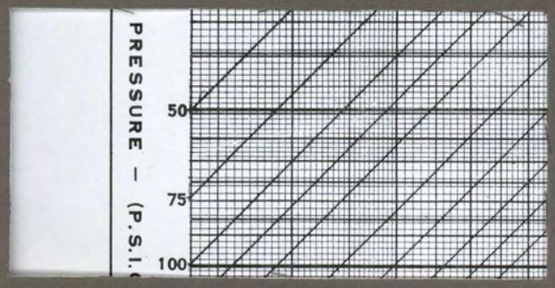
Folder Title:	Research - Energy 1975 / 1977 Correspondence 1 October 1976 - Volume 1
Folder ID:	30044844
Series:	Correspondence and Files Created for Research Projects in Support of Operations (Operations Policy Files)
Dates:	08/03/1976 – 08/03/1976
Subfonds:	Records of the Office of the Vice President, Development Policy (VPD) and the Development Policy Staff
Fonds:	Records of the Office of the Chief Economist
ISAD Reference Code:	WB IBRD/IDA DEC-01-02
Digitized:	03/29/2022

October 1, 1976

Research Energy 1975/77

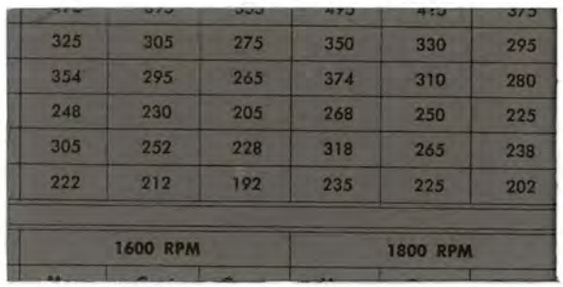
Central Files



more power to you...

ENERGY INDUSTRIES, INC.

Reference No.

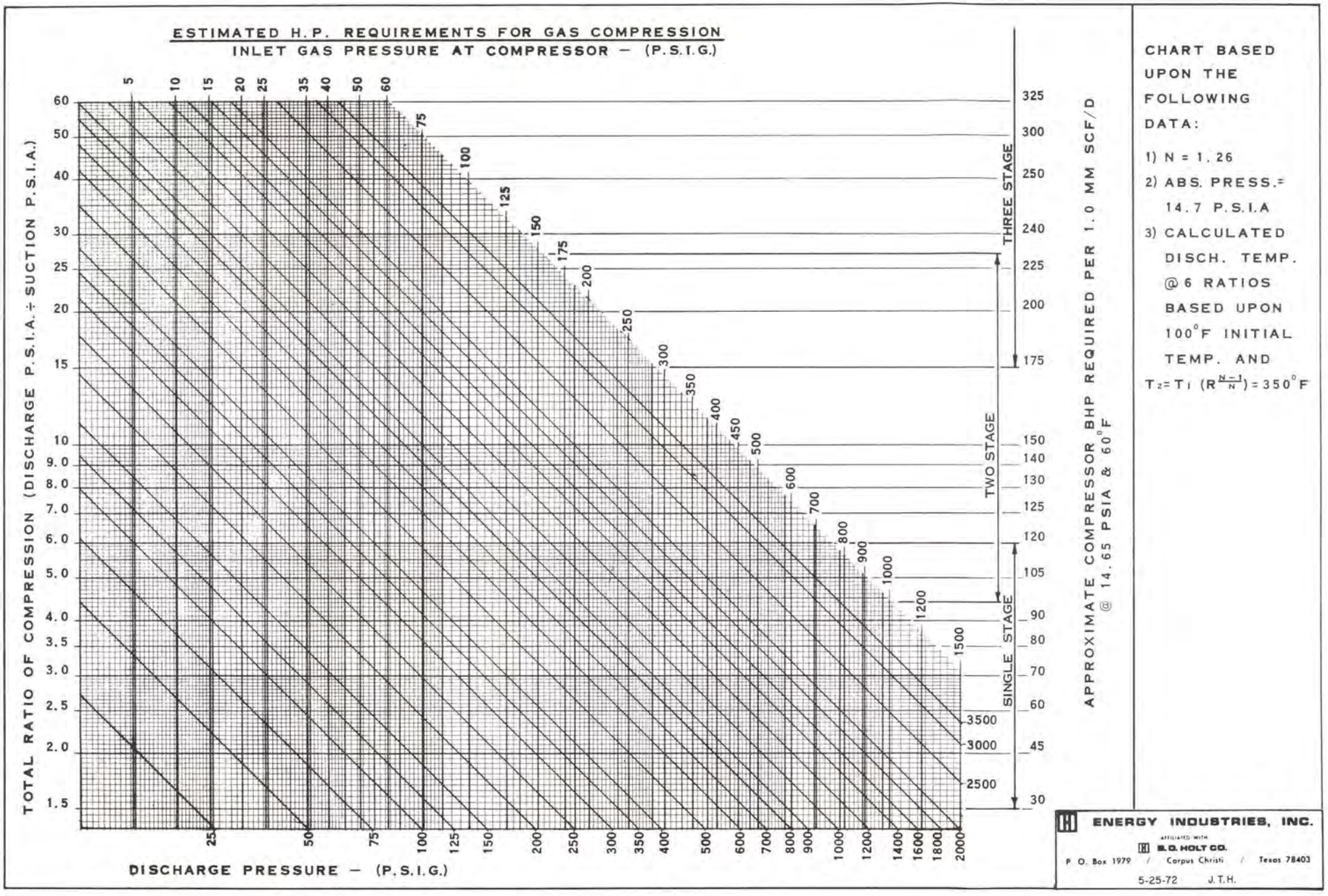


325	305	275	350	330	295
354	295	265	374	310	280
248	230	205	268	250	225
305	252	228	318	265	238
222	212	192	235	225	202
	1600 RPM			1800 RPM	

...through packaged energy

GAS COMPRESSORS						
MODEL	HORSEPOWER RANGE*	TYPE	NUMBER OF CYLINDERS	STROKE	MAXIMUM ROD LOAD*	SPEED RANGE*
TB-9	50-66	Horizontal	1	9"	10000#	90-400 RPM
TB-11	70-132	Horizontal	1	11"	18000#	80-360 RPM
TB-13	140-181	Horizontal	1	13"	22000#	75-327 RPM
5FE-050-20	200-400	Balanced Opposed	1 to 2	5"	20000#	500-1200 RPM
5FE-050-40	400-800	Balanced Opposed	1 to 4	5"	20000#	500-1200 RPM
FE-550A-20	200-600	Balanced Opposed	1 to 2	5"	25000#	500-1200 RPM
FE-550A-40	600-1200	Balanced Opposed	1 to 4	5"	25000#	500-1200 RPM
FE-650A-20	200-600	Balanced Opposed	1 to 2	6"	25000#	500-1000 RPM
FE-650A-40	600-1200	Balanced Opposed	1 to 4	6"	25000#	500-1000 RPM
6FE-065-20	500-1000	Balanced Opposed	1 to 2	6"	30000#	500-1000 RPM
6FE-065-40	800-1600	Balanced Opposed	1 to 4	6"	30000#	500-1000 RPM
FE-665A-20	600-1200	Balanced Opposed	1 to 2	6"	40000#	500-1000 RPM
FE-665A-40	800-2400	Balanced Opposed	1 to 4	6"	40000#	500-1000 RPM
*Applications at higher ratings are available with factory review and approval						

ENERGY INDUSTRIES, INC. Reference No.



GAS COMPRESSOR RATINGS

CAT NATURAL GAS ENGINES

	900 RPM			1000 RPM			1100 RPM			1200 RPM		
Model	Max.	Cont.	Comp.	Max.	Cont.	Comp.	Max.	Cont.	Comp.	Max.	Cont.	Comp.
G399TA	780	650	585	868	720	650	940	785	710	995	830	745
G399NA	510	480	445	580	548	495	645	608	545	700	660	595
G398TA	590	490	440	665	555	495	712	595	534	750	625	565
G398NA	385	360	325	440	410	370	490	460	412	530	500	450
G379TA	395	325	295	440	368	330	475	395	355	495	415	375
G379NA	255	240	215	295	275	248	325	305	275	350	330	295
G353TA	295	245	220	324	272	245	354	295	265	374	310	280
G353NA	195	180	160	224	208	185	248	230	205	268	250	225
G342TA	255	210	190	282	235	210	305	252	228	318	265	238
G342NA	185	175	155	205	195	175	222	212	192	235	225	202

	1200 RPM			1500 RPM			1600 RPM			1800 RPM		
	Max.	Cont.	Comp.	Max.	Cont.	Comp.	Max.	Cont.	Comp.	Max.	Cont.	Comp.
G343TA	248	208	188	311	260	235	335	280	250	372	310	280
G343NA	156	148	132	196	185	166	213	200	180	240	225	204
G333TA	150	125	115	195	164	146	210	175	157	234	195	175
G333NA	105	95	80	130	123	110	139	130	116	155	145	130

WHITE/SUPERIOR

Model	900 RPM
6G-825	600
6GT-825	825
8G-825	800
8GT-825	1100
12G-825	1200
12GT-825	1650
16G-825	1600
16GT-825	2200

STANDARD AND CUSTOM PACKAGES FOR . . .

Gas Compression. Gas Engine, Diesel Engine, Electric Motor Driven Packages for field or plant use.

Air Compression. Gas Engine, Diesel Engine, Electric Motor Driven, Air Cooled or Water Cooled Packages for field or plant use.

Pumping. Gas Engine, Diesel Engine, Electric Motor Driven Piston or Plunger Pumps, Vertical Turbine and Centrifugal Pumps for the Petroleum Industry.

ENERGY INDUSTRIES, INC.

P. O. BOX 1979 / CORPUS CHRISTI / TEXAS 78403

ENERGY INDUSTRIES LTD.

4303 - 11th St. N.E. / Calgary / Alberta T2E 6K4

Telephone 403 - 276-8821
Telex 03-824706

• Chicago Pneumatic Compression

August 3, 1976

International Bank for
Reconstruction and Development,
1818 H Street N.W.
Washington D.C. 20433.

Dear Sir:

Energy Industries Ltd. is a Canadian company, located in Calgary, Alberta which specializes in the fabrication of natural gas compressor units for the oil and gas industry.

We would like to bid on any bank financed projects that require natural gas compressor units. These compressor units are designed for unattended operation at either land or offshore locations.

Our company is registered with the Department of Industry, Trade and Commerce, Government of Canada, and we are able to export to any country in the world.

If we may be of any further assistance, please do not hesitate to contact us.

Yours Truly

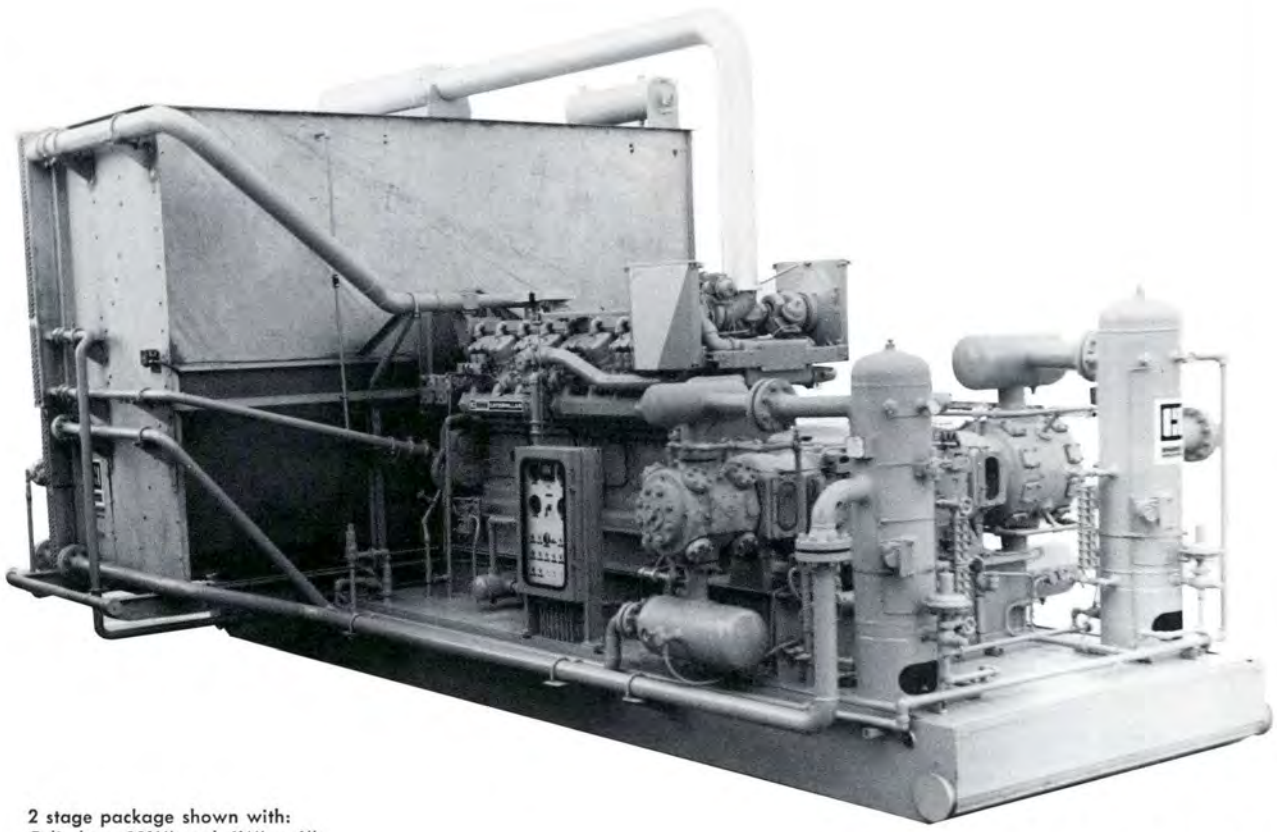
ENERGY INDUSTRIES LTD.

Robin W. Smith

RWS/vm
Brochures Enclosed

ENERGY INDUSTRIES

G399TA
SERIES 6FE20 COMPRESSOR PACKAGE



2 stage package shown with:
Cylinders—11½" and 6¼" x 6"
Scrubbers — 18 x 52 x 400 PSI
16 x 46 x 1000 PSI

APPROXIMATE WEIGHT 115,000 LBS.

Featuring

- NATURAL GAS ENGINE BY **CATERPILLAR**
- 6FE BALANCED-OPPOSED COMPRESSOR BY Chicago Pneumatic
- CUSTOM FABRICATION BY **ENERGY INDUSTRIES**

COMPRESSOR DATA — 6FE20

Make	Chicago Pneumatic
Model	6FE
Type	Horizontal balanced-opposed
Stroke	6"
Number throws	2
Rated speed	1000 RPM
Rated horsepower	*730
Rated rod load	*30,000 pounds
Rod diameter	2¼"
Crankshaft adjacent crank pin centers	7¾"
Crosshead shoes	10¼" long x 6" wide
Crosshead pin	3½" diameter
Connecting rod pin bushing	3½" diameter x 4" long
Crank pin bearings	6½" diameter x 3¼" long
Frame crosshead guide-face to face	60⅛"
No. of main bearings	2
Main bearings	6½" diameter x 3¼" long

*Higher Ratings on Application to Factory

DRIVE

Direct connected with steel disc type coupling

COOLER

Combination type, updraft air discharge, with engine and compressor jacket water cooling coils designed for 110° F ambient air. Includes individual 1200 psig working pressure gas cooling coils for each cylinder designed for 20°F approach with 100°F ambient air. Includes surge tank. Fan requirement 40 horsepower. Cooler sized for sweet, dry natural gas. Cooler is galvanized or inorganic zinc coated.

BASE

Welded steel-framed; steel-reinforced concrete filled; equipped with lugs for loading and skidding. Base has adequate strength and mass to serve as operating foundation. Steel frame is sandblasted, inorganic zinc coated, primed, and painted. Steel channel gutter embedded at perimeter of base with threaded outlets at each corner.

PIPING

All screwed piping minimum schedule 80 seamless steel. Forged steel fittings. Welded piping ASME Code constructed. Pulsation bottles with tuning orifices installed at the inlet and outlet of cylinders. Suction and discharge companion flanges furnished complete with studs, nuts and gaskets. Relief valves are installed between the compressor cylinder outlets and the gas cooling coils. Thermometers are installed at the cylinder inlets and outlets. Pressure taps have block valves and pressure gauges have pulsation dampers. A vent valve and a valved by-pass from final outlet to the first stage inlet are installed for air purging and unloaded starting. All vents and drains are manifolded, and piped to edge of skid. All conduit, low pressure lines, vents and drains are embedded below the concrete surface. Fuel and starting gas systems are completely piped. Industrial exhaust silencer mounted. Welded gas piping, bottles and scrubbers sandblasted, inorganic zinc coated, primed, and painted.

SAFETY SWITCHES

All Units Are Equipped With Magneto Powered Shutdown Switches:

- Low engine lube oil press./level
- High engine jacket water temp.
- Engine overspeed
- Low jacket water level
- Low compressor crankcase lube oil press./level
- Low lubricator oil level
- Vibration (cooler & compressor)
- High/low suction pressure
- High/low interstage pressure
- High/low discharge pressure
- High discharge temp. (Cyl. No. 1 & 2)
- High liquid level, suction scrubber
- High liquid level, interstage scrubber
- Automatic fuel shut-off valve

Unit is equipped with combination shutdown/oil level regulators for engine crankcase, compressor crankcase and cylinder lubricator. Also equipped with cylinder lubrication distribution system with divider blocks and shutdown.

PANEL

Skid-mounted weatherproof enclosed with glass front. All wiring rigid conduit enclosed and connected from controls to panel terminal blocks. Contains pressure gauges for each pressure level, lock-out timer, stop-run switch and annunciators for safety shutdowns. Electronic tachometer standard.

CYLINDERS

Bore Range (Inches)	Valves Per Cylinder Quantity	Valve Number	Working Pressure (psig)
3½ — 4½ L (1)	4	22-c	1800
4¾ — 5½ L (1)	4	32-c	1500
5¾ — 6½ L (1)	8	22-c	1200
7½ — 8¾ L (1)	8	32-c	1000
9 — 11 (2)	12	32-c	400
11½ — 13½ (2)	16	32-c	400

(1) Bore range in increments of ¼ inch

(2) Bore range in increments of ½ inch

(L) Hand removable liners

NOTE: Specifications for optional cylinders up to 23 in. bore available on request.

