[redacted]

PRELIMINARY FLIGHT SUMMARY

F.T.V. 1156 CM-17

F.T.V. 1156 was launched at 1:30 PM, PST on 12-14-62. CM-17 was the primary payload system aboard. A higher than predicted control gas consumption was noted on ascent, however, the remaining gas supply was well within the nominal consumption envelope. All other ascent functions appeared normal. The following orbital parameters were achieved:

TABLE I

	Nominal	Actual
Period (Min)	90.46	90.49
Apogee (N.M.)	212.4	215.0
Perigee (N.M.)	111.6	108.0
Eccentricity	.0140	.0148
Inclination (Deg.)	69.88	70.95
Argument of Perigee	160.01	162.34

The signal strength of Link I telemetry was very irregular throughout the flight. On some passes the signal strength would be as high as 50 micro-volts and drop instantaneously to 10 or less micro-volts. On Pass 7 over [redacted] the signal strength was not strong enough to be readable and no data was acquired. On other passes the weak signal did not prevent acquisition of data. The Link I telemetry transmitter was one of the first solid state transmitters to be flown on this program. The Link III transmitter was an identical unit and appeared to function properly throughout the flight.

A fifteen real time command system was utilized for the first time on this flight. Five of the commands were used for controlling various payload functions.

INSTRUMENT OPERATION

Real Time Command System Performance

The real time command system performed satisfactorily throughout the flight, giving much more versatility to the payload operation. Execution and verification of all real time commands issued was made without any apparent problems.

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on NOV 26 1997

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Five real time commands were used to control the following payload functions:

1. Command 8 - V/h Ramp Selection
2. Command 9 - Instrument and Mode Selection
3. Command 10 - V/h Ramp Start Delay
4. Command 11 - Instrument On/Off (Intermix Mode)
5. Command 12 - Intermix Selection

Command 8 - V/h Ramp Selection

This command steps an 11-position stepper switch which selects any of 10 independent V/h ramps. Steps 10 and 11 select identical ramps. The stepper switch is stepped one position for each command received.

Command 9 - Instrument and Mode Selection

Command 9 operates an 11 position stepper switch that is stepped one position for each command received. This command permits the selection of the instrument to be used and the mode of operation. Instrument and mode selections available are as follows:

Switch Selector Position	Instrument or Mode
1	Stereo - X Mode
2	Stereo - Y Mode
3	Mono - Inst. 1 - X Mode
4	Mono - Inst. 1 - Y Mode
5	Mono - Inst. 2 - X Mode
6	Mono - Inst. 2 - Y Mode
7	Stereo - X Mode
8	Stereo - Y Mode
9	Mono - Inst. 1 - X Mode
10	Mono - Inst. 1 - Y Mode
11	Mono - Inst. 2 - X Mode

The X and Y modes of operation are the designations used to distinguish between two stored programs.

[redacted]

[redacted]

Command 10 - V/h Ramp Start Delay

An 11 position stepper switch is used for the selection of V/h ramp programmer start time and steps one position for each real time command received. This switch is connected point to point with a second 11 position stepper switch which is stepped by one track of the orbital programmer. There are 11 start time punches in the orbital programmer tape for each orbit. The V/h programmer start time is determined by the timing of the 11 punches in the orbital programmer tape and the position of the Command 10 stepper switch. On CM 17, the sixth punch in the orbital programmer tape and Command 10 selector position 5 were the settings for a nominal orbit. Each orbital programmer tape punch and each Command 10 selector position was equal to 50 seconds of variation in the V/h programmer start time giving a total of 11 start times.

By the use of Commands 8 and 10, a total of 110 individual V/h ramp configurations are possible.

Command 11 - Instrument On/Off (Intermix Mode)

Command 11 operates a latching relay for the selection of two intermix modes. With the intermix selection (Command 12) in Position 11 (Home), Command 11 serves as an instrument "On" or "Off" command.

