



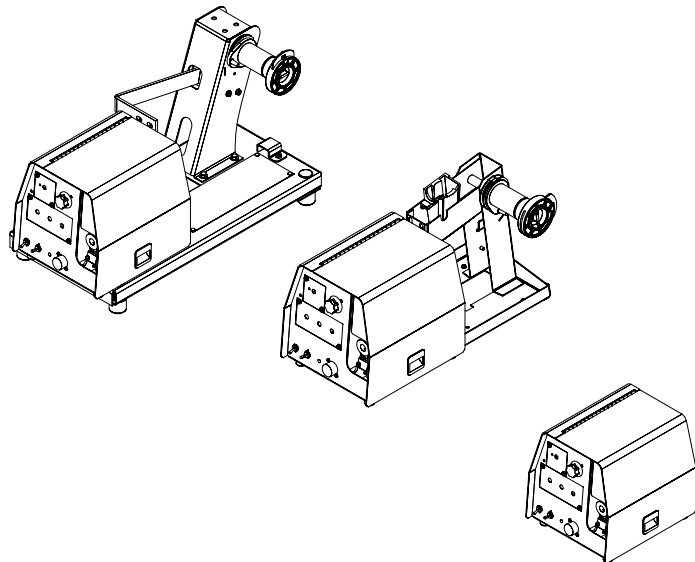
NOTE: This manual will cover most of the troubleshooting and repair procedures for the code numbers listed. Some variances may exist when troubleshooting/repairing later code numbers.

LF-72™ & LF-74™

For use with machines having Code Numbers:

11075, 11076, 11077, 11209, 11210, 11211, 11227, 11290, 11291, 11292, 11293, 11606, 11607, 11608, 11609, 11708, 11709, 11710, 11711, 11195, 11196, 11197, 11610, 11611, 11712, 11713, 12422, 12443, 12442, 12454

SERVICE MANUAL



⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

The Above For Diesel Engines

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

The Above For Gasoline Engines

ARC WELDING can be hazardous. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.



FOR ENGINE powered equipment.

1.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.



1.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.



1.c. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

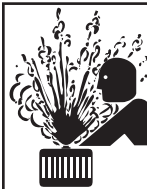
1.d. Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

1.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.



1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.g. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.



1.h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.



ELECTRIC AND MAGNETIC FIELDS may be dangerous

2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

LF-72™ & LF-74™

LINCOLN
ELECTRIC



ELECTRIC SHOCK can kill.

3.a. The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- Semiautomatic DC Constant Voltage (Wire) Welder.
- DC Manual (Stick) Welder.
- AC Welder with Reduced Voltage Control.

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically “hot” parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

3.j. Also see Items 6.c. and 8.



ARC RAYS can burn.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87.1 standards.

4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.



FUMES AND GASES can be dangerous.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**

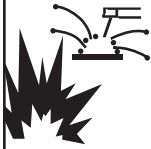
5.b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer’s safety practices. MSDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.



WELDING and CUTTING SPARKS can cause fire or explosion.

6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

- 6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.
- 6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
- 6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).
- 6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.
- 6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.
- 6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.
- 6.h. Also see item 1.c.
- 6.i. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, Ma 022690-9101.
- 6.j. Do not use a welding power source for pipe thawing.



CYLINDER may explode if damaged.

- 7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.
- 7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- 7.c. Cylinders should be located:
 - Away from areas where they may be struck or subjected to physical damage.
 - A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.
- 7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.
- 7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- 7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.
- 7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.



FOR ELECTRICALLY powered equipment.

- 8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.
- 8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.
- 8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

Refer to <http://www.lincolnelectric.com/safety> for additional safety information.

PRÉCAUTIONS DE SÛRETÉ

Pour votre propre protection lire et observer toutes les instructions et les précautions de sûreté spécifiques qui paraissent dans ce manuel aussi bien que les précautions de sûreté générales suivantes:

Sûreté Pour Soudage A L'Arc

1. Protégez-vous contre la secousse électrique:
 - a. Les circuits à l'électrode et à la pièce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vêtements mouillés. Porter des gants secs et sans trous pour isoler les mains.
 - b. Faire très attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher métallique ou des grilles métalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
 - c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état de fonctionnement.
 - d. Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
 - e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
 - f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces précautions pour le porte-électrode s'appliquent aussi au pistolet de soudage.
2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas où on reçoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.
3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:
 - a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
 - b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
 - c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.
4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.
5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans latéraux dans les zones où l'on pique le laitier.

6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû aux étincelles.
7. Quand on ne soude pas, poser la pince à un endroit isolé de la masse. Un court-circuit accidentel peut provoquer un échauffement et un risque d'incendie.
8. S'assurer que la masse est connectée le plus près possible de la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaînes de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'échauffement des chaînes et des câbles jusqu'à ce qu'ils se rompent.
9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particulièrement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumées toxiques.
10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgène (gas fortement toxique) ou autres produits irritants.
11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

PRÉCAUTIONS DE SÛRETÉ POUR LES MACHINES À SOUDER À TRANSFORMATEUR ET À REDRESSEUR

1. Relier à la terre le châssis du poste conformément au code de l'électricité et aux recommandations du fabricant. Le dispositif de montage ou la pièce à souder doit être branché à une bonne mise à la terre.
2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.
3. Avant de faire des travaux à l'intérieur de poste, la débrancher à l'interrupteur à la boîte de fusibles.
4. Garder tous les couvercles et dispositifs de sûreté à leur place.

Electromagnetic Compatibility (EMC)

Conformance

Products displaying the CE mark are in conformity with European Community Council Directive of 15 Dec 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility, 2004/108/EC. It was manufactured in conformity with a national standard that implements a harmonized standard: EN 60974-10 Electromagnetic Compatibility (EMC) Product Standard for Arc Welding Equipment. It is for use with other Lincoln Electric equipment. It is designed for industrial and professional use.

Introduction

All electrical equipment generates small amounts of electromagnetic emission. Electrical emission may be transmitted through power lines or radiated through space, similar to a radio transmitter. When emissions are received by other equipment, electrical interference may result. Electrical emissions may affect many kinds of electrical equipment; other nearby welding equipment, radio and TV reception, numerical controlled machines, telephone systems, computers, etc. Be aware that interference may result and extra precautions may be required when a welding power source is used in a domestic establishment.

Installation and Use

The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing (grounding) the welding circuit, see Note. In other cases it could involve construction of an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

Note: The welding circuit may or may not be earthed for safety reasons according to national codes. Changing the earthing arrangements should only be authorized by a person who is competent to access whether the changes will increase the risk of injury, e.g., by allowing parallel welding current return paths which may damage the earth circuits of other equipment.

Assessment of Area

Before installing welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

- a) other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;
- b) radio and television transmitters and receivers;
- c) computer and other control equipment;
- d) safety critical equipment, e.g., guarding of industrial equipment;
- e) the health of the people around, e.g., the use of pacemakers and hearing aids;
- f) equipment used for calibration or measurement
- g) the immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;
- h) the time of day that welding or other activities are to be carried out.

Electromagnetic Compatibility (EMC)

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

Methods of Reducing Emissions

Mains Supply

Welding equipment should be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. Consideration should be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

Maintenance of the Welding Equipment

The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

Welding Cables

The welding cables should be kept as short as possible and should be positioned close together, running at or close to floor level.