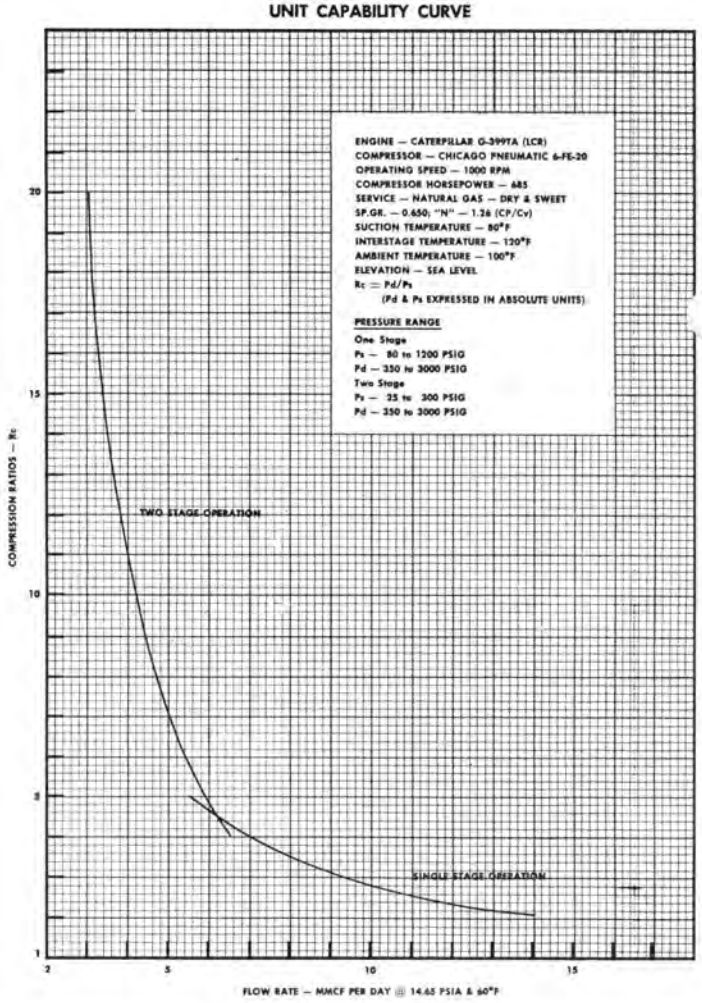
SCRUBBER

	STAGE 1	2
Size (in. O.D. x in. S.S.)*	18 x 52	16 x 46
Working pressure (psig)	400	1000

Scrubbers ASME Code construction and stamped; equipped with mesh-pad type mist extractors; reflex level gauges; level switch; diaphragm operated dump valves with float type controller designed for compressor service, plus quick-opening and self-flushing manual drain valves.

***NOTE:** Specifications for optional scrubbers available on request.

UNIT CAPABILITY CURVE



ENGINE DATA

MAKE: Caterpillar

MODEL: G399TA

TYPE: Four cycle, spark ignited, turbocharged aftercooled

NUMBER OF CYLINDERS	V-16
BORE AND STROKE: inches	6.25 x 8.00
PISTON DISPLACEMENT: cu. in.	3927
COMPRESSION RATIO	7:1
FLYWHEEL HOUSING	SAE No. 00
ROTATION CLOCKWISE	SAE Standard
NORMAL WORKING RANGE	900-1200 RPM
LOW IDLE RPM	425

CAPACITIES FOR LIQUIDS:	**IMP. GAL.**	**U.S. GAL.**
Cooling System (engine only)*	71	85
Cooling System (Complete)*	158	190
Lubricating Oil System (refill)*	92	110

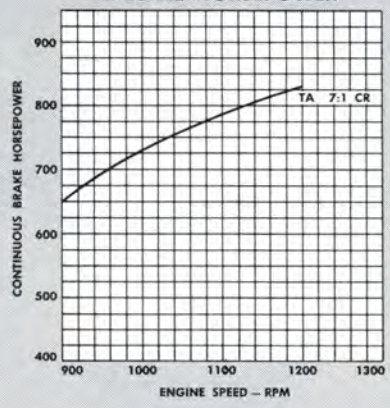
WEIGHT: Net Dry* ..... 15,000 Lbs.

*Approximate

STANDARD EQUIPMENT

Dry, Single Stage, Air Cleaners
Gas Pressure Regulator
Low Tension, Solid-State Ignition System
Gear-Driven Jacket Water Pump
Gear-Driven Auxiliary Water Pump
Water Temperature Gauge
Lube Oil Cooler and Filters
Automatic Prelube Pump
Lube Oil Pressure Gauge
Watercooled Exhaust Manifolds
Hydra-Mechanical Governor
Manual Stop Switch
Lifting Eyes
Tachometer Drive (SAE Standard ½ Engine Speed)
Thermostats and Housing
Service Meter
Floor Type Mounting Rails
Air/Gas Starter

ENGINE HORSEPOWER



RATING

CONTINUOUS is the horsepower and speed capability of the engine which can be utilized without interruption or load cycling. This can extend for months or years of operation if the engine is equipped for non stop lube oil and filter changes.

STANDARDS:

Gas engine ratings are at SAE Standard conditions of 29.38 in. (746 mm.) Hg. and 85°F (30°C). Curves are based on 905 BTU per cubic foot low heat value gas.

WARRANTY

Packages are designed and warranted by Energy Industries, Inc., providing single source responsibility for your complete compressor requirements. Units are engineered and tested, insuring compatibility, increasing plant reliability, decreasing initial investment.

Energy Industries, Inc. warrants products sold by it to be free from defects in material and workmanship, under normal use and service, for six (6) months after date of delivery to the initial user, subject to the following provisions. This warranty is limited to the repair or replacement, as **Energy Industries, Inc.** may elect and at an establishment authorized by it, of such parts as shall appear to **Energy Industries, Inc.**, upon inspection, to have been defective in material or workmanship, but does not include any installation or transportation costs. This warranty does not apply to normal maintenance service (such as engine tune-up) or to normal replacement of service items (such as service filters). No warranty is made with respect to items made by others when such items are warranted by their respective makers or when they are supplied by **Energy Industries, Inc.**, on special order. No recommendation of items made by others shall imply or constitute any warranty with respect to such items. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

COMPRESSOR DATA — 5FE40

Make	Chicago Pneumatic
Model	5FE
Type	Horizontal balanced-opposed
Stroke	5"
Number throws	4
Rated speed	*1000 RPM
Rated horsepower	*800
Rated rod load	20,000 pounds
Rod diameter	1¾"
Crankshaft adjacent crank pin centers	6¼"
Crosshead shoes	6⅜" long x 5-15/16" wide
Crosshead pin	3" diameter
Connecting rod pin bushing	3" diameter x 3½" long
Crank pin bearings	5" diameter x 2¾" long
Frame crosshead guide face-to-face	52"
No. of main bearings	4
Main bearings	5" diameter x 2¾" long

*Higher Ratings on Application to Factory

DRIVE

Direct connected with steel disc type coupling

COOLER

Combination type, updraft air discharge, with engine and compressor jacket water cooling coils designed for 110° F ambient air. Includes individual gas cooling coils for each cylinder designed for 20°F approach with 100°F ambient air. Includes surge tank. Fan requirement 40 horsepower. Cooler sized for sweet, dry natural gas. Cooler is galvanized or inorganic zinc coated.

BASE

Welded steel-framed; steel-reinforced concrete filled; equipped with lugs for loading and skidding. Base has adequate strength and mass to serve as operating foundation. Steel frame is sandblasted, inorganic zinc coated, primed, and painted. Steel channel gutter embedded at perimeter of base with threaded outlets at each corner.

PIPING

All screwed piping minimum schedule 80 seamless steel. Forged steel fittings. Welded piping ASME Code constructed. Pulsation bottles with tuning orifices installed at the inlet and outlet of cylinders. Suction and discharge companion flanges furnished complete with studs, nuts and gaskets. Relief valves are installed between the compressor cylinder outlets and the gas cooling coils. Thermometers are installed at the cylinder inlets and outlets. Pressure taps have block valves and pressure gauges have pulsation dampers. A vent valve and a valved by-pass from final outlet to the first stage inlet are installed for air purging and unloaded starting. All vents and drains are manifolded and piped to edge of skid. All conduit, low pressure lines, vents and drains are embedded below the concrete surface. Fuel and starting gas systems are completely piped. Industrial exhaust silencer mounted. Welded gas piping, bottles and scrubbers sandblasted, inorganic zinc coated, primed, and painted.

SAFETY SWITCHES

All Units Are Equipped With Magneto Powered Shutdown Switches:

- Low engine lube oil press./level
- High engine jacket water temp.
- Engine overspeed
- Low jacket water level
- Low compressor crankcase lube oil press./level
- Low lubricator oil level
- Vibration (cooler & compressor)
- High/low suction pressure
- High/low interstage pressures
- High/low discharge pressure
- High discharge temp. (all cylinders)
- High liquid level, suction scrubber
- High liquid level, interstage scrubbers
- Automatic fuel shut-off valve

Unit is equipped with combination shutdown/oil level regulators for engine crankcase, compressor crankcase and cylinder lubricator. Also equipped with cylinder lubrication distribution system with divider blocks and shutdown.

PANEL

Skid-mounted weatherproof enclosed with glass front. All wiring rigid conduit enclosed and connected from controls to panel terminal blocks. Contains pressure gauges for each pressure level, lock-out timer, stop-run switch and annunciators for safety shutdowns. Electronic tachometer standard.

CYLINDERS

Bore Range (Inches)	Valves Per Cylinder Quantity	Valve Number	Working Pressure (psig)
3½ — 4½ L (1)	4	22-c	1800
4¾ — 5½ L (1)	4	32-c	1500
5¾ — 6½ L (1)	8	22-c	1200
7½ — 8¾ L (1)	8	32-c	1000
9 — 11 (2)	12	32-c	400
11½ — 13½ (2)	16	32-c	400

(1) Bore range in increments of ¼ inch

(2) Bore range in increments of ½ inch

(L) Hand removable liners

NOTE: Specifications for optional cylinders up to 23 in. bore available on request.

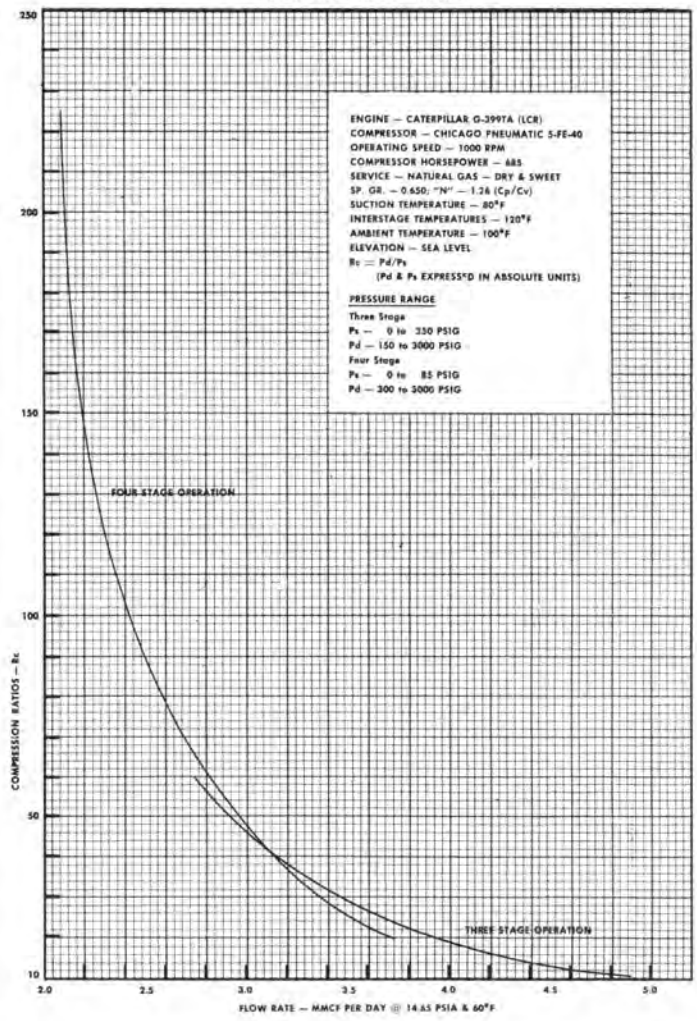
SCRUBBER

	STAGE 1	2	3
Size (in. O.D. x in. S.S.)*	24 x 48	16 x 48	14 x 48
Working pressure (psig)	400	500	1000

Scrubbers ASME Code construction and stamped; equipped with mesh-pad type mist extractors; reflex level gauges with valves; level switch, diaphragm operated dump valves with float type controller designed for compressor service, plus quick-opening and self-flushing manual drain valves.

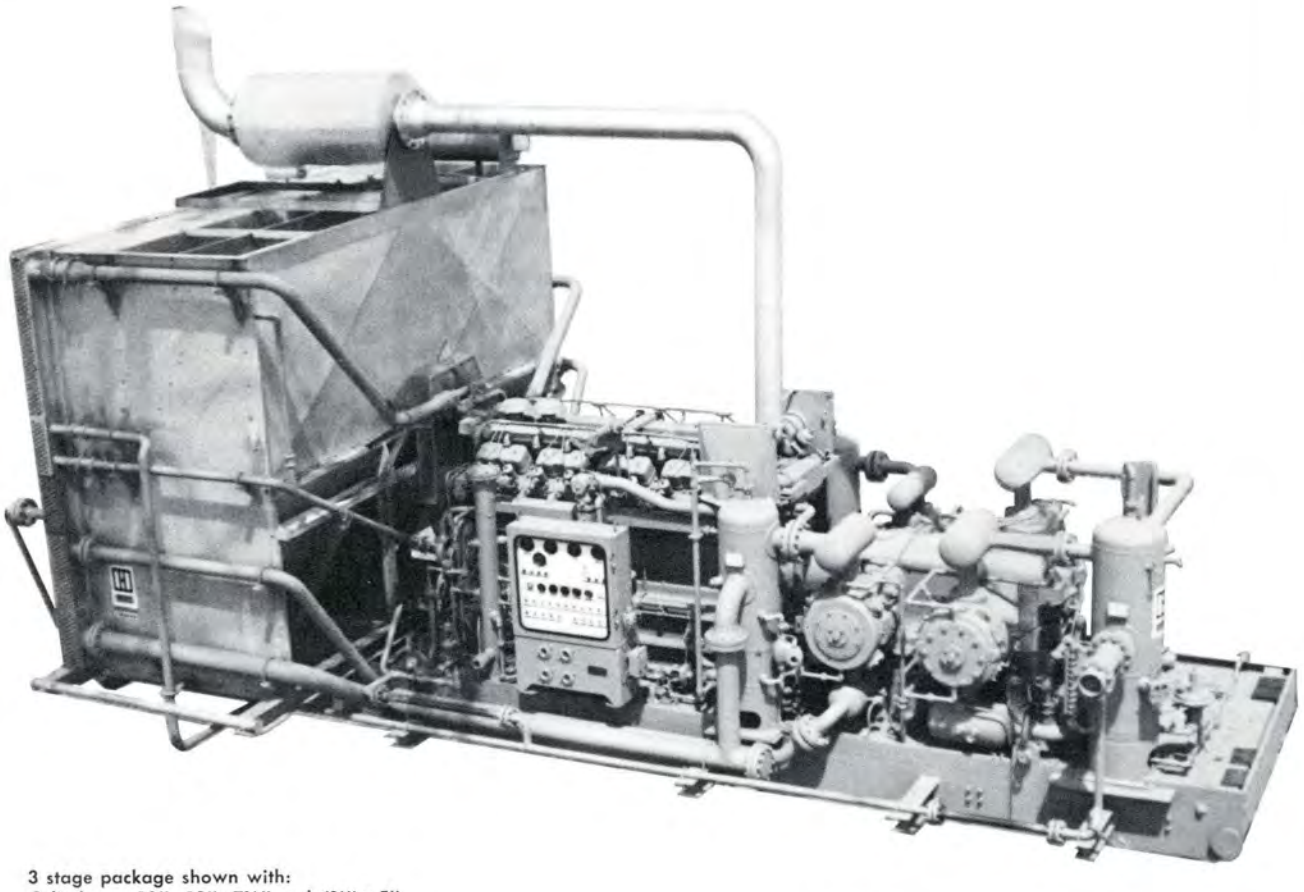
***NOTE:** Specifications for optional scrubbers available on request.

UNIT CAPABILITY CURVE



ENERGY INDUSTRIES

G399TA
SERIES 5FE40
COMPRESSOR
PACKAGE



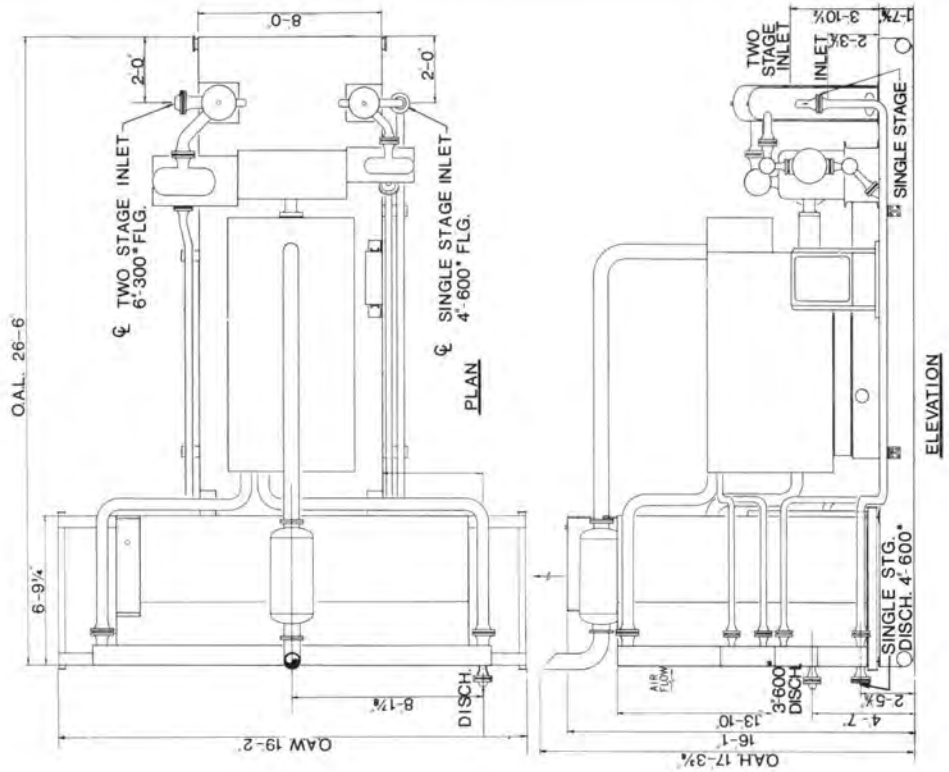
3 stage package shown with:
Cylinders — 10"—10"—7½" and 4¾" x 5"
Scrubbers — 20" x 52" x 400 PSI
18" x 48" x 400 PSI
16" x 48" x 1000 PSI

APPROXIMATE WEIGHT 138,000 LBS.