Command 12 - Intermix Selection

Command 12 steps an 11 position stepper switch one time for each real time command received. This switch is also stepped one time for each orbit by the orbital programmer except when the switch is in the home position(Position 11). This command is used in conjunction with Command 11 for the selection of programmed instrument "enables" and "disables" for use in setting up any combination of instrument operations for four successive orbits. The operational sequences possible with Commands 11 and 12 follow:

[redacted]

[redacted]

TABLE II

REAL TIME COMMANDS 11 AND 12

RTC 12 Selector Position	FUNCTION: RTC 11 On (Mode 1) Switch Setting	RTC 11 On (Mode 1) 4 Pass Seq.	RTC 11 Off (Mode 2) Switch Setting	RTC 11 Off (Mode 2) 4 Pass Seq.
1	0	0100	1	1011
2	1	1001	0	0110
3	0	0011	1	1100
4	0	0111	1	1000
5	1	1110	0	0001
6	1	1101	0	0010
7	1	1010	0	0101
8	0	0101	1	1010
9	1	1011	0	0100
10	0	0111	1	1000
11	1	1111	0	0000

1 - Active Pass 0 - Inactive Pass

Two shortcomings were noted in the operation of the command system. The first was that the Command 12 stepper switch was programmed to step at 15° N Southbound to advance the intermix selection. This proved to be within the command range of the [redacted] tracking station. This makes it possible to issue the wrong number of commands if they are sent late in the pass. This condition will be corrected by programming this function to occur out of range of any tracking station on future flights.

The second problem is in the V/h start delay. The first delay punches in the orbital programmer tape occur far enough south to be out of range of any tracking station which limits the capability of starting the V/h programmer at any available time on a given pass. This condition though not serious, is inconvenient and can be worked around in setting up delay times.

[redacted]

[redacted]

Panoramic Instrument

Both panoramic instruments operated throughout the flight. The cycle periods of both instruments were very close to the pre-flight nominals on the engineering passes with little variation between instruments. The payload consumption indicated the slave instrument ran slower (passed fewer frames) on many of the passes, the average being 2 to 3%.

On one pass (38 Descending) the instruments began operating at 2286 seconds after programmer start and were programmed on for 140 seconds. This apparently resulted in the instruments operating off of the end of the V/h ramp. The instruments were programmed "off" during the 60 seconds the V/h programmer requires to return to the home or bottom of the ramp position, preventing possible damage to the system. Approximately 20 cycles less than programmed were completed during this pass.

Instrument operation was monitored on 4 passes over Vandenberg; 9, 25, 41, and 57. Passes 9, 25 and 57 were stereoscopic operations and Pass 41 was a monoscopic operation. The slave instrument was used on Pass 41 with no dynamic problems apparent in the telemetry data during this pass indicating satisfactory mono operation.

Vehicle Pitch, Roll, and Yaw data was reviewed to determine the effect the system has on the vehicle attitude when operating in the stereo versus the mono mode. There were no attitude perturbations apparent on any of the four engineering operations except on Pass 57, a stereo operation. On Pass 57 the master instrument turned off approximately 3 seconds prior to the turn-off of the slave instrument. This apparently applied a torque to the vehicle, causing a roll of approximately 1/2 of a degree as evidenced on the roll horizon sensor and roll gyro outputs. There were no perturbations noted on either the pitch or yaw gyro outputs. Enclosure 13 is an analog output of the roll gyro and horizon sensor and yaw gyro output during the instrument operation during this pass.

I.M.C. match was good, resulting in an error of less than 2%, utilizing Ramp 3 on all but five instrument operations. Ramp 8 was used during these five operations.

A slit width of 0.250 inches and a WRATTEN 21 (orange) filter was used on the master panoramic instrument and a slit width of 0.250 inches and a WRATTEN 12 (yellow) filter was used on the slave panoramic instrument. The horizon optics were set with an exposure time of 1/100th of a second for both panoramic instruments, and an aperture setting of F 8.0 for the master panoramic instrument and F 6.8 for the slave instrument. A WRATTEN 25 (red) filter was used on both instruments.

The master instrument lens rotation monitor was intermittent on all instrument operations observed by telemetry. The problem appeared to be a maladjustment or failure of the switch used to monitor the lens rotation and did not appear to affect the instrument operation. There were no other instrument problems evident in the telemetry data.

Stellar Index Unit

Stellar Index serial No. D4/4/4 was flown on CM-17. The Stellar Index

[redacted]

[redacted]

unit was observed during four night time engineering passes. All metering functions appeared normal during these passes, indicating proper operation of the Stellar Index. The shutter monitor function did not appear on telemetry as all engineering passes were night time passes which preclude the operation of the shutter monitor.

The Stellar camera was set at F 1.9 with a 1/2 second exposure time. A filter was not utilized. The index camera was set at F 4.5 with a 1/125 second exposure time and a WRATTEN 21 filter.