Equipotential Bonding

Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

Earthing of the Workpiece

Where the workpiece is not bonded to earth for electrical safety, not connected to earth because of its size and position, e.g., ships hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

Screening and Shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications.¹

¹ Portions of the preceding text are contained in EN 60974-10: "Electromagnetic Compatibility (EMC) product standard for arc welding equipment."

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TECHNICAL SPECIFICATIONS: LF-72™ Wire Feeder

SPEC.#	TYPE	LF-72™	Speed	Wire Size	
				Solid	Cored
K2327-1 K2327-4	Base Model	50-800 IPM (1.27-20.3 m/m)		.023 - 1/16 in. (0.6 - 1.6 mm)	.035 - 5/64 in (0.9 - 2.0 mm)
K2327-2 K2327-5	Bench Model Standard Duty				
K2327-3 K2327-6	Bench Model Heavy Duty				
K2327-7					

CONTROL BOX, WIRE DRIVE AND COMPLETE UNITS								
SPEC.#	TYPE	INPUT POWER	PHYSICAL SIZE•			TEMPERATURE RATING		
		Input Voltage and Current	Dimensions			Weight	Operating	Storage
			Height	Width	Depth			
K2327-1	LF-72™	24-42VAC 9 AMPS	11.1" (282 mm)	10.2" (259 mm)	12.9" (328 mm)	43 Lbs (19.7 Kg.)	14°F to 104°F (-10°C to 40°C)	-40°F to 185°F (-40°C to 85°C)
K2327-4	Base Model		26.5 Lbs (12.0 Kg)					
K2327-2 K2327-5	LF-72™ Bench Standard Duty		Dimensions Δ			Weight		
		Height	Width	Depth	Weight			
		12.6" (320 mm)	10.9" (277 mm)	22.5" (572 mm)	52.5 Lbs (23.8 Kg.)			
K2327-3 K2327-6 K2327-7	LF-72™ Bench Heavy Duty		Dimensions Δ			Weight		
		Height	Width	Depth	Weight			
		15.3" (389 mm)	13.0" (330 mm)	27.7" (704 mm)	67.5 Lbs (30.6 Kg.)			

WELDING CAPACITY RATING	
Amp Rating	Duty Cycle
500 A	60%

Δ Dimensions do not include wire reel.

LF-72™ & LF-74™



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SAFETY PRECAUTION



ELECTRIC SHOCK can kill.

- Only qualified personnel should perform this installation.
- Turn off the input power to the power source at the disconnect switch or fuse box before working on this equipment. Turn off the input power to any other equipment connected to the welding system at the disconnect switch or fuse box before working on this equipment.

- Do not touch electrically hot parts.

LOCATION

The LF-72™ may be placed on a bench or mounted on top of a welding power source.

Place the LF-72™ in a clean and dry location.

Do not stack the LF-72™.

MOUNTING

For location and size, LF-72™ Bench Model Rear Mounting Holes (See Figure A.1) and for Bottom Mounting Holes (See Figure A.2).

FIGURE A.1

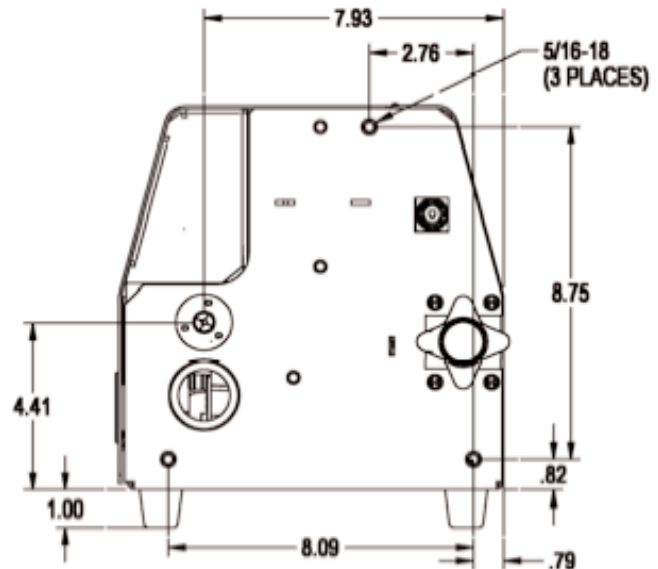
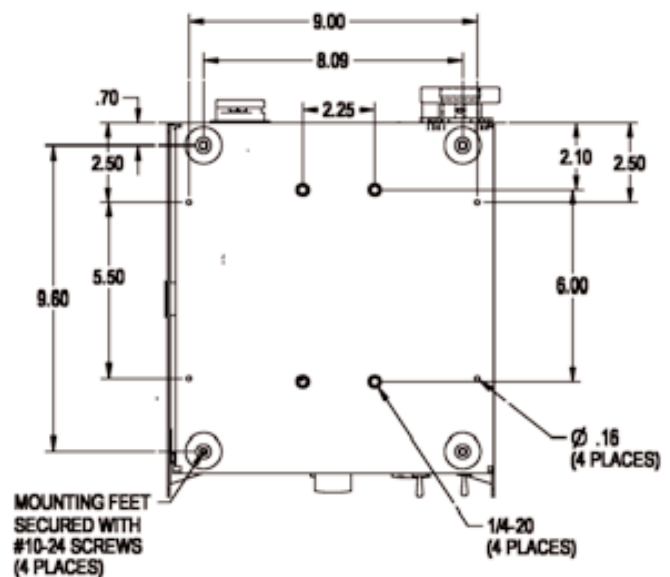


FIGURE A.2



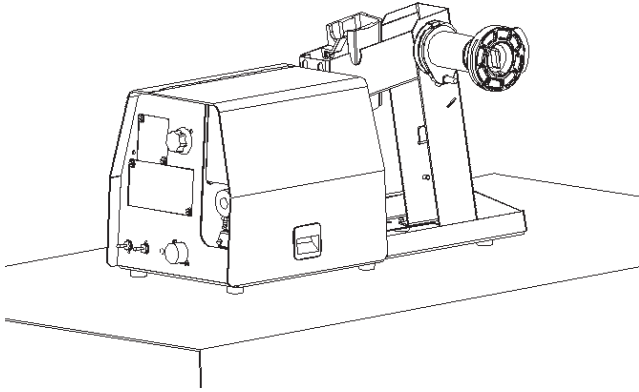
LF-72™ & LF-74™



BENCH MOUNT

The LF-72™ mounts in a variety of configurations. As shipped from the factory, the LF-72™ is suitable for bench mounting or placing directly on top of the welding power source (CV-xxx and DC-xxx product family only).

Bench Mount



SWIVEL MOUNT

Both the standard duty bench model and heavy duty bench model may be mounted onto a swivel when a top a welding power source.

Swivel Kit and Bench Model, Standard Duty

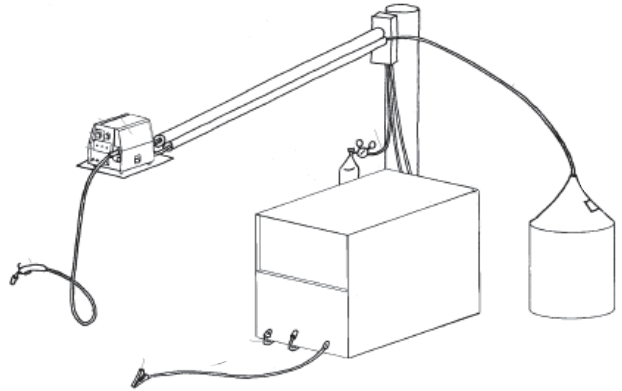


Swivel Kit and Base Model LF-72™



BOOM MOUNT

When boom mounting, remove the wire reel stand (if assembled) and secure the wire feeder directly to the desired surface.