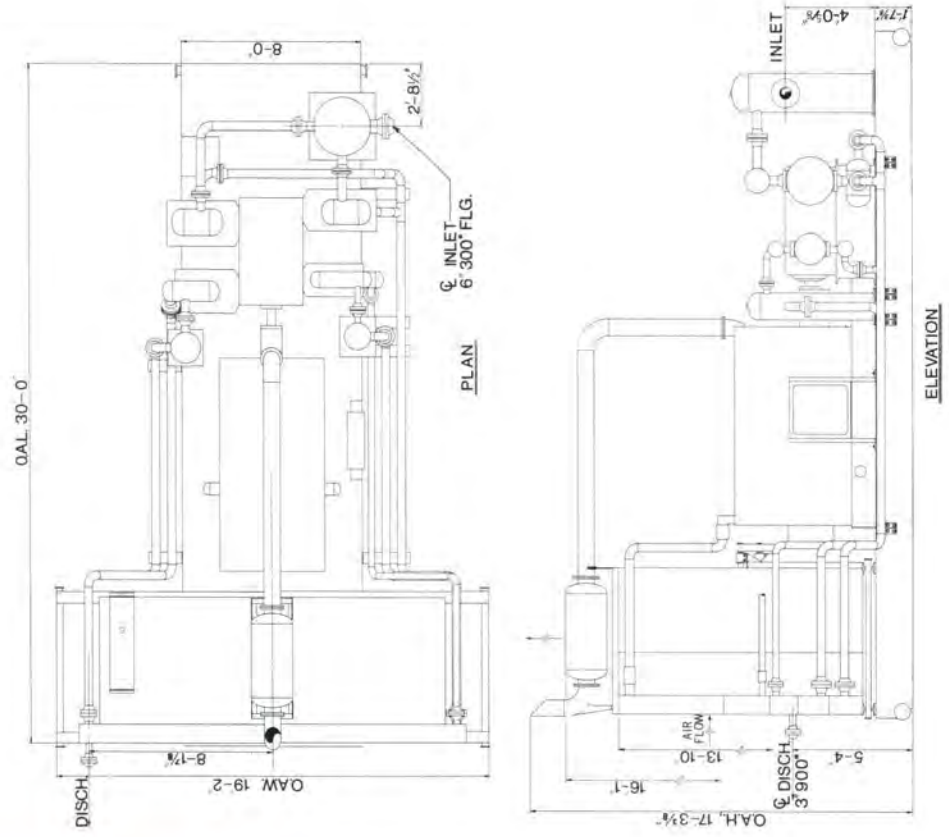
Featuring

- NATURAL GAS ENGINE BY **CATERPILLAR**
- 5FE BALANCED-OPPOSED COMPRESSOR BY Chicago Pneumatic
- CUSTOM FABRICATION BY **ENERGY INDUSTRIES**

6FE20



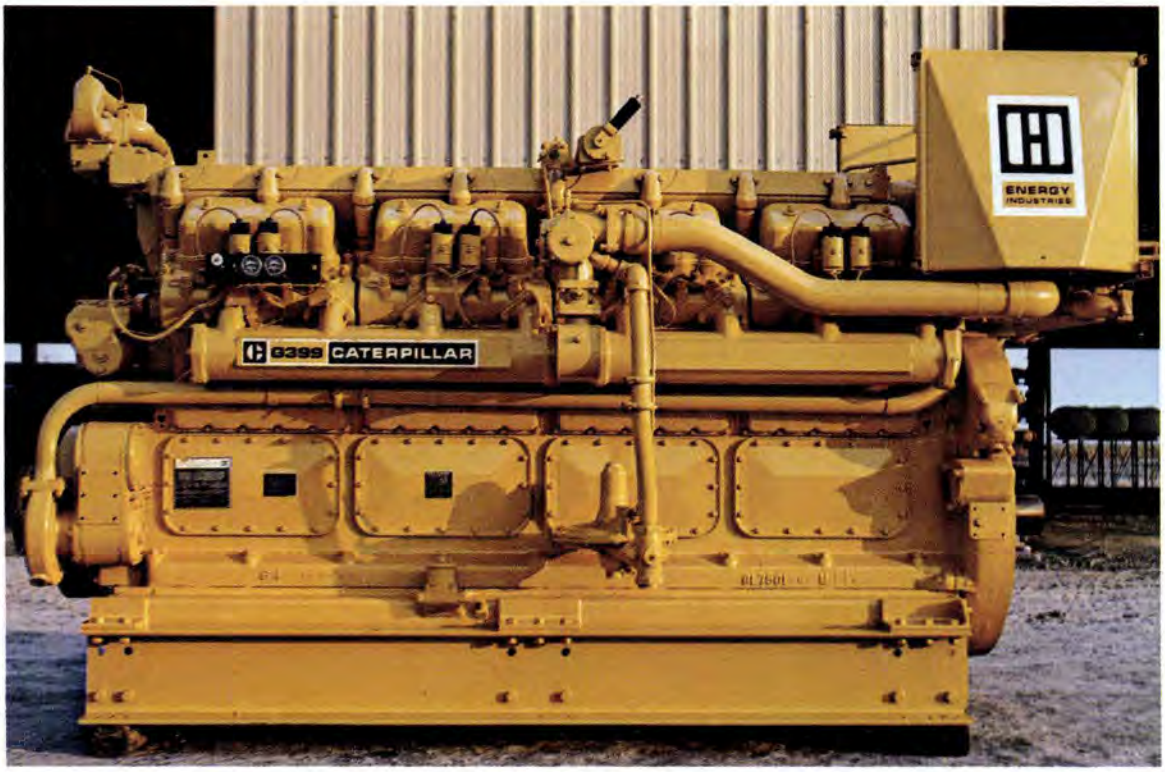
5FE40



ENERGY INDUSTRIES

CORPUS CHRISTI, TEXAS, U.S.A.
LAFAYETTE, LOUISIANA, U.S.A.
CALGARY, ALBERTA, CANADA

Gas Compressor Packages by ENERGY INDUSTRIES



CATERPILLAR ENGINE FEATURES

- ☐ Caterpillar Gas Engines' peak pressures are 50% less than the same engine in diesel operation. Diesel strength enables gas engines to have an exceptionally long service life.
- ☐ All Caterpillar engines are designed from the ground up as turbocharged units. Naturally aspirated models are also available.
- ☐ 85% of gas engine parts are also common to the diesel engine, and since they are produced in large quantities, their prices are appreciably lower.
- ☐ Caterpillar large bore natural gas V engines have more than 99% parts interchangeability.
- ☐ The large oil capacity in the Caterpillar engine system allows the oil to be used for cooling as well as lubrication.
- ☐ Ignition system is low tension, solid state with a high voltage transformer at each plug to produce the required spark intensity.
- ☐ Special silicone rubber insulators at the plugs insure maximum dependability even in wet areas. This reduces ignition failure as a result of moisture.
- ☐ Heavy internal ribbing and a one piece close-grained grey iron casting gives the engine block unusual strength.
- ☐ Engine crankshaft is capable of delivering 100% of engine horsepower from either end. It is steel forged, induction hardened, stress relieved and shot peened for extra strength and hardness.
- ☐ Camshafts are one piece forgings with induction hardened cam lobes and bearing journals.
- ☐ Connecting rods are forged, hardened and shot peened for greater strength.
- ☐ Bearings have steel backing to increase load capacity; aluminum alloy facing provides embedability for grit particles, and gives optimum heat transfer; lead-tin plating resists corrosion and provides a dry lubrication during break-in.
- ☐ Valve guides are knurled and spiral grooved to insure proper lubrication for the valve stem while maintaining a close tolerance for proper valve alignment. Valves rotate 3-degrees upon each opening for uniform wear and elimination of hot spots.
- ☐ Pistons are manufactured of low silicone aluminum to provide greater tensile strength and heat dissipation. Cat pistons are both cam ground and tapered so that at operating temperature and pressure they reach a cylindrical shape which provides increased operating efficiency.
- ☐ Three ring pistons provide greater piston strength and reduced friction for improved efficiency. All Cat-built rings are chromed to minimize wear.
- ☐ Cylinder liners are alloyed cast iron. The inner liner surface is electro-hardened and microhoned to a uniform .001". This attention to construction extends liner, piston and ring life.

CATERPILLAR NATURAL GAS ENGINE GAS COMPRESSOR RATINGS

1000 RPM					1800 RPM				
MODEL		MAX.	CONT.	COMP.	MODEL		MAX.	CONT.	COMP.
G399	TA-LCR	868	720	650	**G343**	TA-LCR	372	310	280
	NA-HCR	580	548	495		NA-HCR	240	225	204
G398	TA-LCR	665	555	495	**G333**	TA-LCR	234	195	175
	NA-HCR	440	410	370		NA-HCR	155	145	130
G379	TA-LCR	440	368	330					
	NA-HCR	295	275	248					
G353	TA-LCR	324	272	245					
	NA-HCR	224	208	185					
G342	TA-LCR	282	235	210					
	NA-HCR	205	195	175					

NOTE: WHITE/SUPERIOR engines are available in the 825 line with 6, 8, 12, 16 cylinder configurations either turbocharged or naturally aspirated in a 700 to 2200 horsepower range.

TURBOCHARGING AND AFTERCOOLING

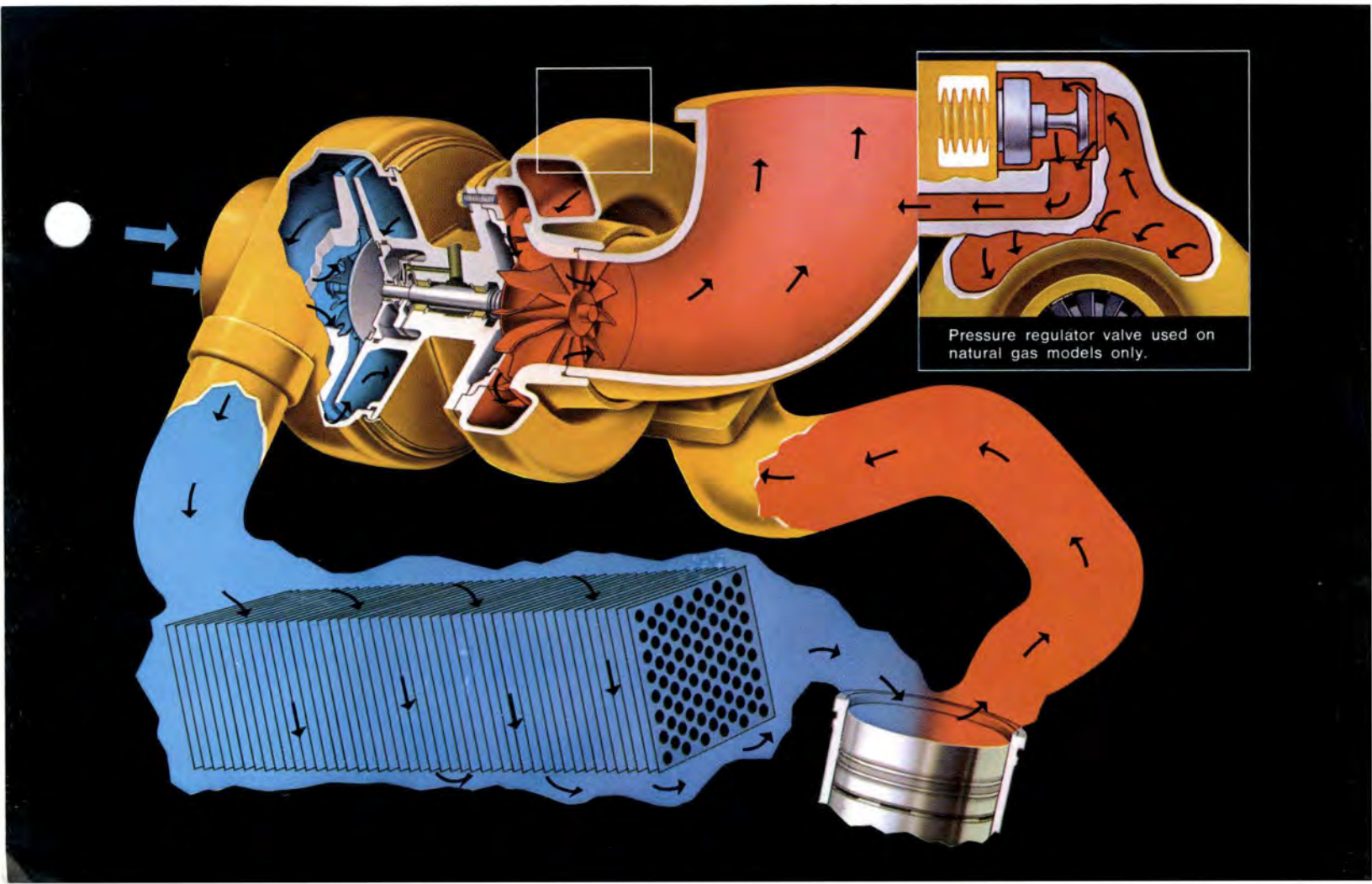
HOW THE SYSTEM OPERATES

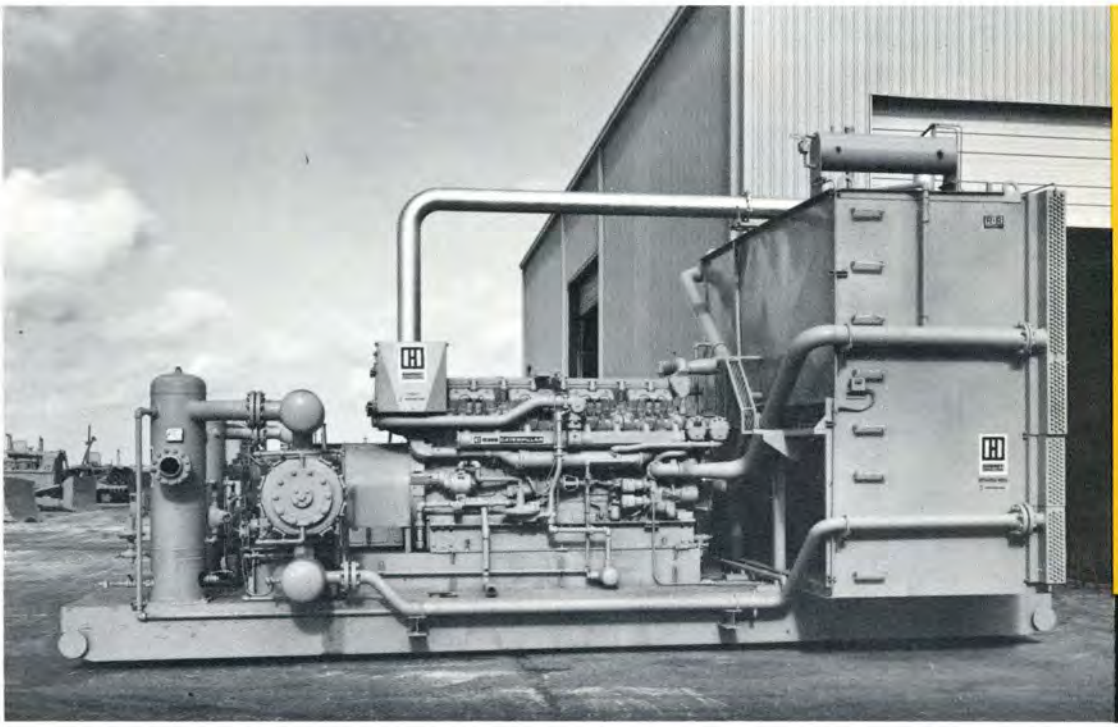
Engine exhaust rotates the turbine wheel. This action is illustrated in red. A centrifugal air compressor on the same shaft compresses air, then pumps it through the water-cooled aftercooler. The resulting dense air, in blue, is then charged into the engine's cylinders. More oxygen per cubic foot of air means an engine can burn more fuel for more power. Combustion process is improved.

All V engines use two turbochargers and twin aftercoolers. Exhaust from one cylinder bank powers air compression for opposite side of engine. Balanced operation.

Natural Gas Manifold Pressure Regulation

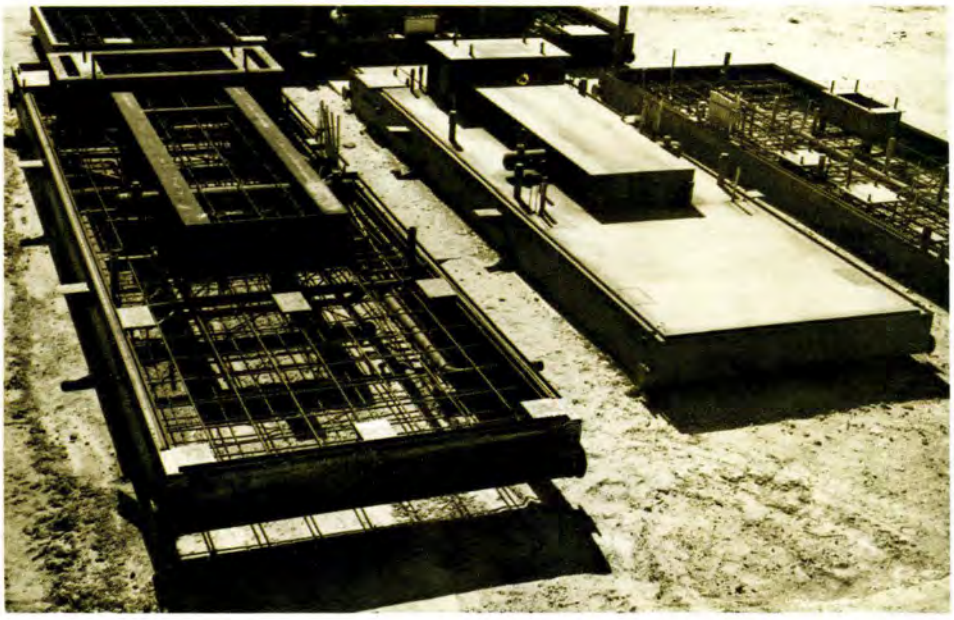
This exhaust by-pass control valve mounts on each natural gas engine turbocharger to prdouce good lugging characteristics and rapid engine acceleration under load. The valve is energized when air pressure feeding into the carburetor reaches a preset level.





G399TA/6FE two-stage, horizontal-opposed gas compressor package.

ENERGY INDUSTRIES COMPRESSOR PACKAGES

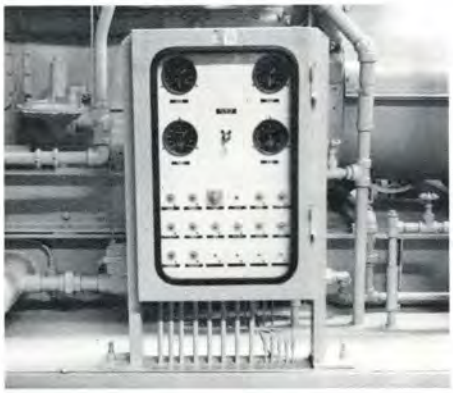


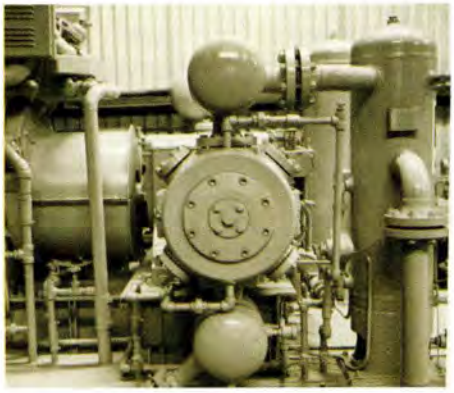
SKID DESIGN:

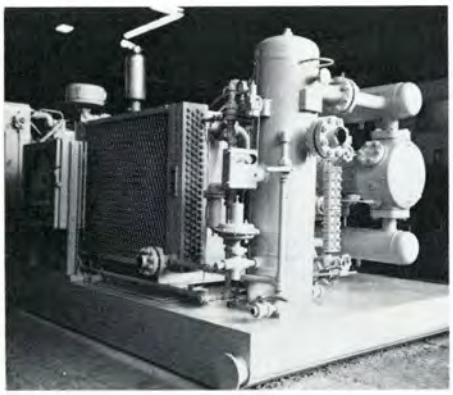
- ☐ Anchor bolts welded at base for proper location and elongation to insure that fasteners remain tight during operation.
- ☐ Steel channel gutter imbedded at perimeter of base with outlets at each corner.
- ☐ Base has sufficient strength for loading, transporting, and unloading by oil field haulers.
- ☐ Two layers of reinforcing steel bars forming a 12″x12″ lattice structure.
- ☐ Frame work is sandblasted, inorganic zinc coated, primed and painted to retard corrosion.
- ☐ Single pour, concrete-filled base to insure homogenous foundation.
- ☐ Drain and vent piping are individually manifolded and embedded in the concrete base to prevent damage and provide a safe, clean package with a smooth, uncluttered surface.
- ☐ Base has adequate strength and mass to serve as an operating foundation. Eliminates the cost of a field-poured foundation and its eventual removal.

