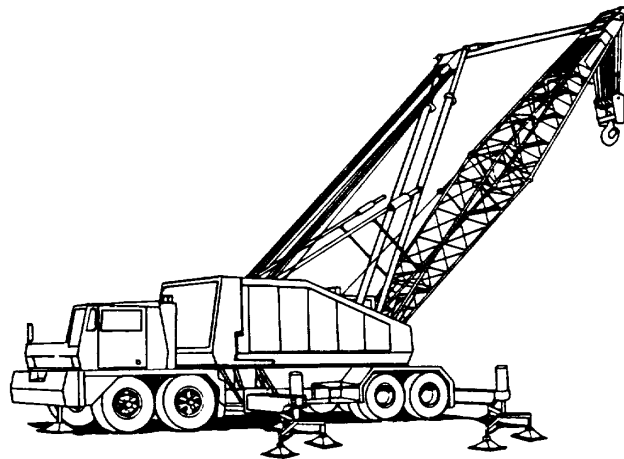


TECHNICAL MANUAL

FOR

**CRANE, MOBILE, CONTAINER HANDLING, TRUCK-
MOUNTED, 140-TON CAPACITY DED, FMC
LINK BELT MODEL HC-238A, ARMY MODEL
MHE 248, NSN 3950-01-110-9224**



**FMC CORPORATION
CABLE, CRANE AND EXCAVATION DIVISION**

HEADQUARTERS DEPARTMENT OF THE ARMY

15 JULY 1985

Service Manual

Quick Reference System

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REVOLVING FRAME & MACHINERY

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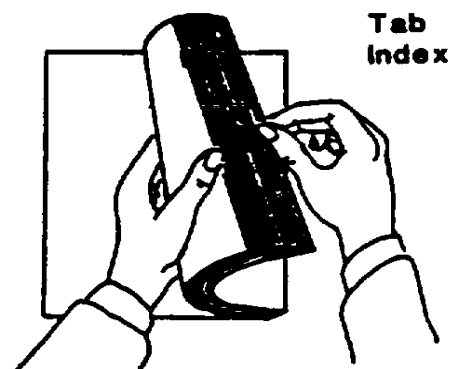
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How To Use This Manual

The manual is divided into nine major sections as shown on this page. Each section can be located with the tabs on the right hand edge of the page as shown in the picture.



SPECIAL ATTACHMENTS

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Warranty**Standard Warranty Cable Cranes**

FMC CORPORATION, CABLE CRANE & EXCAVATOR DIVISION is hereinafter called the COMPANY.

The products manufactured by the COMPANY, exclusive of used or re-built machinery or equipment, are subject to the following warranty:

(A) Warranty.

"ALL of COMPANY's products are of high quality and are manufactured in conformity with the best commercial practices in the various lines. The COMPANY warrants all products manufactured by it to be free from defects in material and manufacture at the time of shipment for six (6) months from date of shipment or 1000 hours of operation, whichever shall occur first. The COMPANY will furnish without charge, f.o.b. its factory, replacements for such parts as the COMPANY finds to have been defective at the time of shipment, or at the COMPANY's option, will make or authorize repairs to such parts, provided that, upon request, such parts are returned, transportation prepaid, to the factory from which they were shipped.

"This warranty shall not apply to any product which has been subjected to misuse; misapplication; neglect (including but not limited to improper maintenance); accident; improper installation, modification (including but not limited to use of unauthorized parts or attachments), adjustments, or repair. Engines, motors, and any accessories furnished with the COMPANY's products, but which are not manufactured by the COMPANY, are not warranted by the COMPANY but are sold only with the express warranty, if any, of the manufacturers thereof. THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED (INCLUDING THOSE OF MERCHANT- ABILITY AND FITNESS OF ANY PRODUCT FOR A PARTICULAR PURPOSE), AND OF ANY OTHER OBLIGATION OR LIABILITY ON THE PART OF THE COMPANY.