SUSPENDED

Only suspend the wire feeder by the lift bail of the portability kit.



⚠ WARNING

Alternative methods for hanging the wire feeder must not be used unless insulation is provided between the wire feeder enclosure and the hanging device.

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SAFETY PRECAUTION

**ELECTRIC SHOCK can kill.**

- Only qualified personnel should perform this installation.
- Turn off the input power to the power source at the disconnect switch or fuse box before working on this equipment. Turn off the input power to any other equipment connected to the welding system at the disconnect switch or fuse box before working on this equipment.
- Do not touch electrically hot parts.

WELD CABLE SIZES

Table A.1 has the copper cable sizes recommended for different currents and duty cycles. Lengths stipulated are the distance from the welder to work and back to the welder again. Cable sizes are increased for greater lengths primarily for the purpose of minimizing voltage in the welding circuit.

TABLE A.1

RECOMMENDED CABLE SIZES (RUBBER COVERED COPPER - RATED 75°C)**						
Amperes	Percent Duty Cycle	CABLE SIZES FOR COMBINED LENGTHS OF ELECTRODE AND WORK CABLES				
		0 to 50 Ft. 0 to 15 m	50 to 100Ft. 15 to 31 m	100 to 150 Ft. 31 to 48 m	150 to 200 Ft. 48 to 61 m	200 to 250 Ft. 61 to 76 m
200	60	2	2	2	1	1/0
200	100	2	2	2	1	1/0
225	20	4 or 5	3	2	1	1/0
225	40 & 30	3	3	2	1	1/0
250	30	3	3	2	1	1/0
250	40	2	2	1	1	1/0
250	60	1	1	1	1	1/0
250	100	1	1	1	1	1/0
300	60	1	1	1	1/0	2/0
325	100	2/0	2/0	2/0	2/0	3/0
350	60	1/0	1/0	2/0	2/0	3/0
400	60	2/0	2/0	2/0	3/0	4/0
400	100	3/0	3/0	3/0	3/0	4/0
500	60	2/0	2/0	3/0	3/0	4/0

** Tabled values are for operation at ambient temperatures of 40°C and below. Applications above 40°C may require cables larger than recommended, or cables rated higher than 75°C.

COAXIAL WELD CABLES

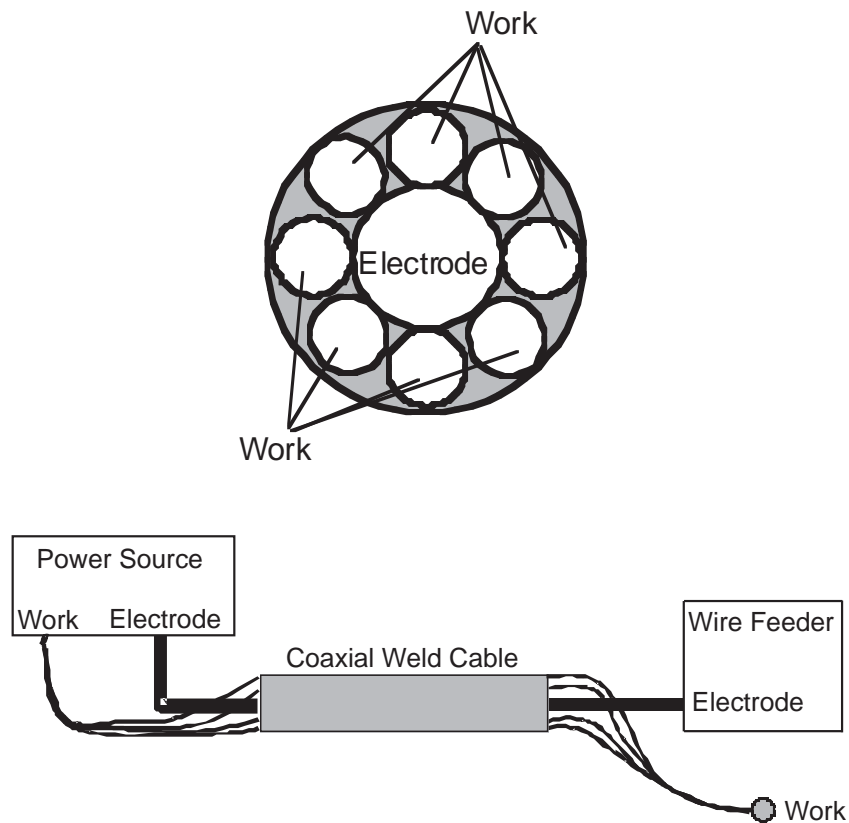
Coaxial welding cables are specially designed welding cables for pulse welding or STT welding. Coaxial weld cables feature low inductance, allowing fast changes in the weld current. Regular cables have a higher inductance which may distort the pulse or STT wave shape. Inductance becomes more severe as the weld cables become longer.

Coaxial weld cables are recommended for all pulse and STT welding, especially when the total weld cable length (electrode cable + work cable) exceeds 50 feet (7.6m)

A coaxial weld cable is constructed by 8 small leads wrapped around one large lead. The large inner lead connects to the electrode stud on the power source and the electrode connection on the wire feeder. The small leads combine together to form the work lead, one end attached to the power source and the other end to the work piece. (See Coaxial weld Cable below.)

WELD CABLE CONNECTION

Connect a work lead of sufficient size between the proper output stud on the power source and the work. Be sure the connection to the work makes tight metal to metal electrical contact. Poor work lead connections can result in poor welding performance.



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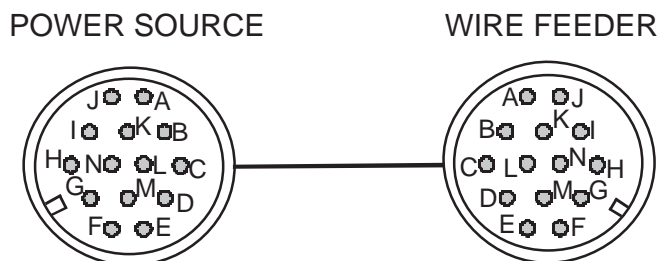
LINCOLN
ELECTRIC

ANALOG CONTROL CABLE CONTROL CABLE CONNECTIONS

- All control cables can be connected end to end to extend their length.

The control cable connecting the wire feeder to the power source is specially made for the welding environment.

The wire feeder power requires overcurrent protection. Connect the wire feeder only to power sources with overcurrent protection of no more than 15 amps.



PIN	FUNCTION	LEAD#
A	Unused	-----
B	Reserved	-----
C	Welding Output Control (trigger from feeder)	2
D	Welding Output Control (trigger from feeder)	4
E	Remote Voltage Control ("+" supply from feeder or remote)	77
F	Remote Voltage Control (control signal from feeder or remote)	76
G	Remote Voltage Control ("-" supply from feeder or remote)	75
H	Reserved	
I	42 VAC	41
J	Reserve for Future Use.	
K	42 VAC	42
L	Reserve for Future Use.	
M	Unused	-----
N	Electrode voltage from feeder	67

Do not use more than 100 ft (30.5 m) of control cable between the wire feeder and power source.