COOLER DESIGN:

- ☐ All coils are bolted on and can be changed in the field without welding.
- ☐ Fully enclosed fan to meet OSHA requirements.
- ☐ Constructed to ASME standards. Certification stamp furnished as option.
- ☐ Individually removable tubes with access plugs for easy repair in the field.
- ☐ Fan blades and hubs have premarked angle settings to allow manual pitch adjustment in the field without the use of a protractor. Blades are individually replaceable.
- ☐ All coolers are sized for a 50-50 ethylene-glycol mixture or approximately 20% larger capacity than for a straight water - filled cooler.
- ☐ Jacket water coil section designed for 110°F ambient air.
- ☐ All gas coils are designed for 1200 psig and 20°F approach at 100°F ambient air.
- ☐ Surge tank is cooler mounted with access ladder and pressure cap at fill point.
- ☐ Bolt-on shutters available as an option and are easily added in the field without welding. Available with pneumatic or manual actuators.
- ☐ Fully galvanized to retard corrosion.
- ☐ Gas coils on two throw compressor units are designed for either single or two-stage operation.
- ☐ Extreme versatility due to design.







SAFETY SWITCHES AND PANEL:

- ☐ Magneto powered shut-down switches with following functions:
  - Engine lube oil low pressure/level.
  - Engine jacket water high temperature/low level.
  - Engine overspeed.
  - Compressor lube oil low pressure/level.
  - Lubricator oil low level/flow.
  - Vibration (cooler and compressor).
  - High/low suction pressure.
  - High/low interstage pressure (multi-stage units).
  - High/low discharge pressure.
  - High discharge temperatures (each cylinder).
  - High liquid level, suction scrubber.
  - High liquid level, interstage scrubber (multistage units).
- ☐ Automatic fuel shut-off valve.
- ☐ Enclosed weatherproof panel with glass front.
- ☐ Skid mounted supports.
- ☐ Rigid conduit enclosed wiring. Panel wired from controls to panel terminal blocks.
- ☐ Panel contains:
  - Pressure gauges for each stage.
  - Pressure gauge for engine manifold.
  - Lock-out timer.
  - Stop-run switch.
  - Annunciators for safety shutdowns.
  - Tachometer at buyers option.
- ☐ Pneumatic panel available at buyers option.

FLANGES & PIPING:

- ☐ Forged steel flanges with reusable spiral wound gaskets for better seal and easier removal.
- ☐ Suction and discharge companion flanges furnished complete with studs, nuts, and gaskets.
- ☐ All screwed piping is minimum Schedule 80 seamless with forged steel fittings for greater structural strength.
- ☐ Pulsation bottles with tuning orifices installed at inlet and outlet of cylinders for pulsation control.
- ☐ Relief valves installed between cylinder outlet and cylinder gas cooling coil to protect cylinder, coil, and scrubber from over pressure.
- ☐ Thermometers are installed at cylinder inlets and outlets.
- ☐ Welded piping is constructed to ASME standards. Certification is available as an option.
- ☐ Pressure taps have block valves and pressure gauges have pulsation dampers.
- ☐ Vent valve and valved by-pass from final discharge to first stage inlet are installed for air purging and unloaded starting.
- ☐ All external welded piping and bottles are sandblasted, inorganic zinc coated, primed, and painted to retard corrosion.

SCRUBBERS:

- ☐ Constructed to ASME standards and certified.
- ☐ Mesh-pad mist extractor.
- ☐ Reflex level gauge with valves.
- ☐ Level switch.
- ☐ Diaphram operated dump valve with float type controller designed for compressor service.
- ☐ Quick-opening and self-flushing manual drain valve.
- ☐ Sandblasted, inorganic zinc coated, primed, and painted to retard corrosion.

ADDITIONAL FEATURES:

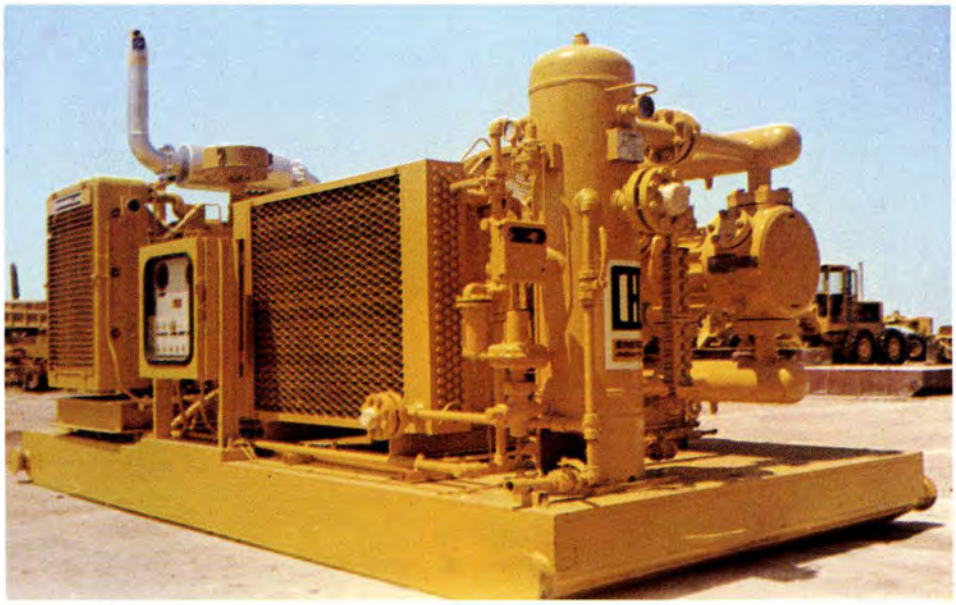
LUBRICATION—Unit is equipped with combination shutdown/oil level regulators for engine crankcase, compressor crankcase and cylinder lubricator. Also equipped with cylinder lubrication distribution system with divider blocks and shutdown.

FASTENERS — All bolts used are Grade 8 bolts. These give longer life and better service than the more commonly used Grade 3 bolts.

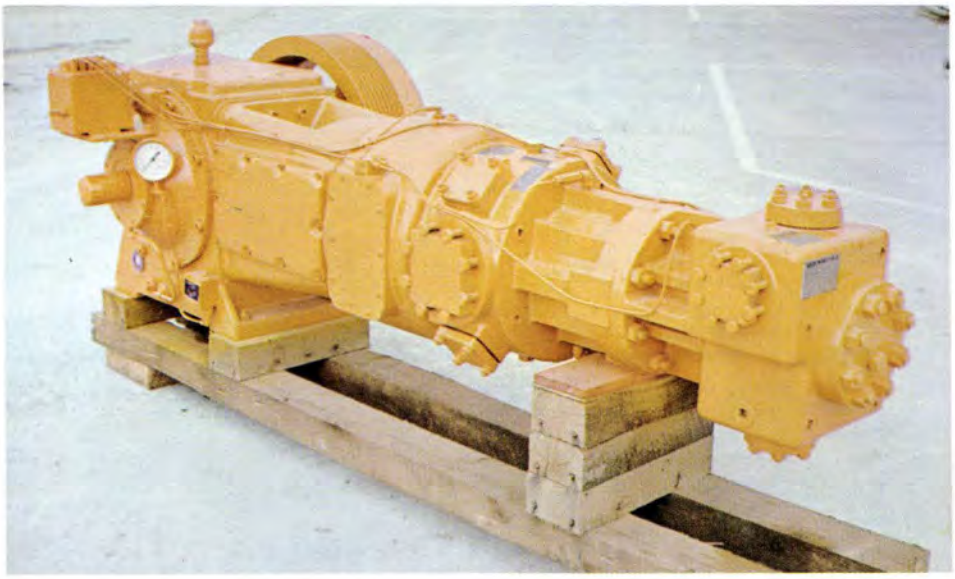
MUFFLERS — Industrial type silencers are standard and residential type silencers are available as well as exhaust condenser at buyers option.

Fully-equipped gas compressor package leaves corporate headquarters ready for immediate installation.

CHICAGO PNEUMATIC COMPRESSORS



Class "T"—horizontal, in-line compressors with 7", 9", 11", and 13" strokes and horsepowers from 25 to 180.



Class "TH2" — horizontal, in-line compressors with tandem cylinders wi 7" and 9" strokes and horsepowe from 50 to 150.

Class "FE" — balanced-opposed compressors with 5" and 6" strokes and horsepowers from 250 to 2400.

CLASS "T" FEATURES:

- ☐ A slower machine with few moving parts.
- ☐ Splash lubrication — no pump required.
- ☐ Trouble-free one piece crosshead.
- ☐ Crosshead guides are integral with frame.
- ☐ Enclosed frame keeps oil clean and prevents leaks.
- ☐ Double row, adjustable, tapered main bearing minimizes maintenance.
- ☐ Double - counterweighted crankshaft for smoother, quieter operation.
- ☐ Combination flywheel/belt wheel for smoother operation and optimum engine selection.

CLASS "TH2" FEATURES:

- ☐ Stepped cylinder allows unit to operate as two-stage unit in the low horsepower range.
- ☐ Cylinder can be mounted vertically or horizontally depending on space requirements.
- ☐ Unit is pressure lubricated for higher speed operation.
- ☐ Single throw frame offers fewer moving parts for two-stage application.
- ☐ Combination flywheel/belt wheel for smoother operation and optimum engine selection.

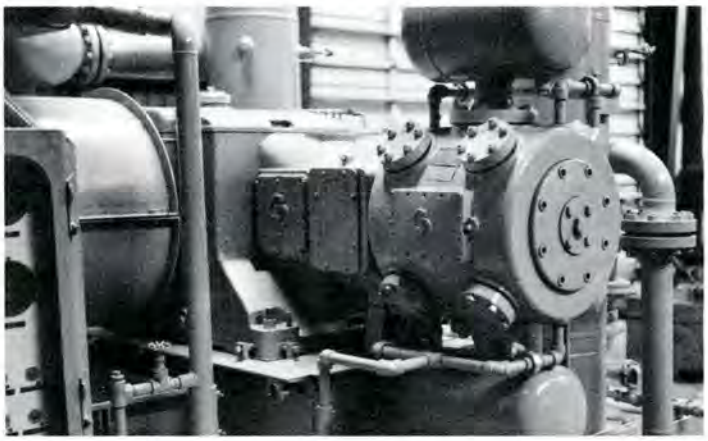
CLASS "FE" FEATURES:

- ☐ Horizontal - opposed construction eliminates unbalanced forces.
- ☐ Unique integral crankshaft coupling flange.
- ☐ Main and connecting rod bearings are interchangeable.
- ☐ Tri-metal Bearing with babbitt surface for break-in, plus an aluminum sub-layer for improved heat transfer characteristics, and finished with steel backing for greater strength.
- ☐ Gear - driven lubricator and oil pump insures pressurized lubrication to all moving parts.
- ☐ Large pistons are centrifugally cast to insure homogeneous casting.
- ☐ Large diameter crosshead pins will withstand higher compression and tension loads.
- ☐ Easily replaceable crosshead shoes maintain correct alignment for extended life.
- ☐ Heavy duty distance piece.
- ☐ Footpad located under distance piece for support.
- ☐ Internal gussets and tieplate construction give increased frame strength.

CHICAGO PNEUMATIC COMPRESSOR APPLICATION DATA

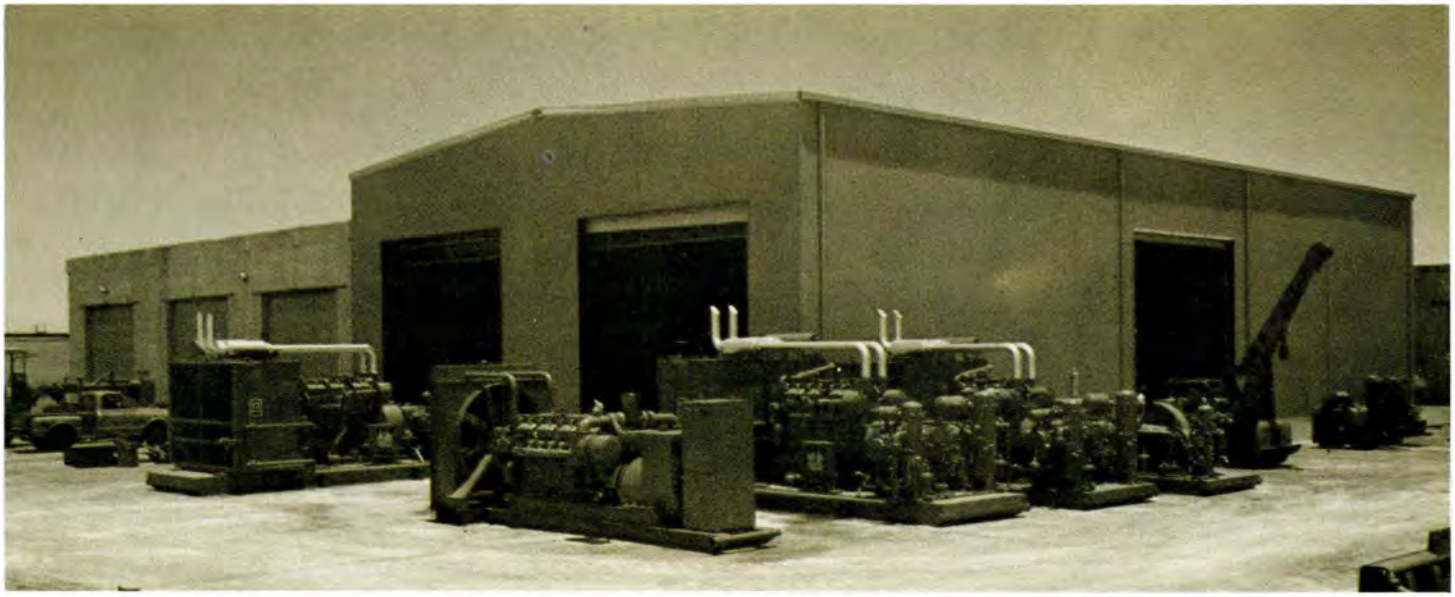
CLASS	NO. OF THROWS	LENGTH OF STROKE (INCHES)	BHP * (MAX.)	RPM (MAX.)	PISTON * LOAD (MAX.)
"T"	1	7	48	500	6,500
	1	9	68	400	10,000
	1	11	130	360	18,000
	1	13	180	327	22,000
"TH2"	1	7	70	700	10,000
	1	9	150	600	15,000
"FE"	2	5	400	1,000	20,000
	4	5	800	1,000	20,000
	2	6	800	1,000	30,000
	4	6	1,600	1,000	30,000
	6	6	2,400	1,000	30,000

*** Higher ratings available on application**



CHICAGO PNEUMATIC CYLINDERS:

- ☐ Sizes in stock range from 3½" to 13" bore with standard working pressures of 400 to 1800 psig. Optional cylinders available up to 23" bore and up to 8000 psig.
- ☐ Cylinders equipped with hand removable liners to allow field removal and installation without special tools.
- ☐ Liberal water jacketing keeps valves cool and reduces both maintenance and power consumption.
- ☐ Large smooth gas passages insure low resistance to flow.
- ☐ Rapid valve action makes Simplate valves highly efficient.
- ☐ Low clearances allow high efficiency.
- ☐ Cylinder head clearance plugs allow in-the-field clearance adjustment.



FABRICATION FACILITIES

Photographs show external and internal fabrication shop views; and field service activity.

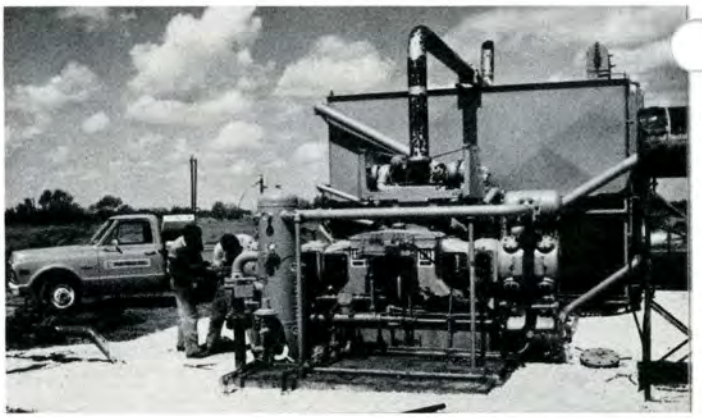
Energy Industries, Inc. (EII) was established in June of 1969 to fabricate gas compressor packages for the petroleum industry. Initially, a 6,000 square foot shop and a 6,000 square foot storage shed were set up to house the manufacturing and inventory capabilities of the B. D. Holt Co. affiliate.

Late in 1969 EII produced the first of a continuing series of compressor packages from its Corpus Christi facility destined for U.S. oil fields. They included both EII standard packages as well as especially designed units built to customer specifications. The units ranged from a 70 HP G333NA/TB9 upwards and were sold, rented monthly, leased with option to purchase or completely installed and operated on an MCF basis.

In addition to building compressor packages, EII has expanded its capacity to repower competitive compressor units and to build pumping packages in a variety of applications for petroleum customers. EII produces units for use with salt water disposal and secondary recovery projects as well as those for fire systems and cooling towers.

In 1972 an 8,400 square foot compressor fabrication shop and branch office was erected in Calgary, Alberta, Canada, to serve the important Canadian oil fields.

B. D. Holt Co.'s Corpus Christi operation and four Texas branch offices furnish 95,000 square feet of administrative, data processing, accounting, warehouse, shop and fabrication space. With this broad-based product support organization behind each compressor package, EII customers are assured of a single source responsibility for all component parts and service.



ENERGY INDUSTRIES

CORPUS CHRISTI, TEXAS, U.S.A.
CALGARY, ALBERTA, CANADA

ENERGY INDUSTRIES

CORPUS CHRISTI LAFAYETTE CALGARY, ALBERTA

Energy Industries' EI PLUS Services for Gas Compressor Users

APPLICATION SERVICES

APPLICATION ENGINEERING — Analysis of production needs to determine horsepower and cylinder requirements for new or existing installations.