(B) Limitation of Liability.

"It is expressly understood that the COMPANY's liability for its products, whether due to breach of warranty, negligence, strict liability, or otherwise, is limited to the furnishing of such replacement parts, and the COMPANY will not be liable for any other injury, loss, damage, or expense, whether direct or consequential, including but not limited to loss of use, income, profit, or production, or increased cost of operation, or spoilage of or damage to material, arising in connection with the sale, installation, use of, inability to use, or the repair or replacement of, the COMPANY's products.

The COMPANY reserves the right to make alterations or modifications in their equipment at any time, which, in their opinion, may improve the performance and efficiency of the machine. They shall not be obliged to make such alterations or modifications to machines already in service. Any operation beyond rated capacity expressly prohibited in the operating instructions or safety manual furnished with the machine, or any adjustment, or assembly procedures not recommended or authorized in the operating or service instructions shall void such warranty.

Special Provisions

The standard machine warranty is modified by special provisions in solicitation DAAEO7-80-B-5230.

J07 EQUIPMENT WARRANTY**J.7.1 Definitions**

Acceptance. The word "acceptance" as used herein means the execution of the Acceptance Block and signing of a DD Form 250 by the authorized Government representative.

Supplies. The word "supplies" as used herein means the end item and all parts and accessories thereof, furnished by the contractor, and any related services required under this contract. The word does not include technical data.

J.7.2 Warranty. Notwithstanding inspection and acceptance by the Government of the supplies furnished under the contract or any provision of this contract concerning the conclusiveness thereof, the contractor hereby warrants that the supplies are free from defects in design, material, and workmanship and will conform with the specifications and all other requirements of this contract for a period of 15 months from date of acceptance, as shown on the Material Inspection and Receiving Report (DD Form 250), or 1500 hours of operation, whichever occurs first. Equipment designated as Production Samples shall be treated as equipment delivered

Warranty

at the time as the production units. If a Safety Recall defect occurs during equipment warranty period, the contractor agrees to extend the term of the warranty by the period of time equal to the time period required to make necessary safety defect corrections. Additionally, to the extent of the contractor or his supplier(s) provide to commercial customers a greater warranty for the supplies furnished therein, the contractor hereby likewise provides such greater warranty to the Government. To the extent the terms of such greater warranty are inconsistent with or conflict with this warranty, the provisions of this warranty shall govern.

J.7.3 Remedies.

J.7.3.1 New Replacement Supplies. With respect to defective supplies, wherever located, the warranty shall include the furnishing, without cost to the Government, F.O.B. contractor's plant, branch or dealer facility, or F.O.B. original CONUS destination, or F.O.B. US Port of Embarkation, at the Government's option, new supplies to replace any that prove to be defective within the warranty period.

J.7.3.2 Corrective Action Options. In addition, the Government shall have the option (a) to return the equipment or parts thereof to the contractor's plant, branch or dealer facility for correction, or (b) to correct the supplies itself. When the Government elects to return the equipment or parts to the contractor's plant, branch or dealer facility, the cost of labor involved in the correction of the defective supplies shall be borne by the contractor. When the equipment or parts thereof are returned to the contractor for correction, the contractor shall bear all transportation costs to the contractor's plant and return. With respect to defective supplies, when the Government elects to correct them itself, the cost of labor involved in the correction of defects shall be borne by the Government. If the Government requires the assistance of Contractor personnel in disassembly/reassembly of items removed in connection with repair or replacement of defective parts, the Contractor will be reimbursed for labor at a rate to be negotiated between the Contracting Officer and the Contractor at the time of repairs.