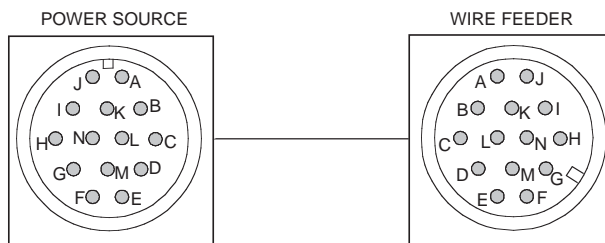
LF-72™ & LF-74™



ANALOG MILLER CONTROL CABLE ADAPTER K2335-1

This Lincoln Electric wire feeder may be mounted to a limited number of Miller Electric power sources. The Miller power source must have the amphenol pin definition shown in the table below for proper operation of the wire feeder.

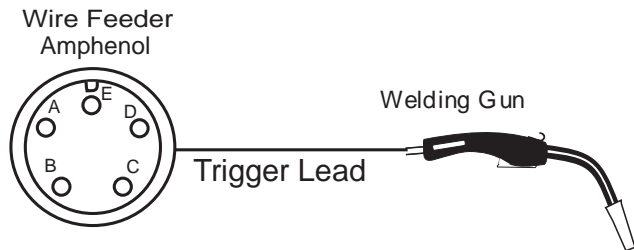
Operation of Lincoln wire feeders on Miller power sources may result in lack of high speeds or reduce pull force on high wire feed speeds. Maximum wire feed speed for the LF-72™ operating on a Miller power source is approximately 720ipm. Be sure the Miller power source provides 24 VAC to the wire feeder and has overcurrent protection of no more than 15 amps. The power source must not exceed 113VDC peak.



MILLER POWER SOURCE		LINCOLN WIRE FEEDER	
Pin	Function	Pin	Function
A	24 VAC to feeder	I	42 VAC feeder
B	Welding Output Control	D	Welding Output Control
C	+10VDC to feeder for remote control	C	Welding Output Control
D	Remote control common	E	Remote Voltage Control ("+" supply, from power source)
E	0-10VDC from feeder for remote control.	G	Remote Voltage Control ("- " supply, from power source)
F	Current feedback to feeder. Scaled 0-10V. 1 V = 100 amps. Referenced to pin D.	F	Remote Voltage Control (control signal from feeder or remote.)
G	24 VAC common.	J	Reserved for future use.
H	Arc Voltage feedback to feeder. Scaled 0-10V. 1 V = 10 Arc volts. Referenced to pin D.	K	42 VAC to feeder
I		L	Reserved for future use.
J			
K			
L			
M			
N		N	Electrode voltage to power source (67)

Miller is a registered trademark not owned or licensed by The Lincoln Electric Company.

WELDING GUN/WIRE FEEDER TRIGGER CONNECTOR



Wire Feeder

Pin	Function
A	Gun Trigger
B	-
C	Common
D	-
E	-

HIGH FREQUENCY PROTECTION

Locate the LF-72™ away from radio controlled machinery. The normal operation of the LF-72™ may adversely affect the operation of RF controlled equipment, which may result in bodily injury or damage to the equipment

REMOTE SENSE LEAD SPECIFICATIONS

Refer to the power source instruction manual for instructions for connecting the wire feeder for STT welding.

WIRE DRIVE SYSTEMS

Drive Roll Kits are designed to feed specific types and wire sizes. The LF-72™ Bench Model comes with the combo **KP1696-1**. All other Drive Roll Kits listed are not included, but are available for ordering from the following tables:

Drive Roll Kits, Steel Wires

Includes: 2 Smooth V groove drive rolls and an inner wire guide.

KP1696-030S	.023-.030 (0.6-0.8mm)
KP1696-035S	.035 (0.9mm)
KP1696-045S	.045 (1.2mm)
KP1696-052S	.052 (1.4mm)
KP1696-1/16S	1/16 (1.6mm)
KP1696-1	.035, .045 (0.9, 1.2mm)
KP1696-2	.040 (1.0mm)

Drive Roll Kits, Cored Wires

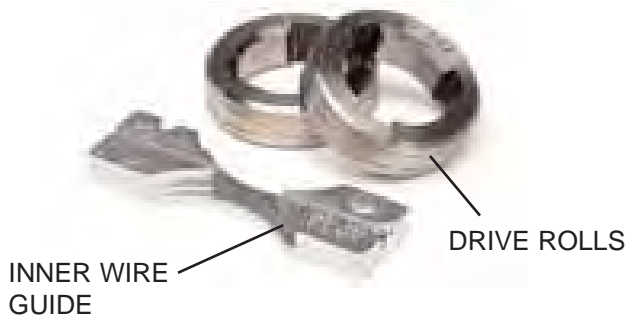
Includes: 2 Knurled drive rolls and an inner wire guide.

KP1697-035C	.030-.035" (0.8-0.9mm)
KP1697-045C	.040-.045" (1.0-1.2mm)
KP1697-052C	.052" (1.4mm)
KP1697-1/16C	1/16" (1.6mm)
KP1697-068	.068-.072" (1.7-1.8mm)
KP1697-5/64C	5/64" (2.0mm)

Drive Roll Kits, Aluminum Wire

Includes: 2 polished U groove drive rolls, outer wire guide and an inner wire guide.

KP1695-035A	.035" (0.9 mm)
KP1695-040A	.040" (1.0mm)
KP1695-3/64A	3/64" (1.2mm)
KP1695-1/16A	1/16" (1.6mm)



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WELDING GUNS, TORCHES AND ACCESSORIES

GUN RECEIVER BUSHING

The LF-72 wire feeder comes with a K1500-2 gun receiver bushing.

MAGNUM GUN AND CABLE ASSEMBLIES

The LF-72 wire feeder model will accept a number of optional gun and cable assemblies. An example of installing the Gun and Cable is shown in **Figure A.3** with a 15 ft. (4.6m) long **Magnum 400** gun and cable. **Figure A.3a** with a 15 ft. (4.6m) long **Magnum Pro 350** gun and cable.

1. Turn off power at the welding power source.
2. Unscrew Thumb screw on Wire Drive Unit, until tip of screw no longer protrudes into gun bushing hole as seen from the front of machine.