PROJECT EVALUATION — The analysis of existing or proposed installation to determine total gas system needs.

COMPUTER ANALYSIS — Energy Industries' computer provides accurate engineering data for project evaluation and application analysis.

ACQUISITION SERVICES

SINGLE SOURCE COMPONENT INVENTORY — New engines, compressor frames and cylinders, coolers and scrubbers are kept in stock ready to meet your compressor needs quickly.

STOCK UNIT INVENTORY — Fast delivery with compressor packages built up to standard configuration and ready for fit out.

REPOWERING SERVICE — Cat engine repowering of existing compressor packages.

CYLINDER BUYBACK — Cylinders can be traded in for 50% of original cost if production needs change.

FINANCIAL SERVICES — Competitive financing support, such as lease purchase and long or short term rental to provide buying flexibility.

TRADE-IN SERVICE — Trade in present used package on a new EI package.

PRODUCT SUPPORT SERVICES

PARTS INVENTORY — Single source responsibility for all parts on EI packages at Corpus Christi, Victoria, Weslaco, Texas - Lafayette, Louisiana - Calgary, Alberta, Canada.

PARTS EXCHANGE SERVICE — Worn components are exchanged for a rebuilt replacement.

FIELD SERVICE — Fully equipped field service trucks for repairs on location.

TRAINED PARTS PERSONNEL — Assistance in getting the right part the first time.

DEALER TERMINAL PARTS SEARCH SYSTEM — This computer network can instantly locate parts at 15 Caterpillar Parts facilities and more than 100 Dealers throughout the U.S. and Canada.

AFTER HOURS EMERGENCY PARTS AND SERVICE — Parts and service available 24 hours/day to meet emergency requirements.

FACTORY TRAINED MECHANICS — Experienced servicemen trained in the latest methods to make repairs efficiently and economically.

FIELD INSPECTION — A complete inspection by experienced personnel to spot potential mechanical problems.

SPARE PARTS PROGRAM — A recommended spare parts list is available for each unit if on-site protective parts stock is required.

PREVENTATIVE MAINTENANCE SERVICE — Complete routine maintenance performed by qualified servicemen on a scheduled basis.

OVERHAUL AND REBUILD SERVICE — Extend the life of EI compressor units with complete overhaul and rebuild done by qualified service personnel.

CAT DEALER NETWORK — Caterpillar engine service is available worldwide through more than 250 Caterpillar dealers with over 700 outlets.

CUSTOMER PARTS BOOK — With each EI unit, two (2) complete parts books are provided to aid operation and service.

HISTORICAL RECORD FILES — A record of parts and repairs is kept for each unit sold.

FREE STARTUP AND REVISIT — To insure that each new unit is ready to work.

PARTS & SERVICE FIELD REPS — To keep you informed of current services available, and to serve your product support needs.

DEVELOPMENT SERVICES

PERSONNEL DEVELOPMENT SERVICES — Operator training, safety program, and maintenance training are available to train your personnel.

MARKET DEVELOPMENT SERVICES — Advertising, involvement in public affairs, and participation with you in trade associations to promote development of the industry.

What Is EI PLUS?

EI PLUS is the "extra value" you receive with every gas compressor purchased from Energy Industries. It's a program designed to maximize the return on your compressor package investment. To be sure you're operating at the best level of profit requires professional expertise and assistance before, during and after you buy. That's what EI PLUS is committed to do. "Extras" like computer analysis, application engineering, and field service are all designed to give you more for your total dollar investment.

EI PLUS includes these extra value services:

- **Product Application Services**
  These services enable Energy Industries to size a gas compressor package to meet your specific job requirements.

- **Product Acquisition Services**
  After your equipment needs are defined, Energy Industries can supply that equipment on short notice and can also offer a variety of competitive financing programs.

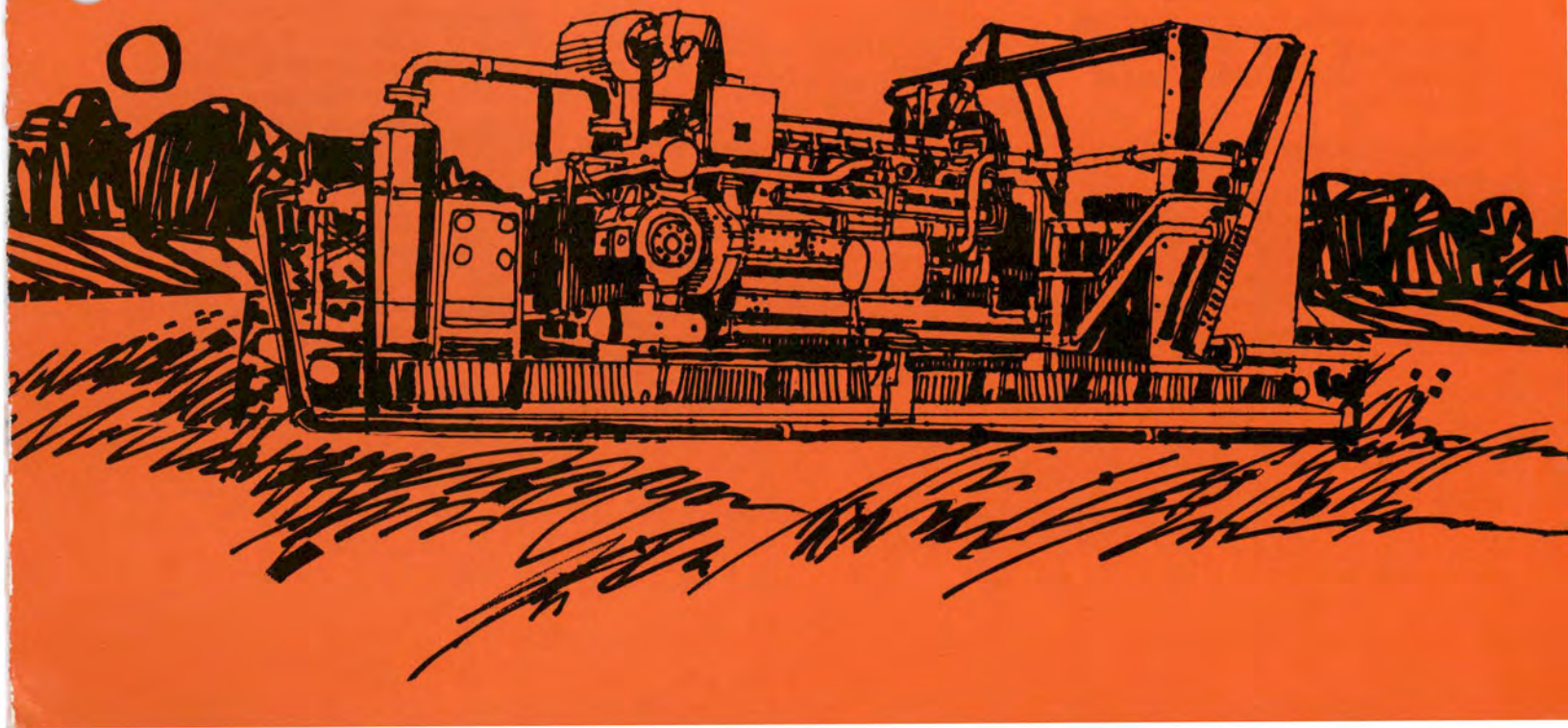
- **Product Support Services**
  After you purchase an Energy Industries compressor package, product support will ensure that the unit will stay operating at the lowest cost possible.

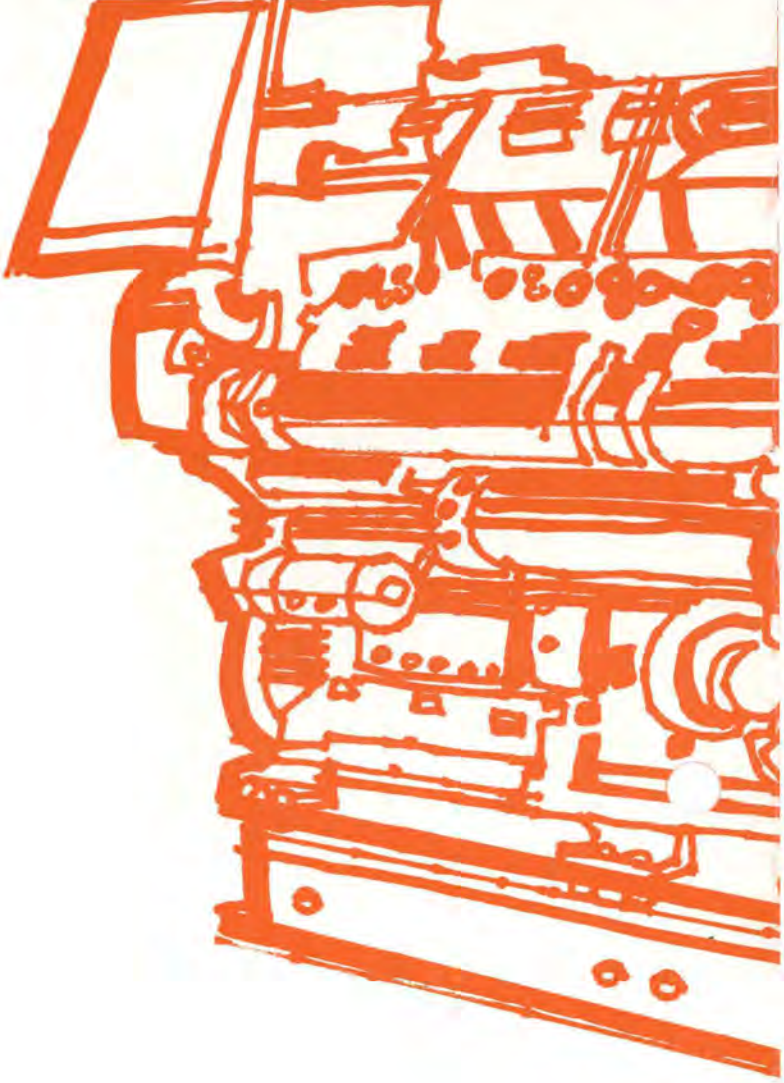
- **Development Services**
  Energy Industries provides maintenance, operator, and safety training programs for your personnel, plus market development through trade association participation.

EI PLUS assures you of quality components and advanced gas compressor package design. When you purchase from Energy Industries you get more than just a compressor package, you get extra value EI PLUS services to go with it.

IF YOU STILL DERATE YOUR GAS COMPRESSOR ENGINES, CONSIDER CATERPILLAR.

HERE'S WHY.





CAT ENGINES GIVE YOU FULL RATED PERFORMANCE WITH FULL RELIABILITY.

■ Derating natural gas engines to about 65% of capacity has been almost standard practice in gas compression applications. For years it was a prudent hedge, considering the untended continuous duty required — and ambitiousness of some ratings.

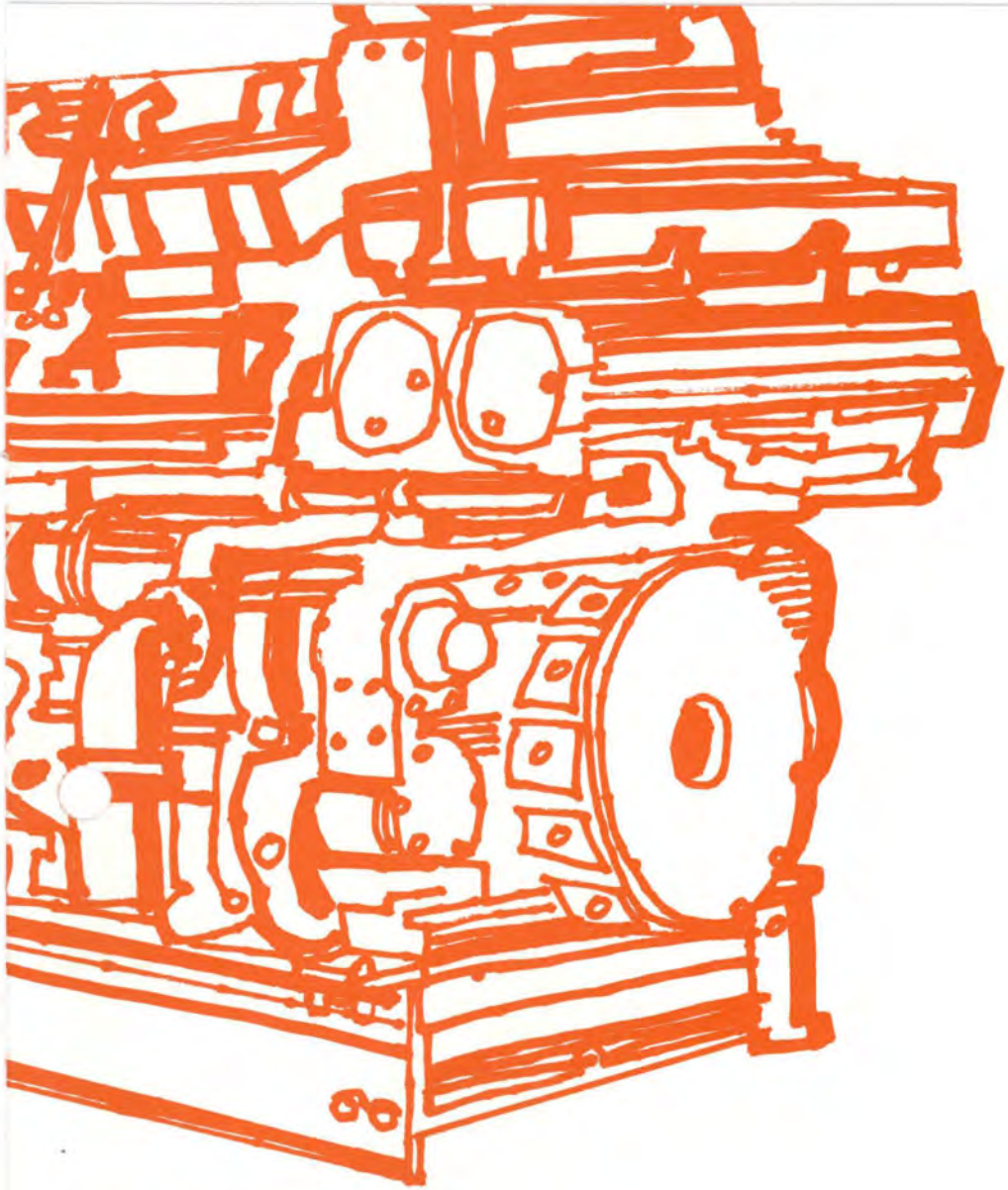
But times change and technology advances.

Now, Caterpillar Natural Gas Engines can live under higher thermal loads and higher pressures (90 BMEP for naturally aspirated, 180 for turbocharged) than advisable or even possible with other engines. Caterpillar developments in turbocharging, cooling, torque and response characteristics, and use of high strength componentry allow the reliable, continuous operation you need over long periods.

As a result, you can specify and run a Cat Natural Gas Engine at its full published horsepower with confidence. *No* derating necessary. You use the horsepower you pay for — all of it — so you don't have to invest in an oversize engine just to be on the safe side. Your initial cost per usable horsepower is reduced. Even foundation and base costs are as much as 50% lower.

You'll save on maintenance costs, too, because Cat Natural Gas Engines are built with many of the same components as Cat Diesels. Volume production keeps parts prices low. Assures immediate parts availability, too, from 900 dealer outlets worldwide.

In all, this means that the old rules on gas engine selection aren't completely fair to you and your company anymore. But how *do* you choose an engine now?

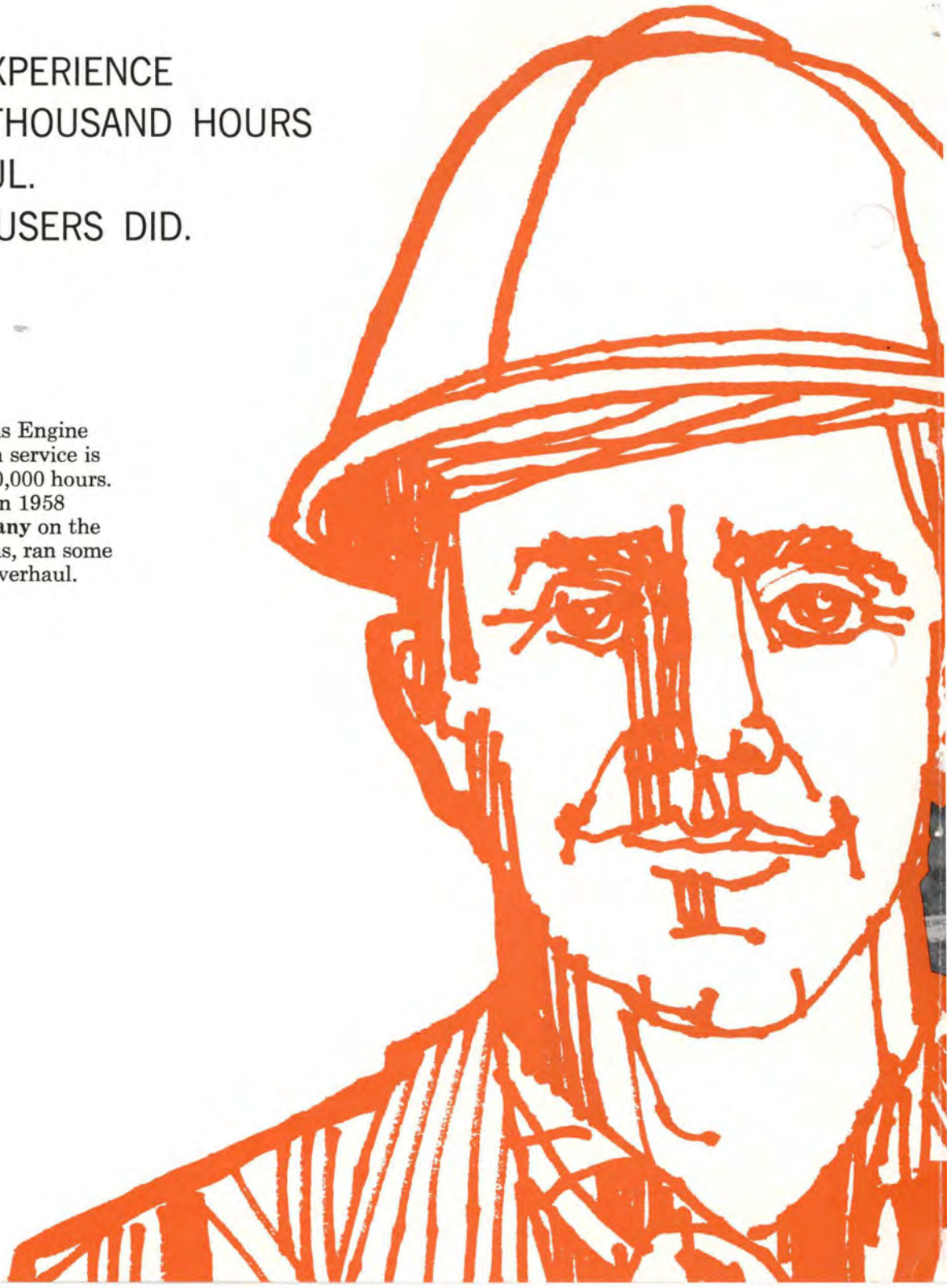


ASK OUR COMPUTER.