Clock System Operation

Clock system operation was observed on four engineering operations; Orbit 9, 25, 41, and 57. The clock system gained approximately 40 milliseconds between orbit 9 and orbit 57, thus good time correlation can be achieved.

A method of clock interrogation from the orbital programmer was scheduled to be included in the instrumentation on this flight. However, the plug at the clock interface was disconnected per the test procedure in effect for this flight to preclude the possibility of double clock outputs previously experienced when this plug has been connected.

Pirani Gage

The pirani gage appeared to function properly throughout the flight. Plots depicting the internal pressure of the system during telemetry acquisitions are included as enclosures 1 and 2 to this report. The pirani gage was first observed at launch + 490 seconds. The internal pressure at this time was approximately 370 microns. At Orbit 1, [redacted] the internal pressure had decreased to approximately 60 microns. By the telemetry acquisition on Orbit 2, [redacted] the internal pressure had decreased to 37 microns and continued to decrease throughout the flight. (Enclosure 3)

A plot of the pirani gage calibration is included as enclosure #4 to this report.

Temperature Environment

A tabulation of the in-flight instrument temperatures is included as Enclosure #5 to this report.

The temperature control design for CM-17 was for the master and slave instrument stovepipes to be maintained at 80° F ± 10°. The desired thermal control was achieved through nominal orbital parameters and launch time. The original CM thermal control mosaic was utilized to achieve the desired temperature environment.

During ascent, the temperatures encountered were considerably cooler than on previous "CM" flights, resulting in the stabilization of instrument temperatures by Orbit 2 [redacted] This temperature environment was maintained throughout the remainder of the flight with little or no change encountered.

The average stovepipe temperatures observed during the flight were 80°F and 78°F for the master and slave instruments respectively. A plot of temperature sensors 11 and 13 is included as Enclosure #6 to this report. Temperature sensors 11 and 13 on the master instrument were recorded during

[redacted]

the flight for readout on selected orbits. Enclosures 10, 11 and 12 are representative of the temperatures encountered during complete orbits.

Recovery System Performance

A successful air catch recovery was accomplished on Orbit 65. The recovery system retro events were not monitored by the [redacted] Tracking Station due to the low inclination of the orbit. See Enclosures 7 and 8 for re-entry data.

The overall condition of the recovered capsule was good, with paint blistering limited to the same approximate area as on preceding flights; the + X quadrant of the cover. Enclosure #9 shows the location of the temp plates and the temperatures encountered during re-entry.