J.7.3.3 Notification. If the Government elects to have warranty repair or replacement performed by the contractor, the Government shall deliver the parts or equipment to contractor's local facility or dealership for warranty corrective repair or replacement. If the Government elects to effect warranty repairs or replacement itself, the contractor shall be notified in writing of repairs required under the warranty within 30 days after discovery of the defect. Within 10 days after receipt of such notices, the contractor shall submit to the Contracting Officer a written recommendation as to the corrective action required to remedy the defect. In any event, the Contracting Officer may, upon the expiration of the 10 day period set forth above, proceed with correction or replacement as set forth in the paragraph, Remedies, above, and the contractor shall, notwithstanding any disagreement regarding the existence of a breach of warranty, comply with the Contracting Officer directions related to such correction or replacement. After the notice, but not later than 30 days after receipt of the contractor's recommendation for corrective action.

The Contracting Officer will, in writing, notify the contractor of the parts used by the Government in repair or replacement and all other costs or expenses required for Government correction of warranty defect as set forth in the paragraph, Remedies, above. The contractor shall respond within 30 days after receipt of this notice, of his intention to furnish identified replacement parts and/or cost reimbursements to the Government. In the event it is later determined that the contractor did not breach the warranty in paragraph, Warranties, above, the contract price will be equitably adjusted pursuant to the terms of the "Changes" clause of the contract. Failure to agree to such an equitable adjustment or upon any determination to be made under this clause shall be a dispute concerning a question of fact within the meaning of the "Disputes" clause of this contract. The Contractor shall furnish with his proposal a listing of distributors, dealers, and franchise outlets where warranty claims may be exercised.

J.7.4 Decalcomania. A synopsis or simplified summary of the warranty coverage and its implementation will be printed on a decalcomania approximately 3" x 4" and shall be mounted in view of the operator as near as possible to the center of the instrument panel of each vehicle. On those vehicles requiring concealed markings and registration numbers said decalcomania shall be placed in a readable position on the engine side of the fire-wall.

J.7.5 Rights. The rights and remedies of the Government provided in this clause are in addition to and do not limit any rights afforded to the Government by any other clause in the contract. Exceptions To Warranty

The following supplies are not covered under the 1500 hour or 15 month warranty: (1) Tires (2) Batteries (3) Light Bulbs (4) Windshield wipers (5) Electrical Wires (6) Lubricants (7) Filters.

Warranty**Preparation Of Warranty Claims**

- (1) Use warranty claim no. 531 for all claims over \$25. These forms are available at no charge from the factory.
- (2) Claims less than \$25.00 will not be processed.
- (3) Campaigns - A \$25.00 minimum will be paid on all claims identified as a campaign and listing the campaign only on the individual warranty claim.
- (4) Delivery and applicable follow-up reports must be on file before warranty consideration will be given.
- (5) Warranty Claim must be typed and mailed to the manufacturing division where the particular machine was manufactured no later than 45 days after work is completed.
Do not type on the reverse side of the warranty claim form. If additional space is required on the warranty claim form, attach an additional sheet.
- (6) The upper right hand corner of the claim must be completely and correctly filled out. Information about description of the job must also be furnished.
- (7) Under Section 1 and 2 of the warranty claim, explanation must be given covering problem as diagnosed and corrective action taken.
The statement "installed or replaced" will not be accepted as a satisfactory explanation of the diagnosis of problem and corrective action taken. Neither will the statement making reference to a previous report be accepted in lieu of information correctly filled out explaining the problem and correct action taken.
- (8) Section 3 entitled "Name of Part(s) That Failed or Caused Failure" must be completely filled out to enable the factory to determine disposition of defective parts. The serial number of the replacement part is also required to ensure future warranty of the part replaced.
- (9) Section 4 of the claim entitled "Other" is reserved to list things not provided for elsewhere on the form. Examples: A freight bill, outside purchase of parts, outside labor for machine shop, etc. A copy of the paid invoice must accompany each claim.
- (10) Section 5 is to list item number of part, description of part, quantity of part, invoice number and cost
- (11) If part or parts were supplied from your "stock", type the word "stock" in the invoice section provided
- (12) If parts were ordered where a 5 or 10% added cost was assessed for emergency shipment, a copy of the
- (13) If a large group of parts were ordered from the factory for warranty repair, a legible copy of the FMC in-voice attached in lieu of filling out Section 5 if preferred.
- (14) If an incorrect FMC part number is listed or a part claimed that cannot be identified, it will be eliminated from the claim and will not appear on the credit memo.
- (15) Section 6 and 8 are reserved for factory use only. Do not enter any information in these areas.
- (16) Section 7 under labor, type hours only.