Evaluating an engine-compressor package doesn't have to be complex. Not if Caterpillar's computer does it. Ask us for an Input Data Form, send it in and you'll get a free analysis in return — with all variables of your operation taken into account and a customized power package recommended.

YOU MAY NOT EXPERIENCE 40, 50, EVEN 80 THOUSAND HOURS BEFORE OVERHAUL. BUT THESE CAT USERS DID.

The very first Cat Natural Gas Engine put on line in gas compression service is still operating after almost 100,000 hours. The engine, a G342 installed in 1958 by the **Northern Pump Company** on the Hall Lease near Mineral, Texas, ran some 74,000 hours before the first overhaul.



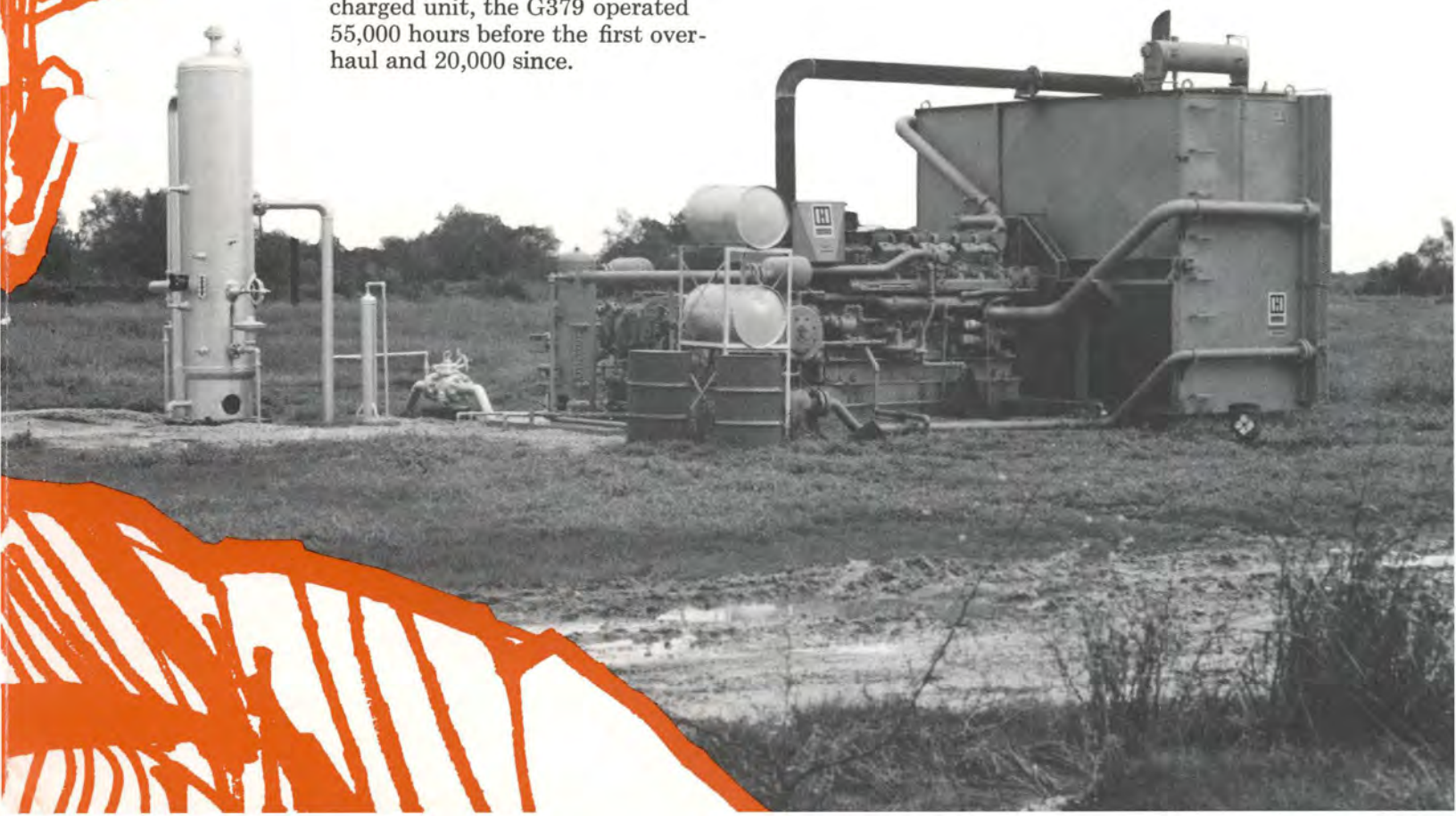
Both G342's at the **Southern Union Gas Co.** Kutz Canyon Compressor Station, Bloomfield, New Mexico, have turned 75,000 hours in ten years of continuous operation — and have yet to be rebuilt.

Another **Arkla** application of Cat engine power has four G398TA turbocharged engines working a gathering operation at Wilburton, Oklahoma. Turning at 1000 rpm, the units have rolled up 40,000 hours apiece without a major overhaul.

Ten Cat G342's gathering gas at the Marshall, Texas, installation of **Production Operations Corporation** average 50,000 hours and eight years in service. Yet only two of the 1000-rpm engines have needed overhaul while in continuous service driving single-stage compressors.

Check-up maintenance on eight 1000-rpm Cat Natural Gas Engines on the **Conoco** gathering operation at Carthage, Texas, is scheduled every four years with repairs made as needed. Five of the engines have over 60,000 hours; two over 90,000; and one over 100,000.

An **Arkansas-Louisiana Gas** Cat G379TA went into gas injection service in 1961 at Waskom, Texas. A low-compression-ratio, turbocharged unit, the G379 operated 55,000 hours before the first overhaul and 20,000 since.



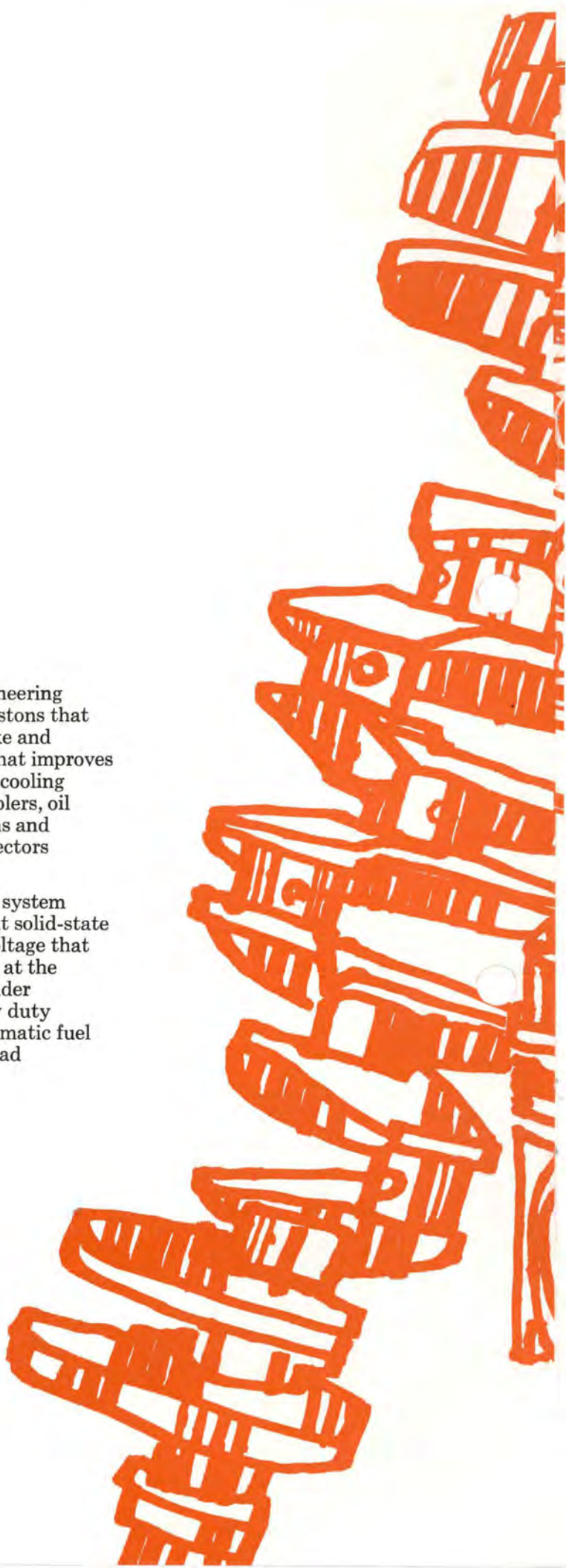
CAT NATURAL GAS ENGINES ARE BUILT LIKE DIESELS TO GIVE HIGH OUTPUT PERFORMANCE.

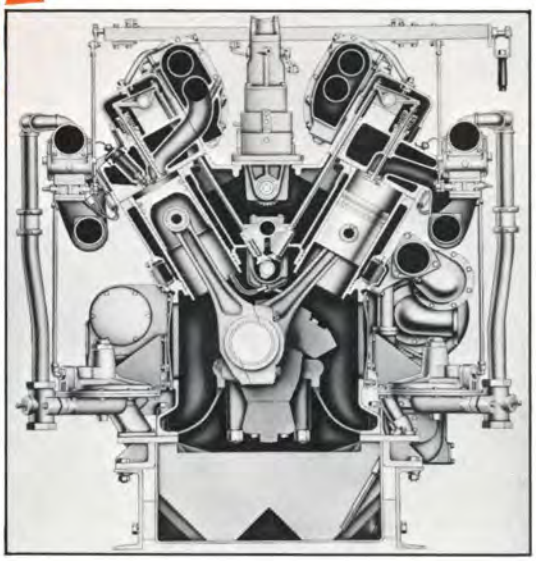
■ Gas engines are generally considered "light duty engines", compared to diesels. Not Cat-built units. In fact, they're built almost wholly of Caterpillar Diesel Engine components. Yet Cat Gas Engines operate at compression ratios and peak pressures 40 to 50% lower than the diesels. So you still have a large dependability "reserve", even though you operate at higher pressures than other gas engines.

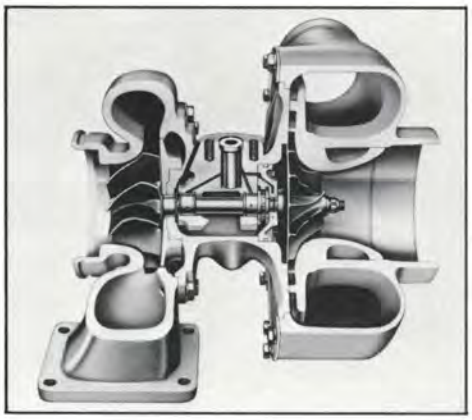
Some of those diesel-strength features include: forged crankshafts, hardened, stress relieved and shot peened — with journals super-finished to within 10 millionths of an inch. Steel-backed aluminum alloy bearings acid resistant and capable of carrying twice the load of soft metal types. Induction hardened, honed, molybdenum alloy liners. Nickel alloy, cast iron heads and blocks of 40,000 psi tensile strength.

And there are such engineering features as three-ring pistons that lower friction, plus intake and exhaust valve rotation that improves seating and life. Special cooling provisions such as oil coolers, oil spraying of piston crowns and cylinder-head water directors are standard.

The natural gas ignition system employed is a unique Cat solid-state design generating low voltage that is boosted to a hot spark at the plugs by individual cylinder transformers. The heavy duty carburetors feature automatic fuel metering according to load requirement.







TURBOCHARGING BOOSTS PERFORMANCE.

Turbocharging with aftercooling gets much more horsepower out of any given engine displacement. Because it packs in more air, allowing more fuel to be burned and more hp produced. A 12-cylinder, 2945 cu/in Cat TA Gas Engine, for example, produces 700 hp. A naturally aspirated engine of comparable size produces only *500* hp.

The high pressures don't strain the diesel-strength design either. And thermal loading is no problem since turbocharging and aftercooling increase the cooled air flow so exhaust temperatures are actually lower than a comparable naturally aspirated engine's. Longer valve and piston life results.

You retain good lugging characteristics, also. Because the Cat turbocharging system employs a pressure ratio control on the turbine side to provide more air at low loads while governing pressures and speeds at maximum output. The control, an exhaust by-pass valve, allows Cat Natural Gas Engines to produce the torque rise suitable for compressor operation.

ENGINE CHOICES FROM 93 TO 835 HP.

■ The chart below shows the options you have with Cat Natural Gas Engine power. The compressor service ratings are 10% under the regular continuous operation ratings. This is not a derating but rather a reserve allowance for variances in gas fuel quality.

Maximum is the horsepower and speed capability of the engine that can be demonstrated within 5% at the factory corrected to sea level and 60° F ambient conditions.

Continuous is the horsepower and speed capability of the engine which can be utilized without interruption or load cycling at SAE standard ambient conditions. (29.38 in. Hg and 85° F)

Gas Compressor Service: The ratings shown are for continuous operation based on standard A.P.I. (American Petroleum Institute) 7B-11C conditions of 60° F (16° C) at 29.92 in. (760 mm) Hg using 905 BTU per cubic foot low heat value fuel. Derating for altitude above 500 feet (150 m) on naturally aspirated and 6500 feet (1950 m) on turbocharged engines is required. No further derating is intended or required. Matching accurately computed compressor power requirements to the ratings will yield maximum engine utilization and economic rewards to the owner without jeopardizing engine life.

CAT NATURAL GAS ENGINES: GAS COMPRESSOR RATINGS W/O FAN

		900 RPM			1000 RPM			1100 RPM			1200 RPM		
Model		Max.	Cont.	Comp.	Max.	Cont.	Comp.	Max.	Cont.	Comp.	Max.	Cont.	Comp.
G399	TA–HCR	860	715	645	955	800	720	1045	870	785	1115	930	835
	TA–LCR	780	650	585	868	720	650	940	785	710	995	830	745
	NA–HCR	510	480	445	580	548	495	645	608	545	700	660	595
	NA–LCR	450	425	385	520	490	440	580	550	495	635	600	540
G398	TA–HCR	645	538	485	715	595	535	780	650	585	840	700	630
	TA–LCR	590	490	440	665	555	495	712	595	534	750	625	565
	NA–HCR	385	360	325	440	410	370	490	460	412	530	500	450
	NA–LCR	340	320	290	390	370	335	440	414	375	475	450	405
G379	TA–HCR	430	358	320	478	400	360	520	435	390	560	465	420
	TA–LCR	395	325	295	440	368	330	475	395	355	495	415	375
	NA–HCR	255	240	215	295	275	248	325	305	275	350	330	295
	NA–LCR	228	215	195	262	245	220	295	275	248	318	300	270
G353	TA–HCR	320	265	245	360	300	270	392	328	295	420	350	315
	TA–LCR	295	245	220	324	272	245	354	295	265	374	310	280
	NA–HCR	195	180	160	224	208	185	248	230	205	268	250	225
	NA–LCR	170	160	145	198	185	168	220	208	188	240	225	200
G342	TA–HCR	270	225	200	305	255	225	330	275	245	354	295	265
	TA–LCR	255	210	190	282	235	210	305	252	228	318	265	238
	NA–HCR	185	175	155	205	195	175	222	212	192	235	225	202
	NA–LCR	160	150	135	180	170	152	195	185	170	210	200	180

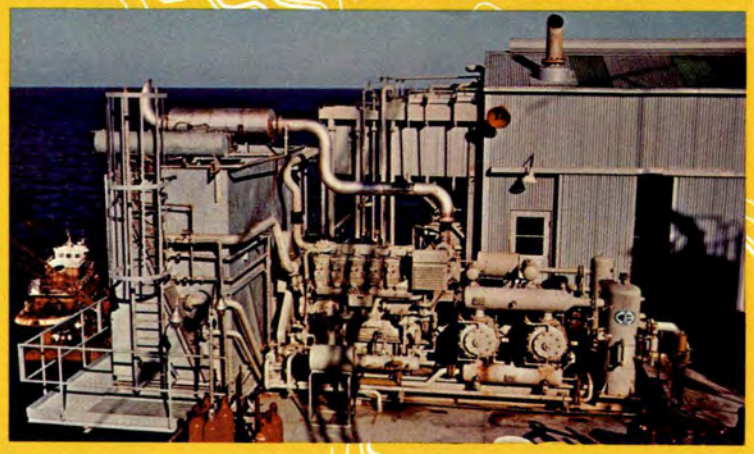
		1500 RPM			1600 RPM			1700 RPM			1800 RPM		
		Max.	Cont.	Comp.	Max.	Cont.	Comp.	Max.	Cont.	Comp.	Max.	Cont.	Comp.
G343	TA–HCR	355	295	265	380	315	285	400	335	300	420	350	315
	TA–LCR	311	260	235	335	280	250	355	295	266	372	310	280
	NA–HCR	196	185	166	213	200	180	228	214	194	240	225	204
	NA–LCR	170	160	145	186	175	160	200	190	170	213	200	180
G333	TA–HCR	218	183	164	233	195	176	247	208	187	263	220	199
	TA–LCR	195	164	146	210	175	157	222	185	166	234	195	175
	NA–HCR	130	123	110	139	130	116	147	137	124	155	145	130
	NA–LCR	108	103	93	116	110	100	125	118	106	133	125	113

CATERPILLAR

Printed in U.S.A.

CHICAGO PNEUMATIC CLASS "FE" GAS AND OIL FIELD COMPRESSORS

CAPACITIES: 200 HP TO 2,000 HP



Equipment Division

Class "FE"... Balanced-Opposed Compressors.

Chicago Pneumatic compressors have continually demonstrated their unexcelled dependability in gas patch applications—wherever compressors are needed for gas boosting, gathering, lifting, injection or vapor recovery . . . whenever you demand continuous 24-hour-a-day, 7-day-week operation.