Figure A.3

FIGURE A.3 for Codes 11075, 11076, 11077, 11209, 11210, 11211, 11227 11290, 11291, 11292, 11293

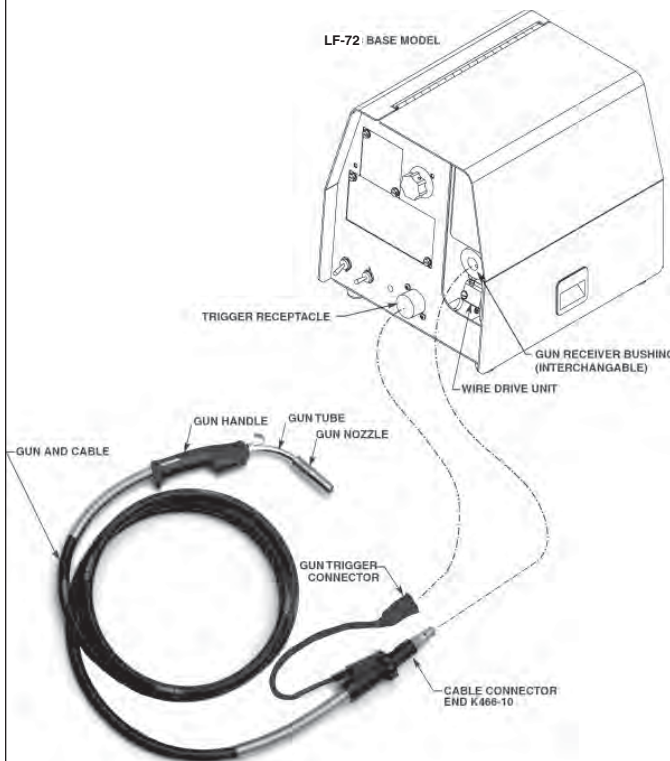
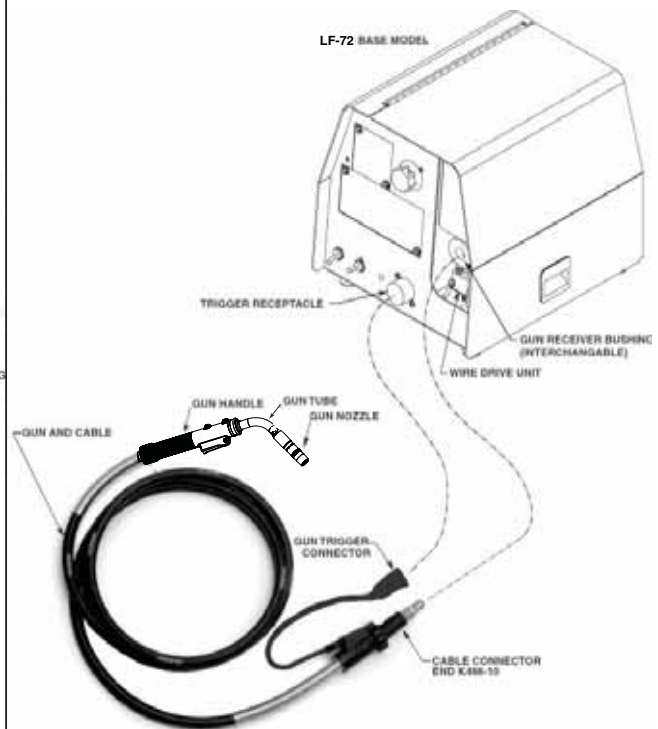


Figure A.3a

FIGURE A.3a for Codes 11606, 11607, 11608, 11609



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PROCEDURE FOR CHANGING DRIVE AND IDLE ROLL SETS

(See Figure A.4)



WARNING

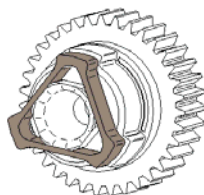
ELECTRIC SHOCK can kill.



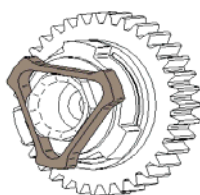
- Turn the input power OFF at the welding power source before installation or changing drive rolls and/or guides.
- Do not touch electrically live parts.
- When inching with the gun trigger, electrode and drive mechanism are "hot" to work and ground and could remain energized several seconds after the gun trigger is released.
- Only qualified personnel should perform maintenance work.

1. Turn power off at the welding power source.
2. Release the idle roll pressure arm.
3. Remove the outer wire guide by turning the knurled thumbscrews counter-clockwise to unscrew them from the feed plate.
4. Rotate the triangular lock and remove the drive rolls.

FIGURE A.4



UNLOCKED POSITION



LOCKED POSITION

5. Remove the inner wire guide.
6. Insert the new inner wire guide, groove side out, over the two locating pins in the feed plate.
7. Install a drive roll on each hub assembly secure with the triangular lock.
8. Install the outer wire guide by aligning it with the pins and tightening the knurled thumbscrews.
9. Close the idle arm and engage the idle roll pressure arm. Adjust the pressure appropriately.

WIRE DRIVE CONFIGURATION

(See Figure A.5)

Changing the Gun Receiver Bushing



WARNING



ELECTRIC SHOCK can kill.

- Turn the input power OFF at the disconnect switch or fuse box before attempting to connect or disconnect input power lines, output cables or control cables.
- Only qualified personnel should perform this installation.

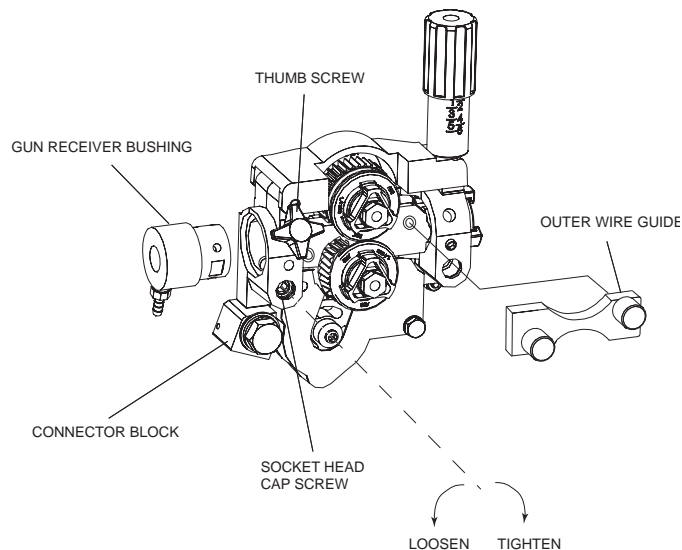
Tools required:

- 1/4" hex key wrench

Note: Some gun bushings do not require the use of the thumb screw.

1. Turn power off at the welding power source.
2. Remove the welding wire from the wire drive.
3. Remove the thumb screw from the wire drive.
4. Remove the welding gun from the wire drive.
5. Loosen the socket head cap screw that holds the connector bar against the gun bushing. Important: Do not attempt to completely remove the socket head cap screw.
6. Remove the outer wire guide, and push the gun bushing out of the wire drive. Because of the precision fit, light tapping may be required to remove the gun bushing.

FIGURE A.5



LF-72™ & LF-74™



7. Disconnect the shielding gas hose from the gun bushing, if required.
8. Connect the shielding gas hose to the new gun bushing, if required.
9. Rotate the gun bushing until the thumb screw hole aligns with the thumb screw hole in the feed plate. Slide the gun receiver bushing into the wire drive and verify the thumb screw holes are aligned.
10. Tighten the socket head cap screw.
11. Insert the welding gun into the gun bushing and tighten the thumb screw.

Gun Receiver Bushing	For use With
K1500-1	K466-1 Lincoln gun connectors; Innershield and Subarc guns)
K1500-2	K466-2, K466-10 Lincoln gun connectors; Magnum 200/300/400 guns and compatible with Tweco® #4)
K1500-3	K1637-7 Lincoln gun connectors; Magnum 550 guns and compatible with Tweco® #5)
K1500-4	K466-3 Lincoln gun connectors; compatible with Miller® guns.)
K1500-5	(Compatible with Oxo® guns.)
K489-7	(Lincoln Fast-Mate guns.)

PRESSURE ARM ADJUSTMENT

⚠ WARNING

ELECTRIC SHOCK can kill.