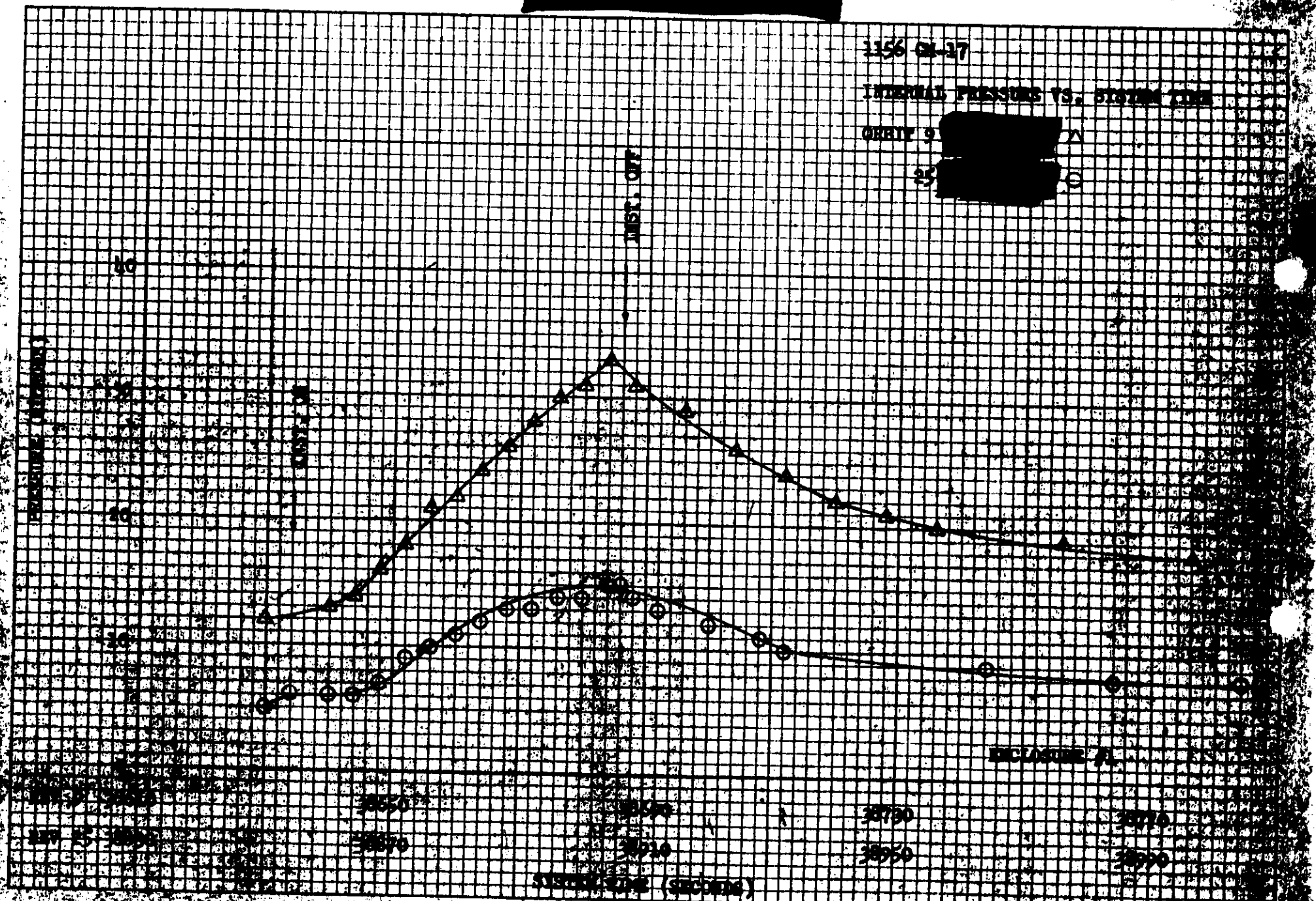
The first "ring slot" type parachute was utilized on this flight. The performance of this new parachute was satisfactory and resulted in a much smoother de-acceleration as exhibited by the recovery capsule accelerometer. The maximum "G" load sensed by the accelerometer was approximately 3 to 5 "G"s. No other effects were noted in the telemetry data.

The actual impact point was very near the predicted impact point of 23° 50.7' N 162° 43.2' W.

[redacted]

K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U. S. A.

[redacted]