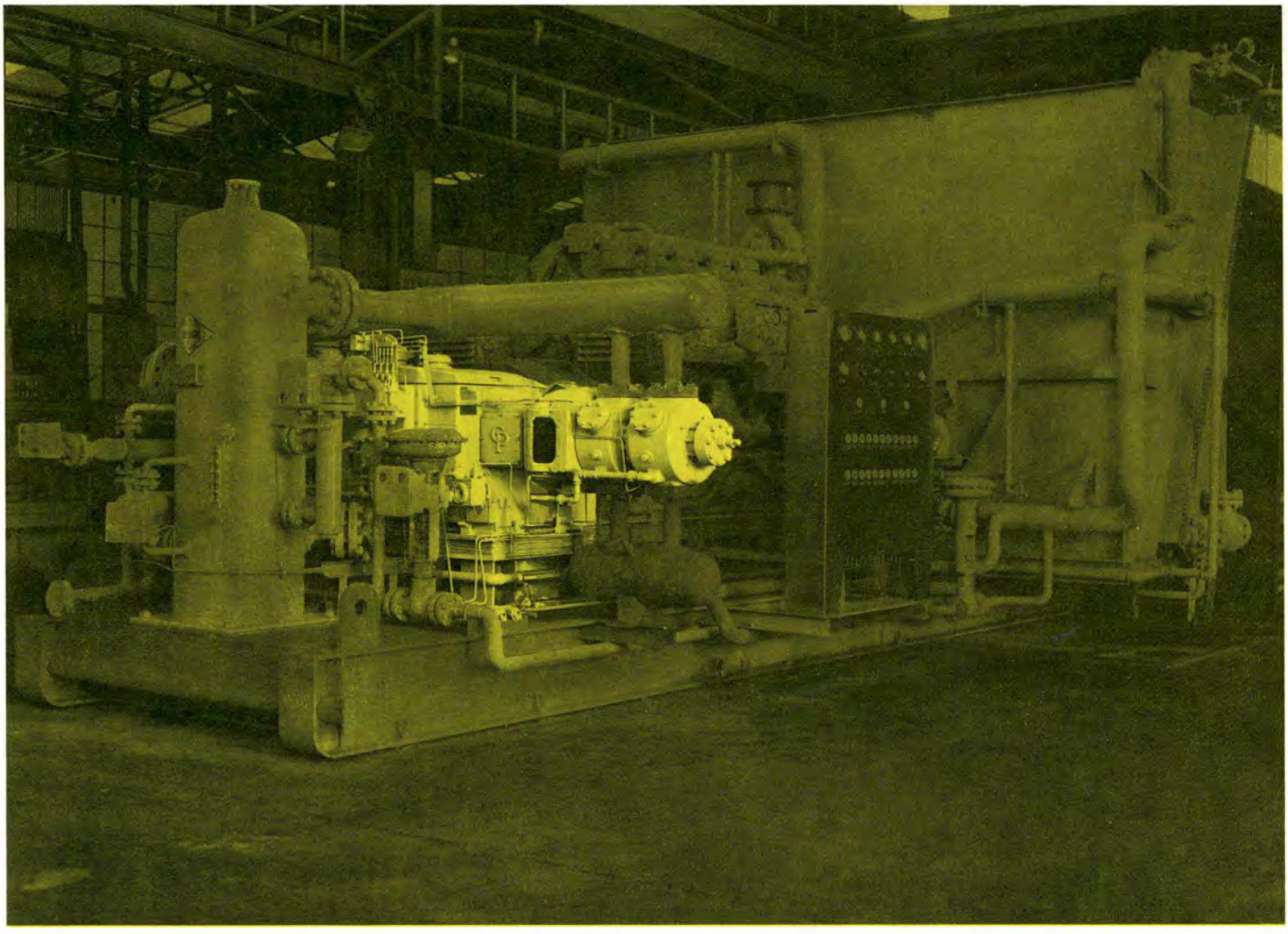
The Class "FE" compressor continues this tradition of rugged dependability. It's a real workhorse in the industry . . . designed for semi-portable service and for direct connection to a gas engine or other prime mover. Its balanced opposed design is particularly well suited for gas and oil field installations because of its exceptionally smooth operating characteristics . . . the result of balancing the inertial forces of opposing reciprocating masses.

Commonly built with either two or four cylinders, CP Class "FE" Compressors are available in 5-inch or 6-inch strokes. They feature heavy duty, high load capacity design that despite its ruggedness, minimizes frame and foundation requirements because of virtual freedom from vibration and shaking forces . . . a characteristic of balanced opposed operation. As a result, "FE" compressors are especially well suited for skid, piling or barge mounting.

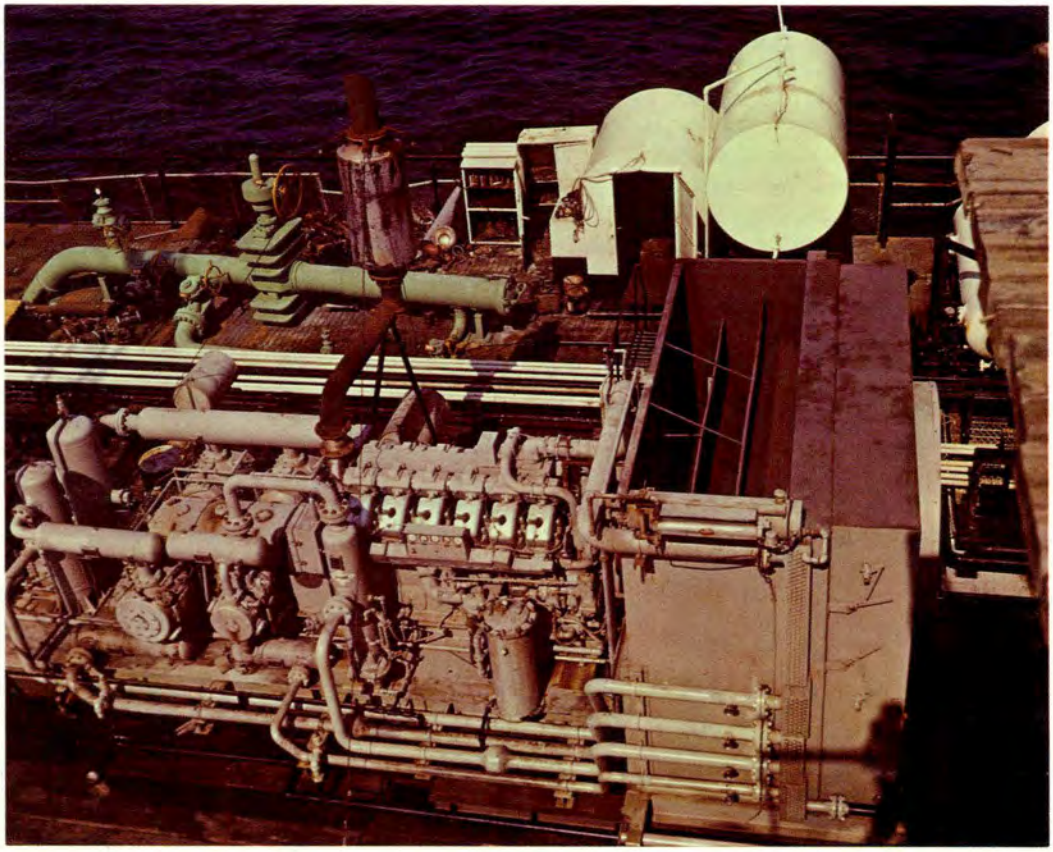
This same smooth operation has earned CP compressors a reputation for long life and reliability. Many units have logged years of continuous operation—shut down only for routine maintenance.

A FLEXIBLE DESIGN—Inherent in all Class "FE" compressors is ready adaptability to changing field conditions through the following options;

1. Hand-removable and field-replaceable cylinder liners for changing pressure conditions are available on most cylinders.
2. Field-adjustable cylinder head clearance pocket plugs for adding clearance.
3. Variable volume clearance pockets.



For Installations...



Offshore

This five-inch (12.70 cm) stroke, four-throw "FE" unit in the Gulf of Mexico picks up separator gas at 40 to 50 psi (2.81 to 3.52) Kg/cm^2) and boosts it into an undersea pipeline which carries the gas to shore.

Onshore

This two-throw, six-inch (15.24 cm) stroke "FE" handles 13 MMCFD (15344m^2/HR) and is rated 650 HP.

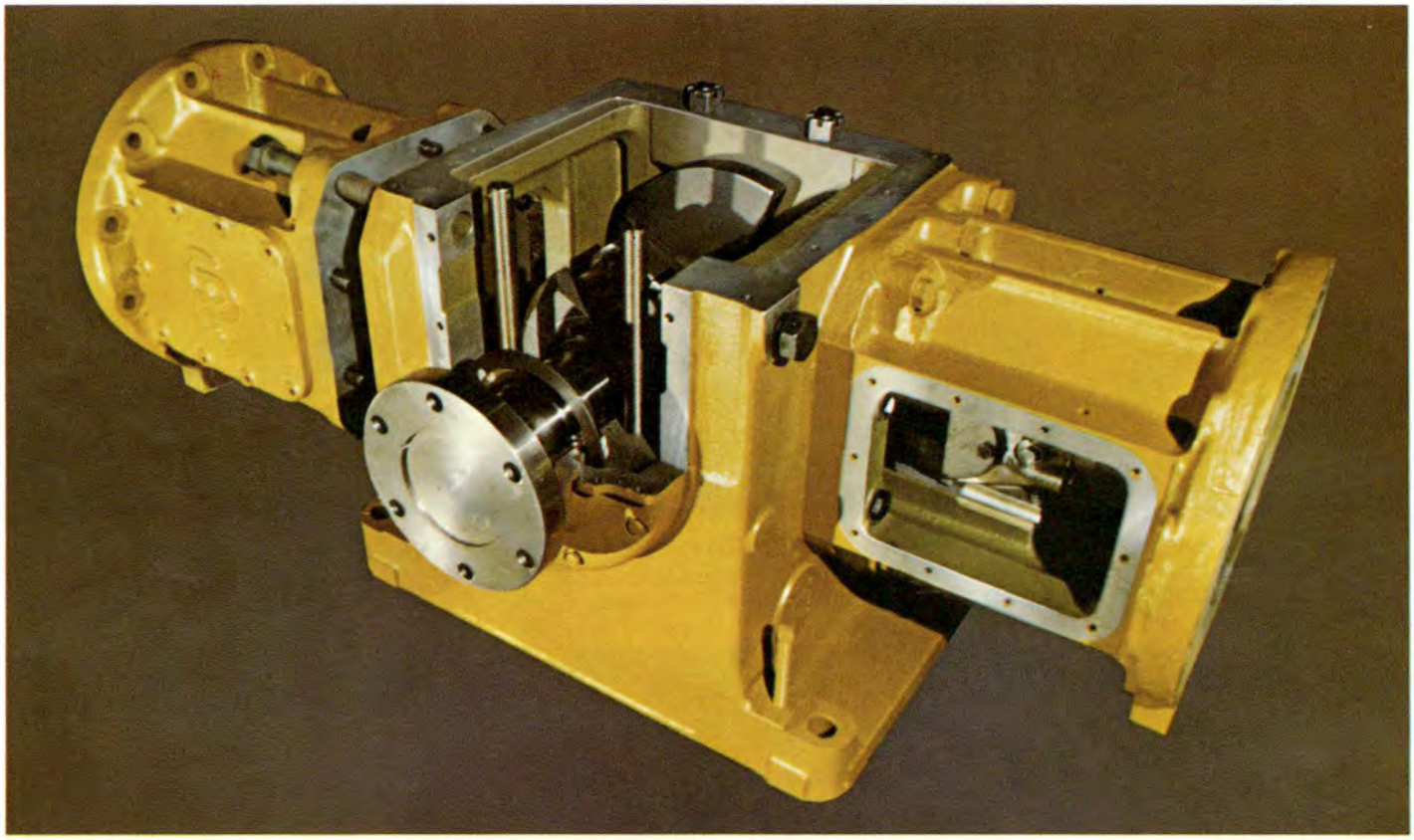
The inside story: What makes CP Class "FE" Compressors great.

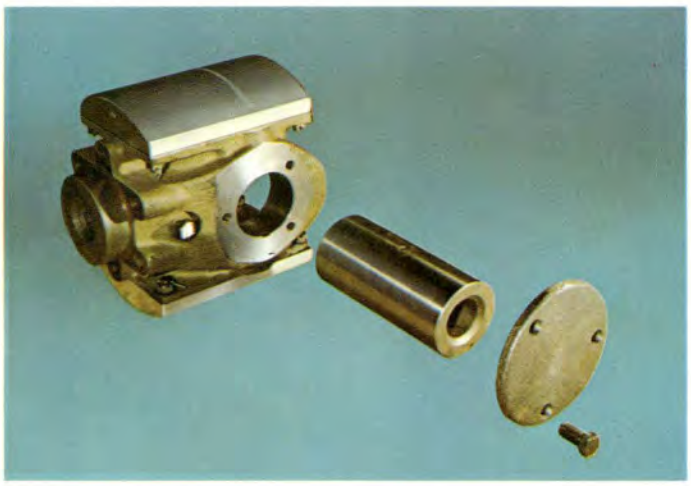
VIBRATION FREE FOR MINIMUM FOUNDATION WHETHER SKID, PILING, OR BARGE MOUNTED

- two or four throw cranks available with five or six-inch (12.70 or 15.24 cm) stroke. Each pair of throws is supported between two main bearings for minimum couple.
- equal opposing piston weights for zero unbalanced forces.

HIGHEST ON STREAM AVAILABILITY

- short piston offset for minimum loading of main bearings . . . also minimizes the bending stress tending to deflect the crankshaft.



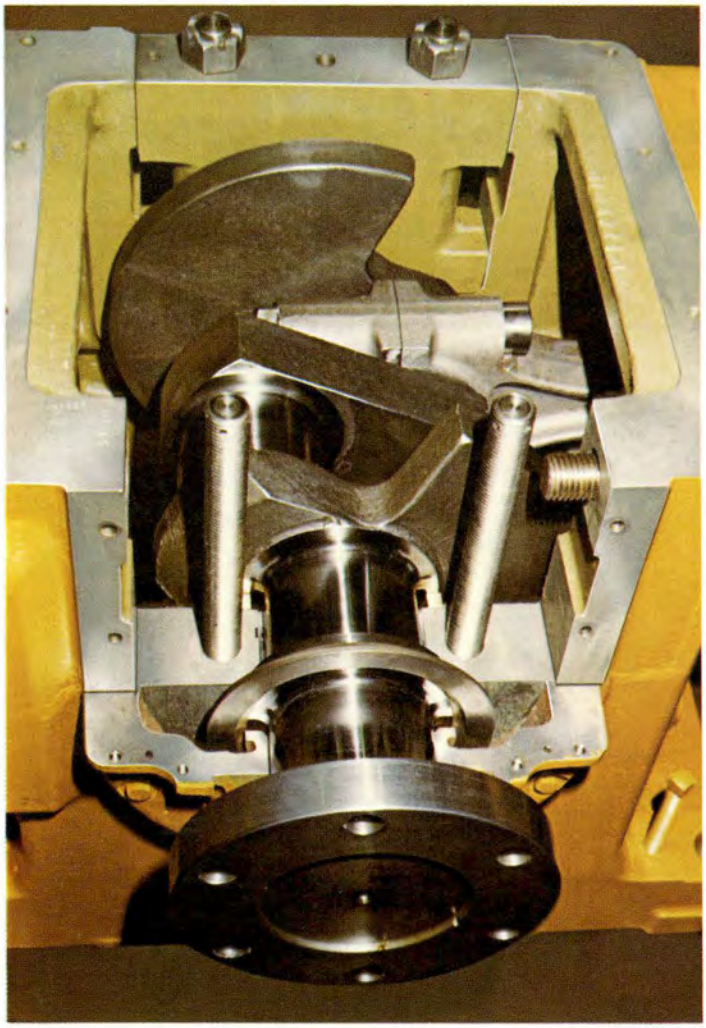


The Frame

The frame is a well ribbed, smoothly contoured Meehanite casting with doweled separable crosshead guides. Cast Meehanite main bearing caps are held to the saddles by alloy steel studs. Sides of the frame are solidly bolted together through the bearing caps which extend to the top of the frame. This adds strength and rigidity to the crankcase.

The Crosshead

Crossheads are of ductile iron, box section construction and equipped with shim adjusted, replaceable aluminum shoes on both top and bottom. They are precision turned and grooved for lubrication and overtravel the guides to assure even wear. Full floating crosshead pins are of alloy steel, hardened and ground. Crossheads are easily accessible through oversize doors.

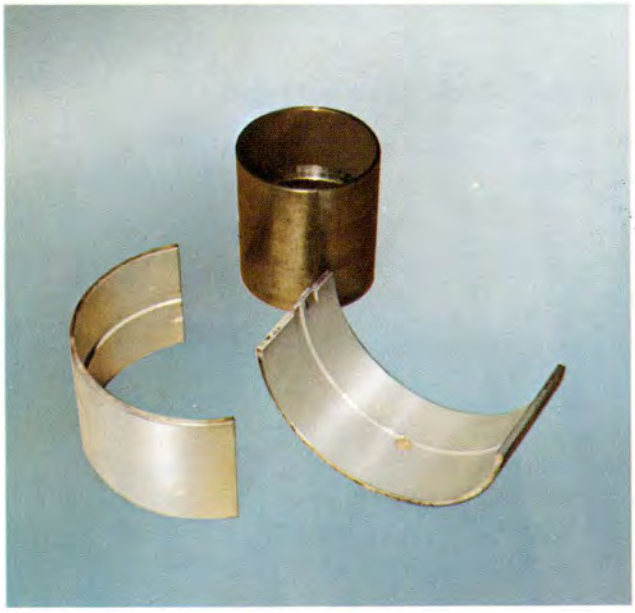


The Crankshaft

This massive crankshaft is precision ground and polished. Crank webs are thick sections and crank pin journals are the same diameter as the main shaft. This results in exceptional stiffness and the transmission of torque through the crank pin at low stress. All journals are precision ground to close tolerances.

Main and Crankpin Bearings

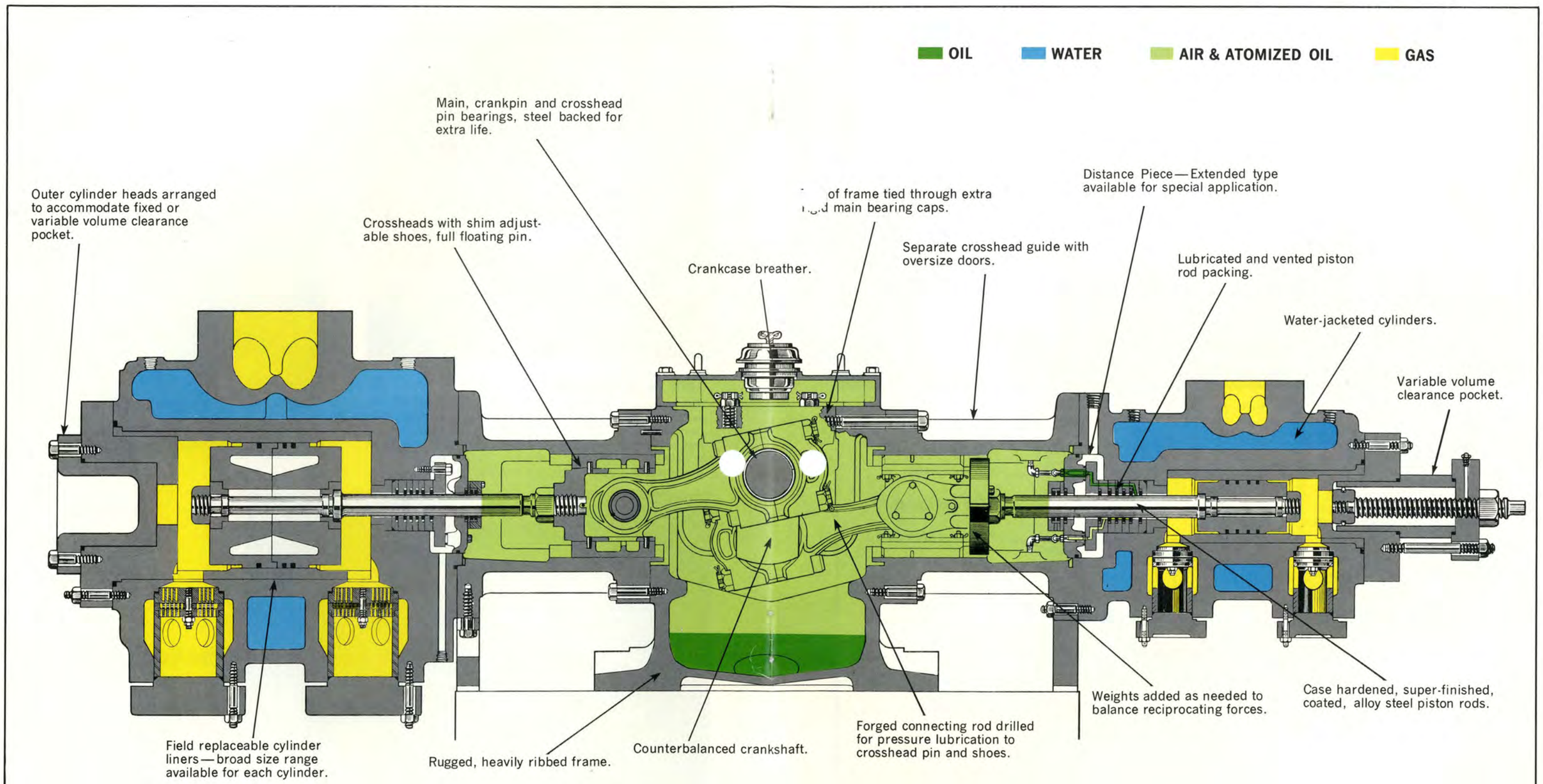
Main and crankpin bearings are interchangeable and are the precision insert type. They can be rolled out without removing the shaft or connecting rod. There is a main bearing on each side of each pair of cranks. The thrust bearing consists of two bronze half rings retained in counterbores on each side of one of the standard main bearings.