Returning Defective Or Failed Parts To The Manufacturing Division

- (1) Do not send defective parts to the factory. Hold all defective parts until information is received as to their disposition. If and when the parts are needed by the manufacturing division, the manufacturing division will forward instructions wither verbally or in writing and/or both. In all cases an A.T.R. number (Authorization to Return and Authorization to Receive) will be assigned with shipping instructions.

A.T.R. 87 - - - is used by the Bowling Green plant.

FMC Corporation

Crane & Excavator Division

U.S. 31. W. South

Bowling Green, Kentucky 42101

The Receiving Departments have orders not to accept any shipment of warranty parts without an A.T.R. number clearly displayed on all parts, shipping cartons, tags, bills of lading and other papers required by transportation companies.

If the part to be returned is a large item that cannot be crated (Example: boom sections, large hydraulic cylinders, frames, counterweights, etc.) it will be necessary to have the A.T.R. number legibly marked or painted with some waterproof marking device. If it is a part that is apt to be rolled over, it is required that the number be marked on two or more sides of the component.

- (2) Parts must be returned in clean condition. Hydraulic parts must be sealed to prevent contamination. Any parts received without covering port plugs, etc., will not be inspected or forwarded to the vendor as vendors refuse any warranty consideration of hydraulic components not properly protected.
- (3) Shipping of parts for more than one claim in one shipment is discouraged. However, if for some reason or other, this must be done then each individual part must be identified by item number, claim number and A.T.R. number.

Warranty

Submitting Of Warranty Claims

- (a) Prepare claim as outlined under "PREPARATION OF WARRANTY CLAIMS".
- (b) Distribute copies as follows:
 - Copy #1 White (Forward copies to the Manufacturing Division
 - Copy #2 Yellow (responsible for the model involved. For your
 - Copy #3 White (assistance we are listing below the mailing
 - Copy #4 Pink (address of each of the models manufactured.
 - Copy #5 Green (
 - Copy #6 Blue (Government copy. Copy should be retained for your records.
- (c) You will be advised on the disposition of any alleged defective parts.
- (d) Approximate time for processing claims that are within the time frame of normal warranty will fall in the following categories:
 - (1) If material is not required for inspection, the claim will be accepted or rejected within 45 days of receipt of the #3 copy. The Government will assume the responsibility for destroying and scrapping related parts under the direction of the Warranty Supervisor.
 - (2) If material is required for inspection, the claim will be accepted and credit issued within 45 days of receipt of the part or parts at the factory or a designated location. If inspection reveals the part or parts were not defective, the factory will re-invoice the Government to cancel the credit
 - (3) Government will be notified by phone followed by confirming letter with shipping instructions for alleged defective parts. If parts not received within 3 days a follow-up letter will be sent to distributor. If parts not received within 30 days after follow-up letter mailed, warranty claim will be
 - (4) A disputed warranty settlement must be presented in writing to Construction Equipment Distribution Operation, 2800 Lakeside Drive, Bannockburn, Illinois 60015, Attention: Service Department, no later than 45 days after the warranty claim status report is dated.

If the Government does not reply to FMC within the 45 day time frame, the warranty claim will not be opened to any further discussion at a later date.

Listed below are the mailing addresses and models for the Manufacturing Division. Direct claims to the attention of the Warranty Departments.