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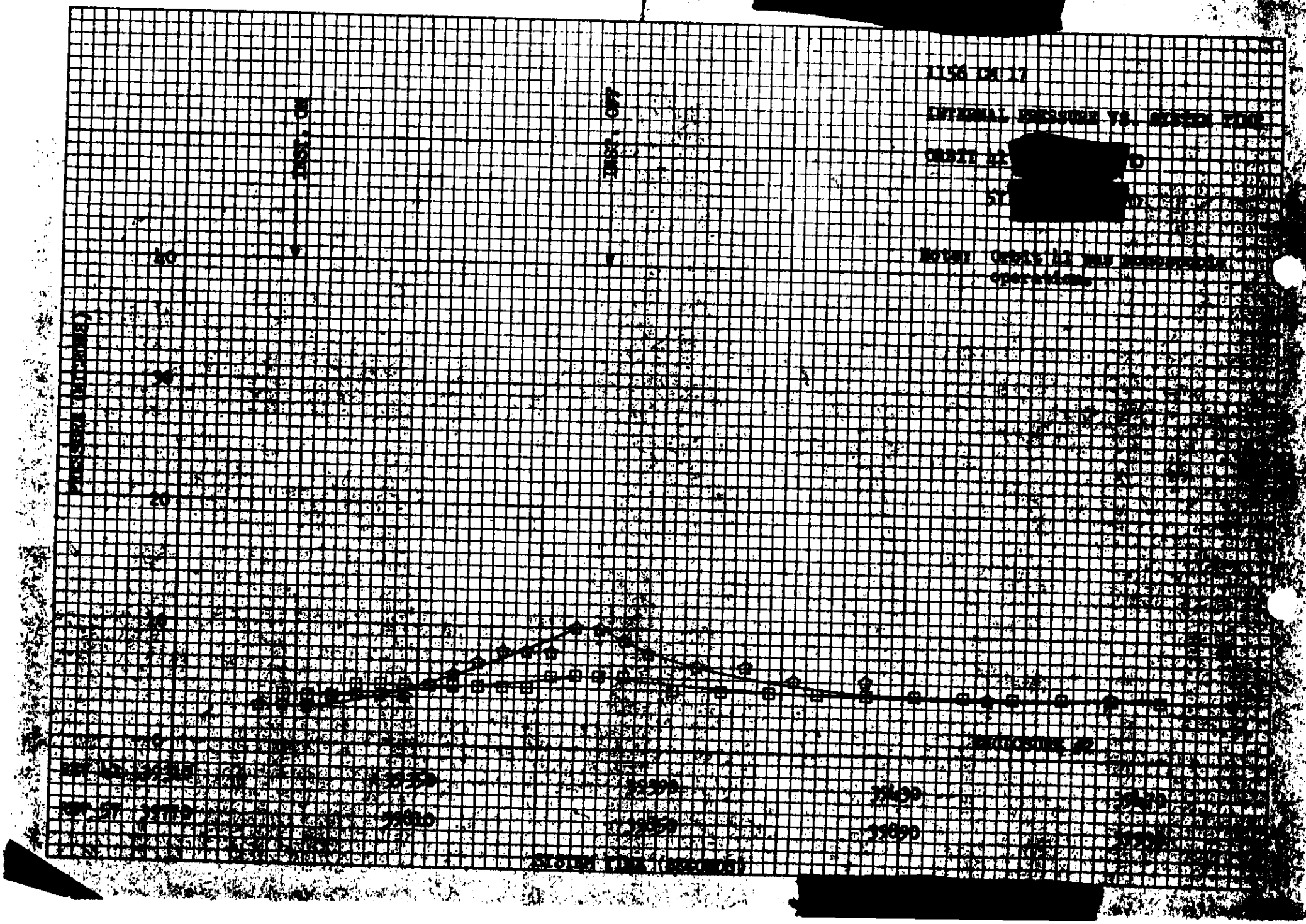
K&E 10 X 10 TO THE INCH KEUFFEL & ESSER CO. 359-5 MADE IN U. S. A.



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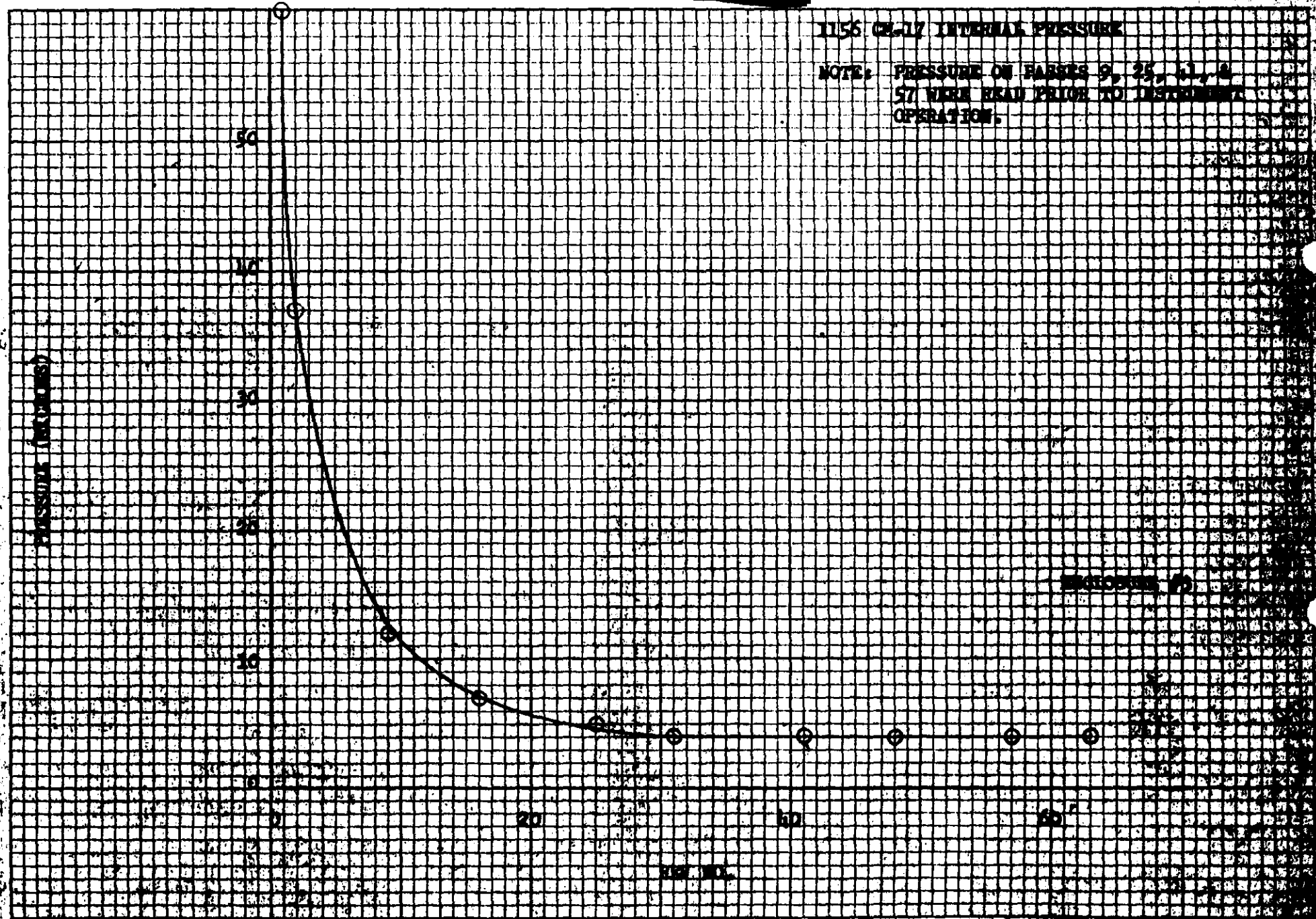
[redacted]