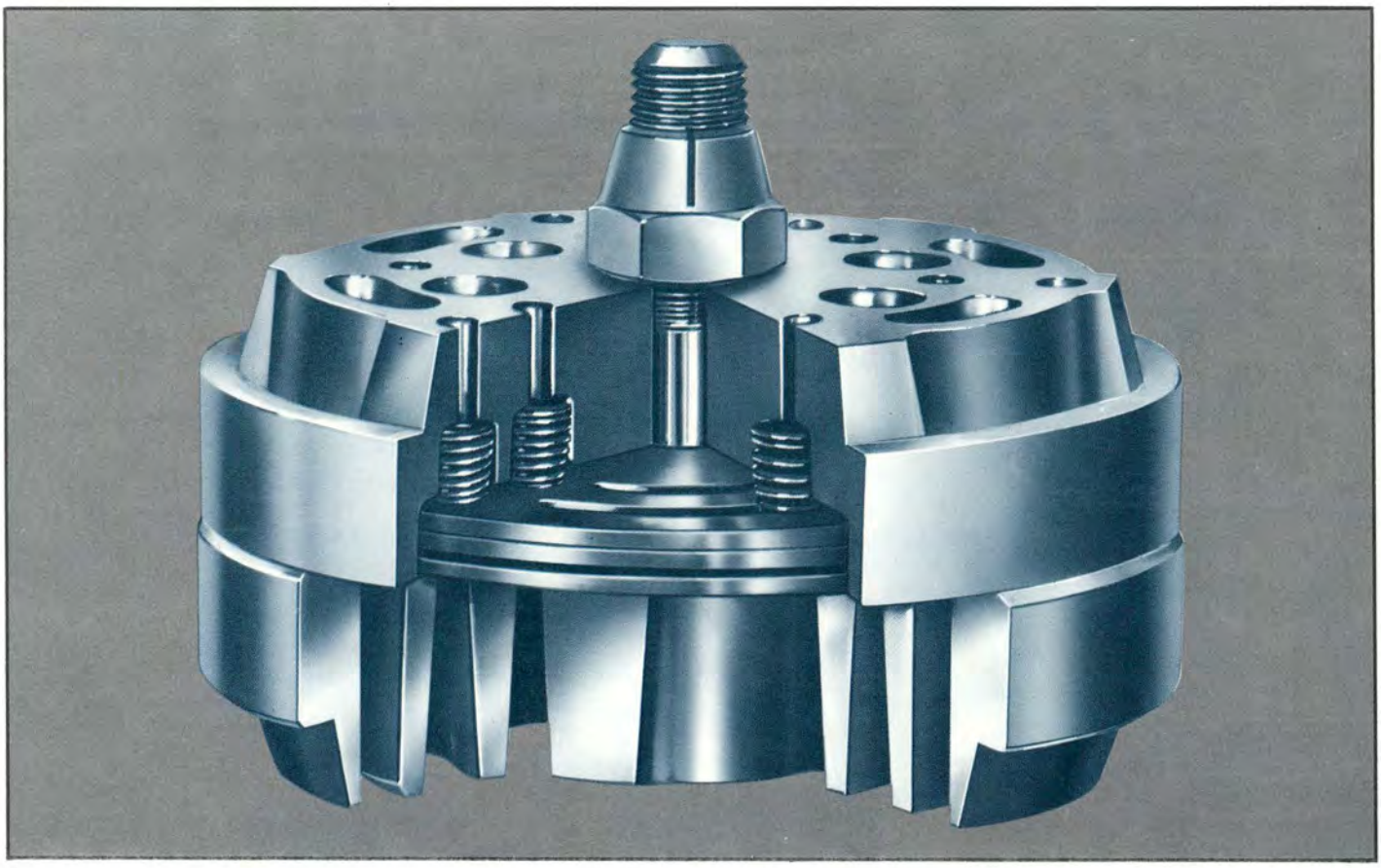
The Connecting Rod

Connecting rods are carbon steel I-section drop forgings. The cross-head end is fitted with a solid, precision type bushing. The crank end is split to take the precision insert type bearing shells and is held together with fitted, heat treated alloy steel bolts. The rod is rifle drilled for force feed lubrication.

Class "FE" Balanced-Opposed Compressor.

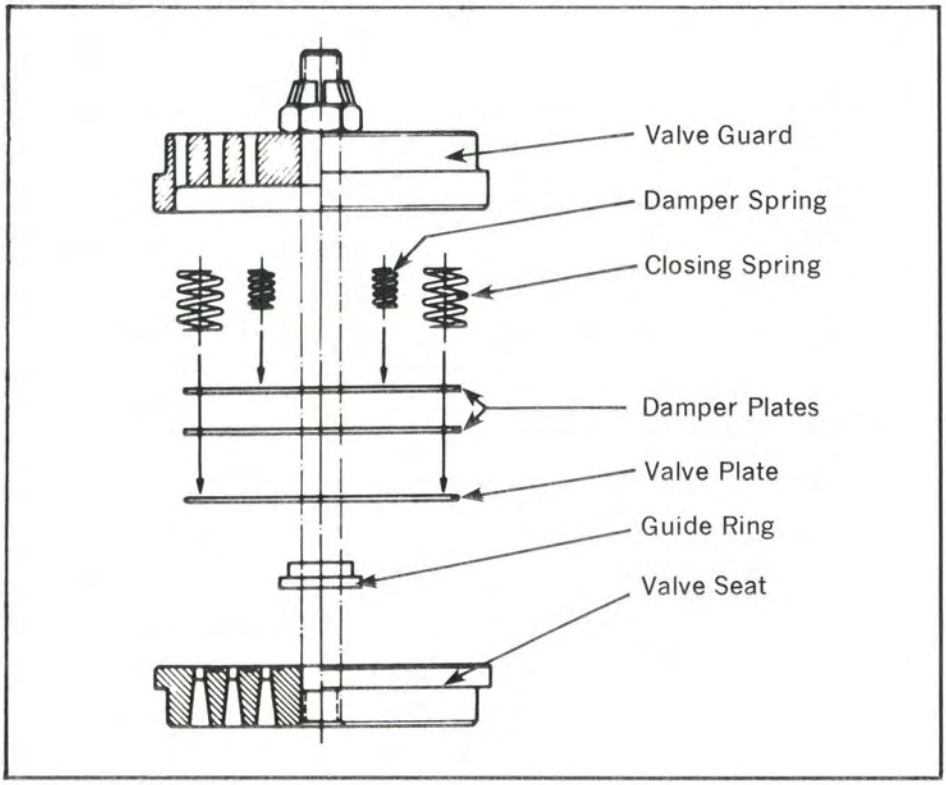


Valves



Designed for top performance under medium and high pressure conditions. Chicago Pneumatic's new double damped valves combine fast responding valve plates and soft opening and closing impact with lower pressure loss and increased output. This is achieved by placing a damper plate between the valve plate and valve guard, and having the damper and valve plate separately and differently spring loaded.

The only valve design with two step spring load characteristics. Double damped valves guarantee fast opening, best damping, low pressure losses, and reduced downtime.



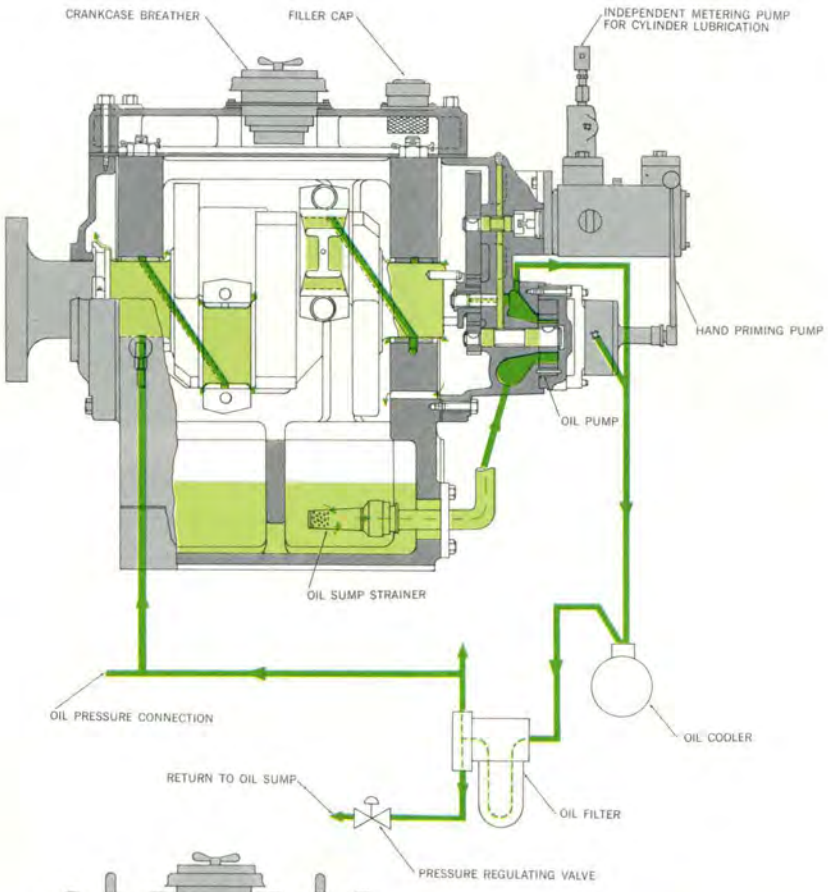
Lubrication

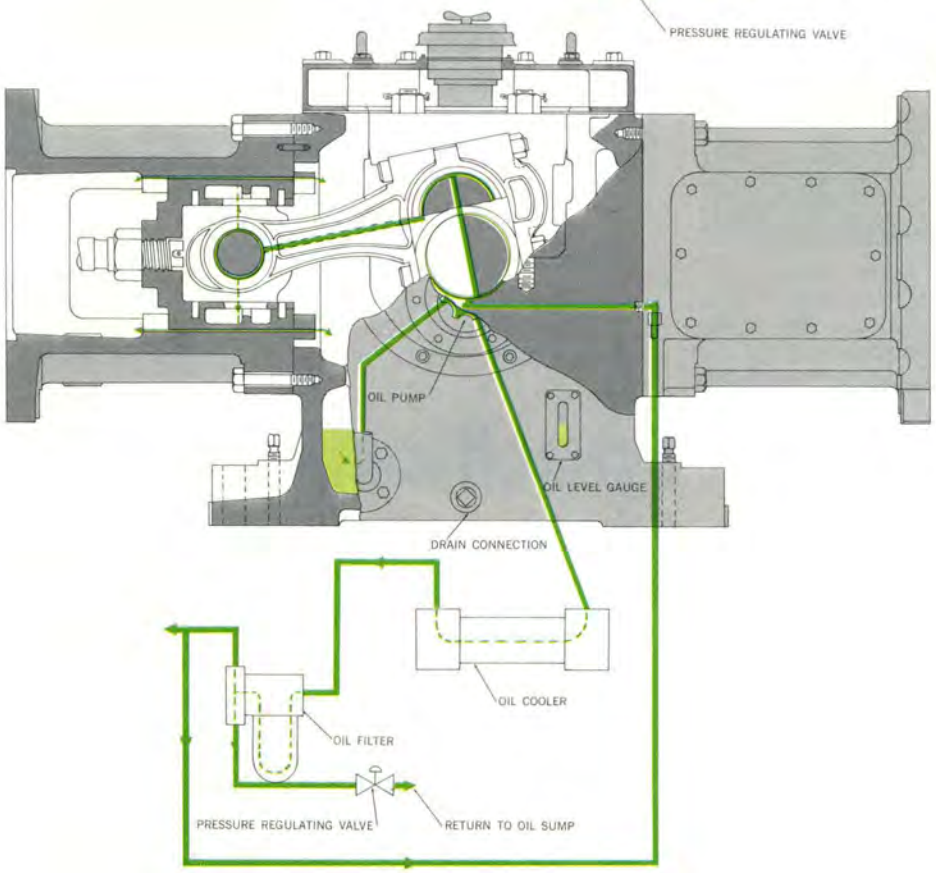
Full force-feed lubrication is used throughout on Class "FE" Compressors. A positive displacement gerotor pump, gear driven from the crankshaft, forces oil through a cooler and full flow filter before it enters each main bearing. Holes drilled in the crankshaft conduct oil to the crank pin bearings, then through the rifle drilled connecting rods to the crosshead pin and both top and bottom crosshead shoes.

A hand operated lube oil pump for flooding the bearings before startup is provided.

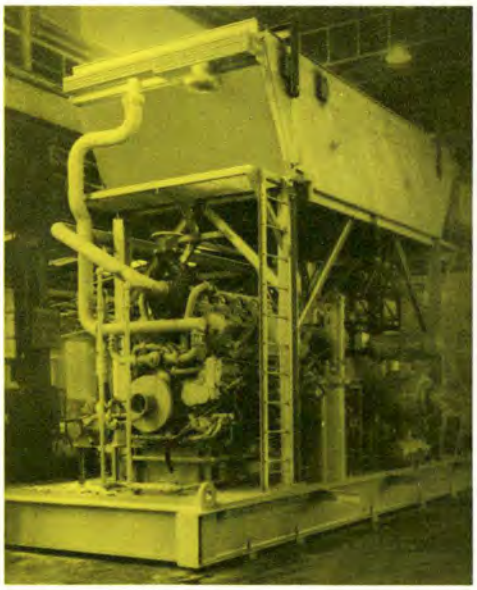
Provision is made for driving a compressor analyzer.

A separate force feed lubricator, driven through gears from the crankshaft, supplies oil to the compressor cylinders and piston rod packing.



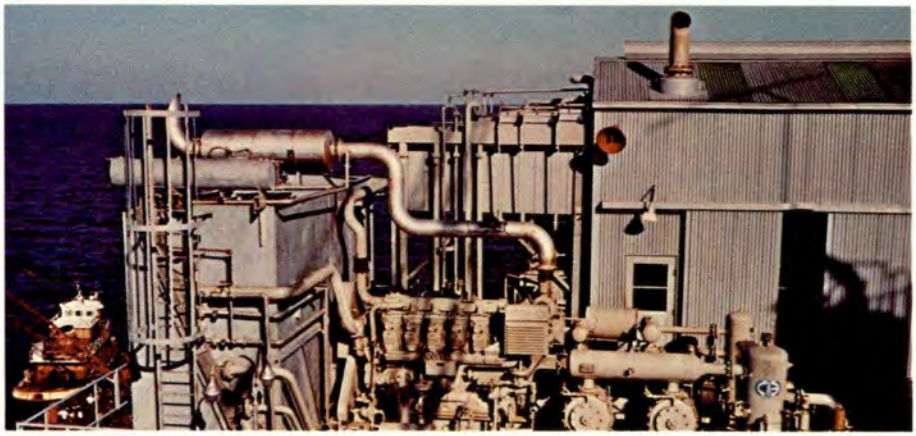


Typical Applications



OVERHEAD COOLING on this six-inch (15.24 cm) stroke, two-throw "FE" conserves valuable floor space on offshore platform.

RESERVOIR DEPLETION application near Refugio, Texas employs a two-throw, five-inch (12.70 cm) stroke "FE" compressor to handle pressure of 85 psi (5.98 Kg/cm²) and discharges at 950 psi (66.79 Kg/cm²).



FLARE GAS operation on this platform one hundred miles (160.93 KM) off the Louisiana coast uses a six-inch stroke (15.24 cm), four-throw, three-stage "FE" compressor at 1200 psig (84.37 Kg/cm²) discharge. The unit is rated at 1100 HP.

SALES GAS installation in Texas uses a five-inch (12.70 cm) stroke, two-throw "FE" compressor operating in conjunction with an eleven-inch (27.94 cm) stroke Chicago Pneumatic T-type compressor.

Specifications

CLASS "FE" GAS BOOSTER COMPRESSORS						
CLASS	No. of Throws	Length of Stroke		RPM (Max.)	Piston Load (Max.)	
		IN	CM		LBS.	Kg.
"FE"	2	5	12.70	1,200	25,000	11,340
	4	5	12.70	1,200	25,000	11,340
	2	6	15.24	1,000	25,000	11,340
	4	6	15.24	1,000	25,000	11,340
	2	6	15.24	1,000	40,000	18,144
	4	6	15.24	1,000	40,000	18,144

RESERVOIR DEPLETION employing a five-inch (12.70 cm) stroke, two-throw "FE" compressor near Refugio, Texas.

CASING HEAD GAS compressor station in western Oklahoma is on stream twenty-four hours a day unattended. Uses two five-inch (12.70 cm) stroke, four-throw, three-stage compressors operating from 20 psig (1.41 Kg/cm²) to 900 psig (63.28 Kg/cm²).

SALES GAS compressor installation in south Texas uses a five-inch (12.70 cm) stroke, four-throw "FE" compressor operating with 70 psi (4.92 Kg/cm²) intake pressure and discharging at 900 psi (63.28 Kg/cm²).

CASING HEAD GAS application of a five-inch (12.70 cm) stroke, two-throw "FE" compressor. This unit operates with 45 psig (3.16 Kg/cm²) suction pressure, 950 psig (66.79 Kg/cm²) discharge pressure.

EQUIPMENT DIVISION
Chicago Pneumatic
HOWARD STREET, FRANKLIN, PENNA. 16323

CP-3890-NMM-4/76-EP

Printed in U.S.A.