FMC Corporation
Crane and Excavator Division
Box 950
Bowling Green, Kentucky 42101

Campaign Procedures (Safety Recall)

- A. Labor compensation for announced factory modification and retrofits implemented by CCED.
 - (1) FMC will compensate the Government 100% of its charge out rate which must be on record with the company at the time the claim is received, for performance of work related to the campaign.
 - (a) If FMC has established the work time required to effect the campaign, only the time so established will be recognized in establishing the amount of the claim.
 - (b) If FIC has not established the hours required to effect the campaign, the company will accept actual documented time expended by the distributor, provided the time is reasonable and can be substantiated.
- B. Travel Time - Per Diem
 - (1) FMC will compensate the Government at 100% of their charge out rate, on record with the company, for actual travel time expended in the performance of campaign work up to a maximum of eight hours.
 - (2) The standard 10% add-on clause, as found in the warranty labor program, will not apply to computing the credit amount on the warranty claim.
 - (3) In addition to travel time, a reasonable per diem will be allowed for living expenses. Per diem receipts must accompany claim.

Warranty

C. Overtime

- (1) Overtime charges will not be accepted, unless agreed to by the company prior to the performance of the work.

D. Limits of FMC Responsibility

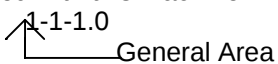
- (1) FMC reserves the right to make alterations or modifications in their equipment at any time which in their opinion may improve the performance and efficiency of the machine. FMC shall not be obligated to make such alterations or modifications to machines already in service
- (2) FMC will not be under obligation to credit the Government with the price of the new part or to reimburse the Government for the labor cost for repairing or replacing defective part unless, within thirty (30) days of the date of the campaign work performed, the Government submits a typewritten claim listing parts used and the R1C allotted time provided in the campaign letter, or if FMC has not established the time, satisfactory proof of the time reasonably expended in repairing or replacing the defective
- (3) FMC will issue a minimum of \$25.00 per claim.
- (4) Claims which cover campaign work performed on more than one machine will not be accepted.
- (5) The work must be completed within the time frame stated in the campaign agreement and campaign instructions. If campaign work is not completed within the stated time frame, FMC assumes no responsibility for any damage that might be incurred due to delay of campaign completion.

E. Requirements for Qualification

- (1) The Government will utilize only qualified personnel in the performance of campaign work. These personnel must have attended an authorized factory school on the particular product line within the
- (2) The Government must maintain properly equipped service vehicles and shop facilities as dictated by past 18 months.
- (3) The Government must have any specialized material, equipment, and tools, required by general industry general industry standards.
- (4) The Government must maintain a current and updated service library; including service manuals, bulletins standards, tins, policy handbook, parts books, and/or microfilm.

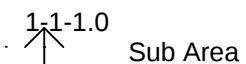
1.1 SM (Service Manual) System

The index is a list, identifying all major components on a machine. It is divided into general areas. The following areas are used with this machine.

Example:  1-1-1.0
General Area

Area	Description
1	Rubber Tired Lower
3	Upper Revolving Frame And Equipment
4	Vertical Shafts
5	Horizontal Shafts
6	Upper Engine & Converter
7	Speed-o-Matic System
9	Boom Attachment
18	Special Equipment

Each area is divided into numerous sub areas. The following is an alphabetical index of sub areas used on this machine.

Example:  1-1-1.0
Sub Area

Alphabetical Index		
A		
Accumulator		
Air	7-1	
Controls & Lines	1-27	
Auxiliary Generator	18-10	
Axle		
Front	1-2	
Rear	1-25	
B		
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Live Mast	9-2	
Foot Pin Remover	9-1	
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Boom Hoist	5-12	
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C		
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HC238A

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Cylinder	5-9
Drum	5-9
Engine	
Upper	6-5
Pedals	1-17
Counterweight	
Removal	
Hydraulic	3-10
Cylinder	
Drum Clutch	5-9
Gantry (Live Mast)	9-2
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Extend-Retract	1-45
Jack	1-46
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Pin Removal, Outrigger	1-82
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Differential	1-25
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Electrical	
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Carrier Cab	1-68
Carrier Lights	1-67
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Filter	
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Hydraulic Drive	
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