1156 CH-17 INTERNAL PRESSURE

NOTE: PRESSURE ON PAGES 9, 25, 41, & 57 WERE READ PRIOR TO INSTRUMENT OPERATION.



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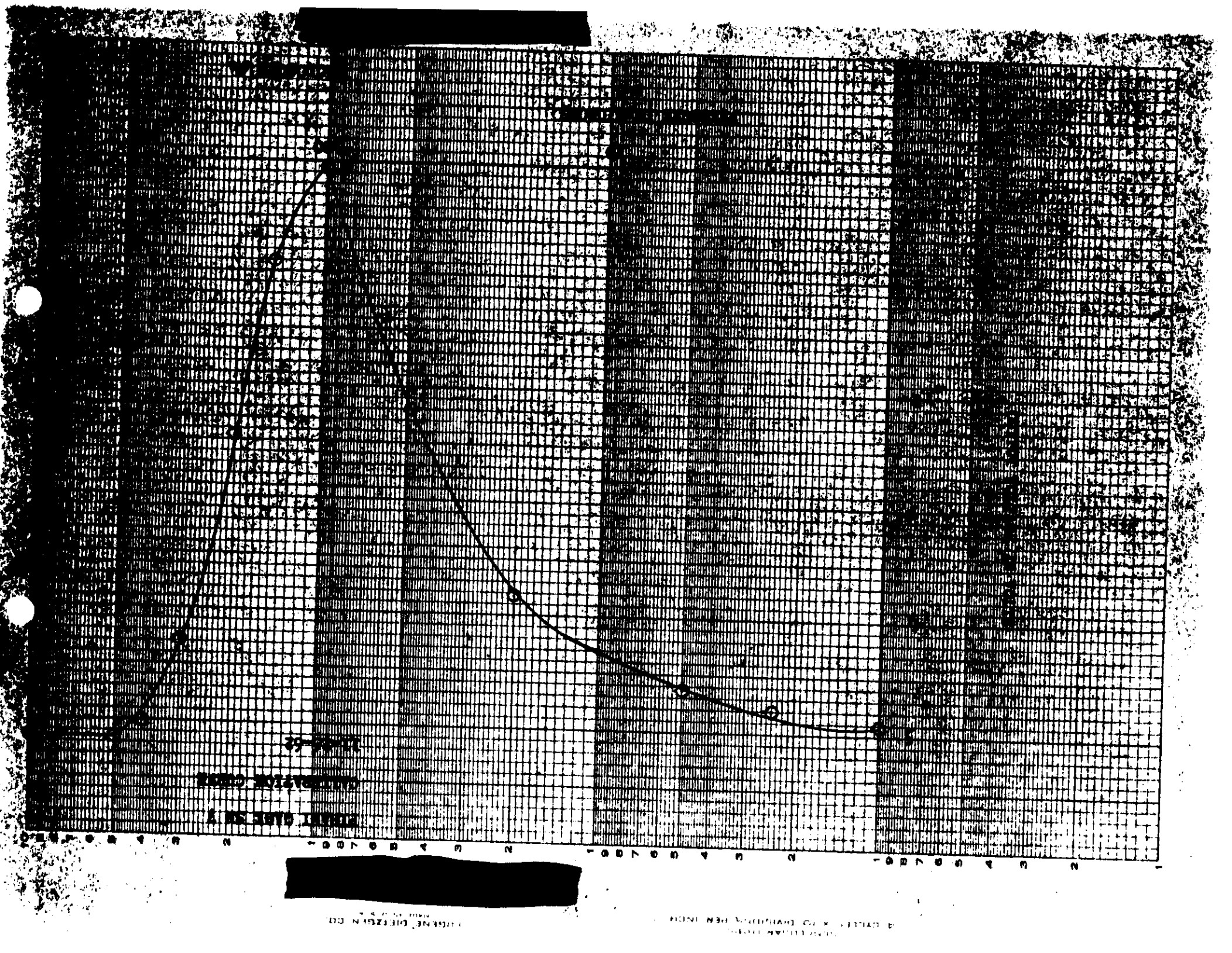