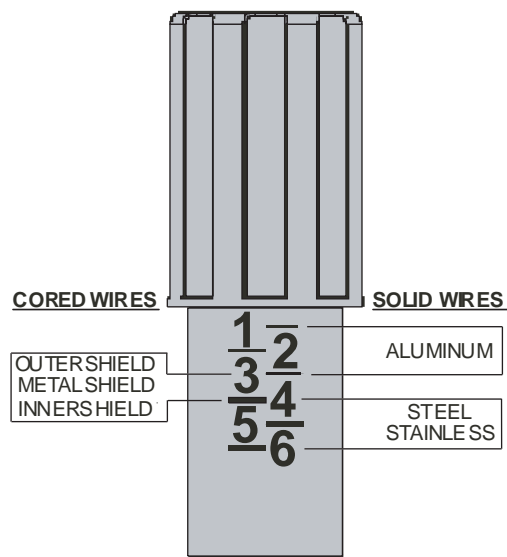
- Turn the input power OFF at the welding power source before installation or changing drive rolls and/or guides.
- Do not touch electrically live parts.
- When inching with the gun trigger, electrode and drive mechanism are "hot" to work and ground and could remain energized several seconds after the gun trigger is released.
- Only qualified personnel should perform maintenance work.

The pressure arm controls the amount of force the drive rolls exert on the wire. Proper adjustment of the pressure arm gives the best welding performance.

Set the pressure arm as follows (See Figure A.6):

- Aluminum wires between 1 and 3
- Cored wires between 3 and 4
- Steel, Stainless wires between 4 and 6

FIGURE A.6



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WIRE REEL LOADING

WARNING

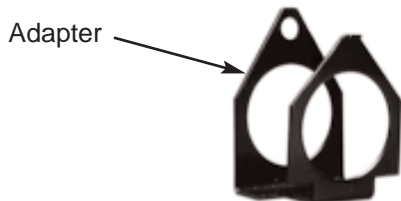
- Keep hands, hair, clothing and tools away from rotating equipment.
- Do not wear gloves when threading wire or changing wire spool.
- Only qualified personnel should install, use or service this equipment.

Loading 10 to 15 lb. (4.5 – 6.8kg) Spools

A K468 spindle adapter is required for loading 2" wide spools on 2" (51mm) spindles. Use a K468-1 spindle adapter for loading 2-1/2" (64mm) wide spools. (See figure A.7 and figure A.8)

1. Squeeze the release bar on the retaining collar and remove it from the spindle.
2. Place the spindle adapter on the spindle, aligning the spindle brake pin with the hole in the adapter.
3. Place the spool on the spindle and align the adapter brake tab with one of the holes in the back side of the spool. An indicator mark on the end of the spindle shows the orientation of the brake tab. Be certain the wire feeds off of the spool in the proper direction.
4. Re-install the retaining collar. Make sure that the release bar snaps out and that the retaining collar fully engages the groove on the spindle.

FIGURE A.7



Spindle Placement

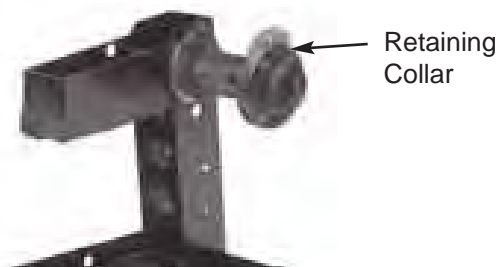
The wire reel stand provides two mounting locations for the spindle. Each mounting location consists of a tube in the center of the mast and locating slots.

Loading 16 to 44 lb. (7.3 – 20kg) Spools (See figure A.8)

1. Squeeze the release bar on the retaining collar and remove it from the spindle.
2. Place the spool on the spindle, aligning the spindle brake pin with one of the holes in the back side of the spool. An indicator mark on the end of the spindle shows the orientation of the brake holding pin. Be certain the wire feeds off of the spool in the proper direction.

3. Re-install the retaining collar. Make sure that the release bar snaps out and that the retaining collar fully engages the groove on the spindle.

FIGURE A.8



Loading 30 lb. (13.6 kg) Readi-Reels (See Figure A.9)

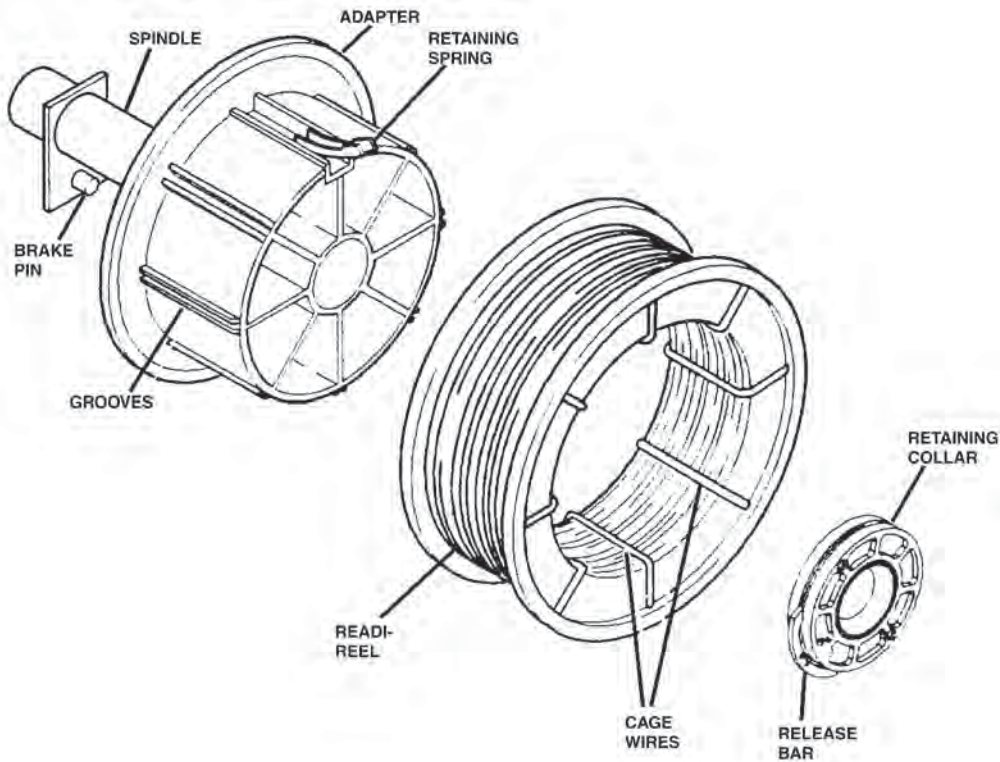
A K363-P Readi-Reel adapter is required for loading these spools on 2" (51mm) spindles.

1. Squeeze the release bar on the retaining collar and remove it from the spindle.
2. Place the Readi-Reel adapter on the spindle, aligning the spindle brake pin with one of the holes in the adapter.
3. Re-install the retaining collar. Make sure that the release bar snaps out and that the retaining collar fully engages the groove on the spindle.
4. Rotate the spindle and adapter until the retaining spring is at the 12 o'clock position.
5. Position the Readi-Reel so that electrode de-reels in the proper direction.
6. Set one of the Readi-Reel inside cage wires on the slot in the retaining spring.
7. Lower the Read-Reel to depress the retaining spring and align the other inside cage wires with the grooves in the adapter.
8. Slide the cage all way onto the adapter until the retaining spring "pops up" fully.

