Pushbuttons	DATA summary, PROGram summary, PRINTer on/off, paper FEED, ALARM on/off, and PRESET thresholds
28 Keypad Pushbuttons	Programming and real time setup, with numerical keypad
6 Lower Pushbuttons	CLOCK position to set date and time; 1 through 5 selects individual plug-in for programming
5-Position FUNCTION Keyswitch	OFF, OPERATE, PROGRAM, CLEAR DATA, and RESET. Keyswitch is locked by removal of key in OPERATE position. Programming keyboard only active in PROGRAM position.
5-Position PRINTOUT MODE Keyswitch	Selects four printout modes, SUMMARY ONLY, OUT-OF-LIMITS ONLY, NORMAL, MAXIMUM DETAIL, and SYSTEM CHECK with calibration check and diagnostic routine. Removal of key locks keyswitch in desired position.
Clock	Crystal controlled, approximately ± 2 sec/day
Alarms	Audible alarm, 1 second, plus contact closure on rear panel
Event Timemark Input	Accepts 5-12 VDC signal indicating occurrence of external event. Pulse (100 μ sec. min.) received causes printout of asterisk followed by time.
Data Output	On-board thermal printer, 2 1/4" x 140' paper roll with paper-low sensor. RS 232C interface with control capability.
Temperature Range Operating Storage	+10 to +40°C -40 to +55°C
Power Requirements	90-130 V or 180-250 V, switch selectable, 47-450 Hz, 50 W nominal. Rear panel terminals to accept 3 A at +12 VDC for extended battery operation without AC power.
UPS Capacity	10-40 minute operation internal battery, rechargeable in 6-10 hours.
Dimensions	7 1/2 in. x 11 x 15 1/2 (190mm x 280 x 390)
Weight	20 lbs. (9 kg) approximate.
Included Accessories	8-foot line cord, mating connectors for 12 V battery input and Option 102 connector, 3 rolls of printer paper, and printer cleaning paper
Factory Installed Option 102	Isolated field contact voltage supply provides 5 VDC to enable use of 626-PA-6007 and 626-PA-6011 with dry contacts