[redacted]

1156 TEMPERATURE ENVIRONMENT

T/S No.	Pin No.	Function	LAUNC. +490	1	2	9	16	25	31	41	48		63
2	30	Inst. No. 1	69.0	89.3	90.2	90.2	87.9	87.9	82.0	86.0	83.1	86.8	81.1
5	32	Inst. No. 1	73.5	87.7	83.1	83.1	80.7	80.7	75.5	80.7	76.0	80.7	74.9
7	34	Inst. No. 1	66.5	89.5	91.5	91.5	90.2	90.2	83.5	88.0	83.1	87.9	82.0
11	36	Inst. No. 1	93.0	89.3	80.7	85.5	80.7	85.5	76.4	82.0	74.9	80.7	72.6
12	38	Inst. No. 1	88.0	89.3	76.0	76.0	68.9	74.9	77.7	74.0	67.8	74.9	66.0
13	40	Inst. No. 1	57.2	87.0	82.6	82.0	76.0	79.6	75.5	77.0	72.4	76.0	69.5
2	42	Inst. No. 2	62.0	80.5	83.1	86.6	85.5	85.5	81.1	84.0	80.7	83.1	79.6
4	44	Inst. No. 2	63.0	83.1	81.6	92.8	84.2	92.8	78.9	90.0	78.3	87.9	76.3
6	46	Inst. No. 2	64.0	80.7	78.5	79.6	78.3	78.3	73.6	77.0	73.6	76.4	73.6
7	49	Inst. No. 2	62.0	81.5	83.5	85.5	83.1	84.2	78.3	83.0	80.7	83.1	78.3
11	51	Inst. No. 2	66.5	81.7	85.7	82.0	78.3	78.3	71.3	78.0	79.6	78.3	73.2
12	54	Inst. No. 2	70.0	82.9	83.8	91.5	83.1	92.8	78.1	88.0	77.1	87.9	76.8
13	57	Inst. No. 2	57.2	76.9	79.2	80.7	78.3	78.3	75.1	77.0	76.0	76.0	72.4
1	31	Clock No. 1	85.5	95.6	80.7	70.6	66.5	68.9	69.5	69.0	64.1	68.9	63.0
2	33	Clock No. 2	98.0	90.2	76.0	66.5	61.9	64.1	60.7	64.0	59.5	64.1	58.1
1	45	Thrust Cone	81.7	95.2	88.6	91.0	86.2	91.0	77.0	87.0	82.8	86.2	81.6
1	50	Fairing No. 1	-	-	-	-	-	-	-	-	-	-	-
3	52	Fairing No. 3	-	-	-	-	-	-	-	-	-	-	-
4	55	Fairing No. 4	-	81.9	82.9	76.8	69.2	76.8	53.8	72.0	58.5	74.2	55.6

ENCLOSURE #5

[redacted]

K&E 10 X 10 TO THE INCH KEUFFEL & ESSER CO. 359-5 MADE IN U. S. A.