Removing a Readi-Reel

1. To remove a Readi-Reel from the an adapter, depress the retaining spring with a thumb while pulling the Readi-Reel cage from the adapter with both hands. Do not remove the adapter from the spindle.

FIGURE A.9



WELD WIRE ROUTING

The electrode supply may be either from reels, Read-Reels, spools, or bulk packaged drums or reels. Observe the following precautions:

- a) The electrode must be routed to the wire drive unit so that the bends in the wire are at a minimum, and also that the force required to pull the wire from the reel into the wire drive unit is kept at a minimum.
- b) The electrode is "hot" when the gun trigger is pressed and must be insulated from the boom and structure.
- c) If more than one wire feed unit shares the same boom and are not sharing the same power source output stud, their wire and reels must be insulated from each other as well as insulated from their mounting structure.

SHIELDING GAS CONNECTION



CYLINDER may explode if damaged.

- Keep cylinder upright and chained to support.
- Keep cylinder away from areas where it may be damaged.
- Never lift welder with cylinder attached.
- Never allow welding electrode to touch cylinder.
- Keep cylinder away from welding or other live electrical circuits.



BUILD-UP OF SHIELDING GAS may harm health or kill.

- Shut off shielding gas supply when not in use.

SEE AMERICAN NATIONAL STANDARD Z-49.1, "SAFETY IN WELDING AND CUTTING" PUBLISHED BY THE AMERICAN WELDING SOCIETY.

Maximum inlet pressure is 100 psi. (6.9 bar.)

Install the shielding gas supply as follows:

1. Secure the cylinder to prevent it from falling.
2. Remove the cylinder cap. Inspect the cylinder valves and regulator for damaged threads, dirt, dust, oil or grease. Remove dust and dirt with a clean cloth. **DO NOT ATTACH THE REGULATOR IF OIL, GREASE OR DAMAGE IS PRESENT!** Inform your gas supplier of this condition. Oil or grease in the presence of high pressure oxygen is explosive.
3. Stand to one side away from the outlet and open the cylinder valve for an instant. This blows away any dust or dirt which may have accumulated in the valve outlet.
4. Attach the flow regulator to the cylinder valve and tighten the union nut(s) securely with a wrench. Note: if connecting to 100% CO₂ cylinder, insert regulator adapter between regulator and cylinder valve. If adapter is equipped with a plastic washer, be sure it is seated for connection to the CO₂ cylinder.

5. Attach one end of the inlet hose to the outlet fitting of the flow regulator. Attach the other end to the welding system shielding gas inlet. Tighten the union nuts with a wrench.
6. Before opening the cylinder valve, turn the regulator adjusting knob counterclockwise until the adjusting spring pressure is released.
7. Standing to one side, open the cylinder valve slowly a fraction of a turn. When the cylinder pressure gage stops moving, open the valve fully.
8. The flow regulator is adjustable. Adjust it to the flow rate recommended for the procedure and process being used before making a weld.

INSTALLING ELECTRODE CONDUIT KITS

⚠ WARNING



ELECTRIC SHOCK can kill.

- Turn the input power OFF at the disconnect switch before working on this equipment.
- Do not touch electrically hot parts.

Electrode conduit is used when feeding wire drums, from boxes or large reels. For best feeding results, use the shortest conduit length possible and avoid sharp bends.

(For Codes 11075, 11076, 11077)

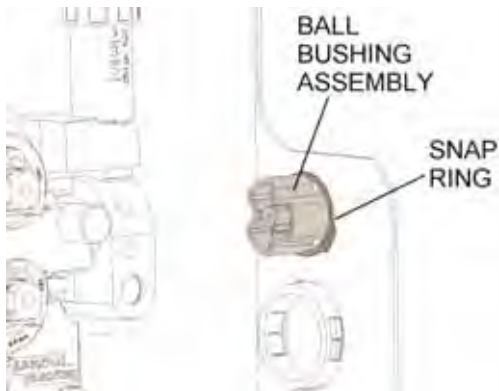
Tools required: (See Figure A.10a)

- Snap Ring Pliers

To install Lincoln conduit:

1. Turn off power at the welding power source.
2. Remove the snap ring holding the ball bushing assembly to the back of the wire feeder. Remove the ball bushing assembly.

FIGURE A.10a

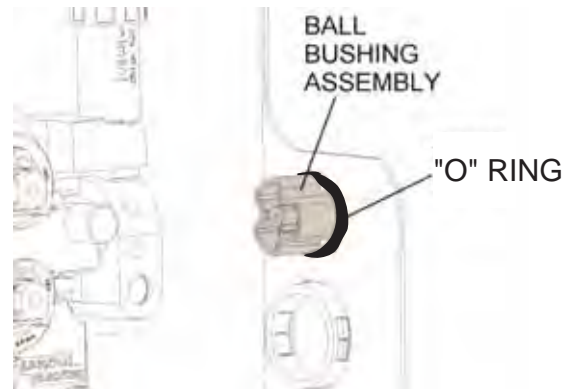


(For Codes 11209, 11210, 11211 and above)

To install Lincoln conduit: (See Figure A.10b)

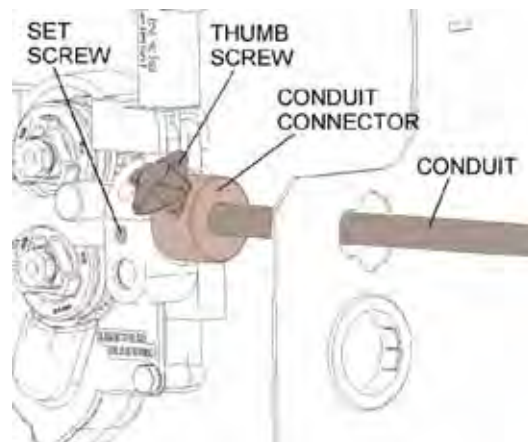
1. Turn off power at the welding power source.
2. Remove the "O" ring holding the ball bushing assembly to the back of the wire feeder. Remove the ball bushing assembly.

FIGURE A.10b



3. Place a K1546-xx conduit connector into the back of the wire drive. Rotate the conduit connector to a position where the thumb screw does not interfere with the idle arm or door.
4. Tighten the set screw to secure the conduit connector in the wire drive.
5. Insert conduit through the sheet metal of the LF-72™ and into the conduit connector. Secure with the thumb screw.

FIGURE A.11



ALUMINUM WIRE PREPARATIONS

⚠ WARNING



ELECTRIC SHOCK can kill.

- Turn the input power OFF at the disconnect switch before working on this equipment.
- Do not touch electrically hot parts.

Welding with aluminum filler wires requires extra care. Aluminum wire is softer and not as stiff as steel wires, it is important to keep aluminum wire free of dirt and scratches. Limit gun length to 10 Ft.(3.0 m) for best results and use a spool cover if feeding from a spool.

To prevent scratching of the aluminum wire, remove the ball bearings from the ball housing as follows.

(For Codes 11075, 11076, 11077)

Tools required: (See Figure A.12a)

- Snap Ring Pliers
- 9/64" Hex key wrench

1. Turn off power at the welding power source.
2. Remove the snap ring holding the ball bushing assembly to the back of the wire feeder. Remove the ball bushing assembly.

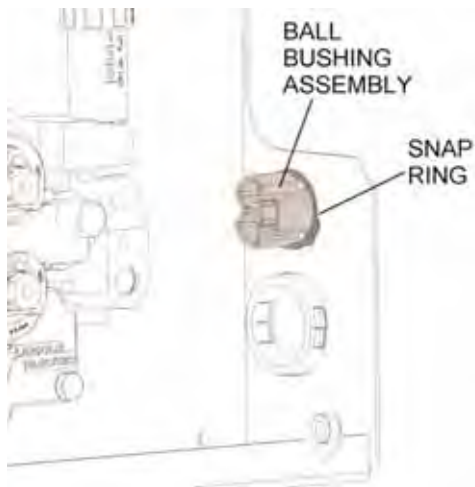


FIGURE A.12a
(For Codes 11209, 11210, 11211 and above)

Tools required: (See Figure A.12b)

- 9/64" Hex key wrench

1. Turn off power at the welding power source.
2. Remove the snap ring holding the ball bushing assembly to the back of the wire feeder. Remove the ball bushing assembly.

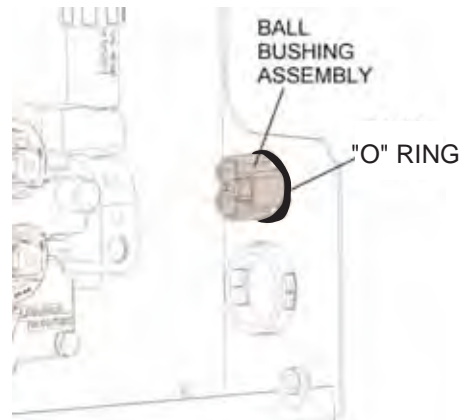
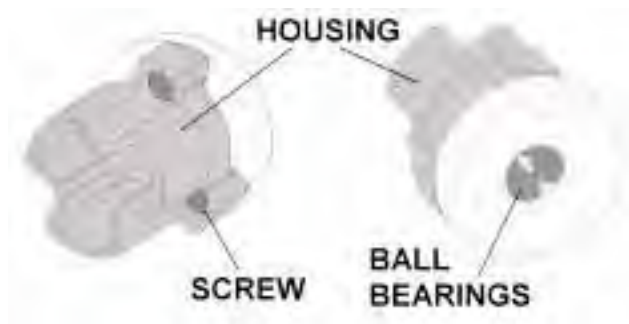


FIGURE A.12b

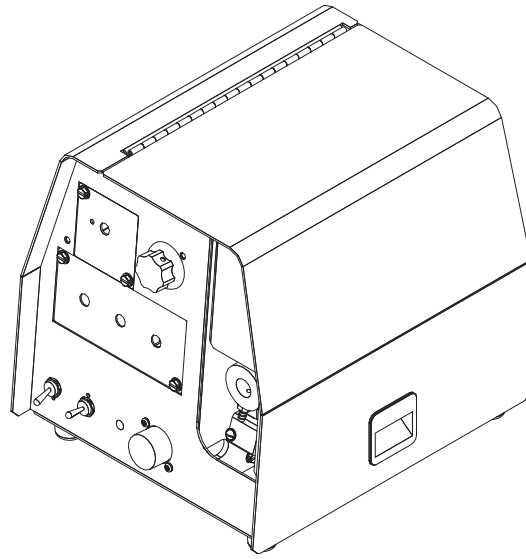
3. Remove the three socket head cap screws from the ball bushing assembly. **Caution: as the screws are being loosened, the balls may fall free from the assembly.** Remove the balls and the steel washer.

FIGURE A.13

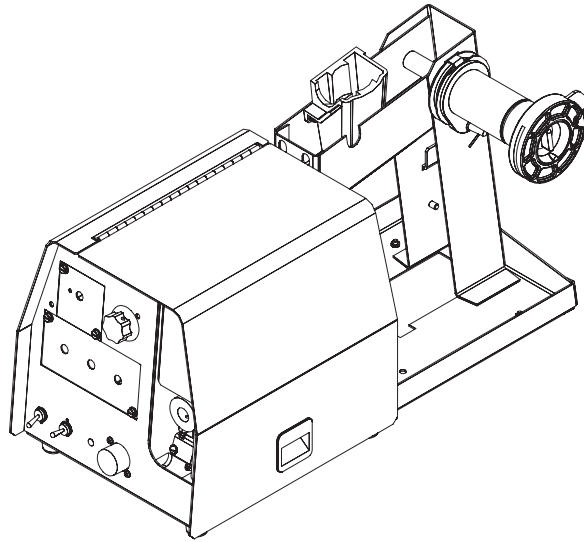


4. Place the ball bushing housing into the wire feeder case and secure with the snap ring or "O" ring depending on which code your machine uses.

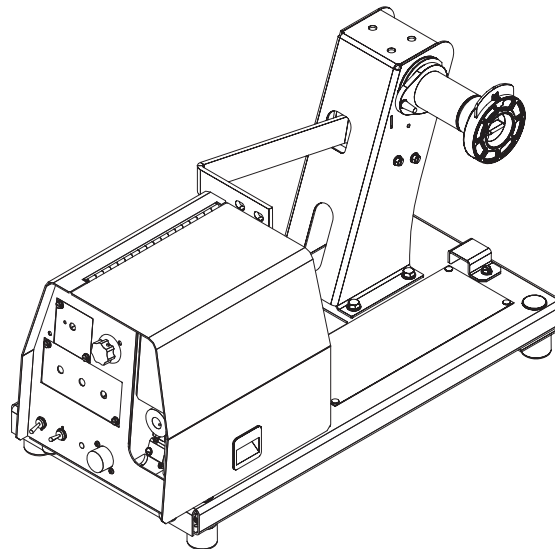
BASE MODEL



BENCH MODEL STANDARD DUTY



BENCH MODEL HEAVY DUTY



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TYPICAL SYSTEM CONFIGURATIONS

The LF-72™ is capable of welding with many different welding processes. These processes may require reconfiguring the LF-72™ with other products that may or may not be included with the model you purchased. Use the Table 1 below to identify the basic items which are included in the LF-72™ to utilize the various Welding Processes that the machine is capable of controlling.

TABLE 1

PART NO.	Description	Wire Feeder	Gun	Wire Reel Stand	Drive Roll Kit	CONTROL CABLE
K2327-1	Base Model	LF-72	15', Magnum 400, .035-.045 (0.9-1.2 mm)	---	.035-.045 combo (0.9-1.2 mm)	10' (3m)
K2327-2	Bench Model, Standard Duty			Standard duty, up to 44 lb. (20 kg) spools.		
K2327-3	Bench Model, Heavy Duty			Heavy Duty, up to 60 lb. (27.2 kg) coils.		
K2327-4	Base Model	---	---	---	---	---

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SAFETY PRECAUTIONS

Read this entire section of operating instructions before operating the machine.

WARNING



ELECTRIC SHOCK can kill.

- Unless using cold feed feature, when feeding with the gun trigger, the electrode and drive mechanism are always electrically energized and could remain energized several seconds after welding ceases.
- Do not touch electrically live parts or electrodes with your skin or wet clothing.
- Insulate yourself from the work and ground.
- Always wear dry insulating gloves.

ONLY QUALIFIED PERSONS SHOULD INSTALL, USE OR SERVICE THIS EQUIPMENT. READ AND FOLLOW THE MANUFACTURER'S INSTRUCTIONS, EMPLOYER'S SAFETY PRACTICES AND MATERIAL SAFETY DATA SHEETS (MSDS) FOR CONSUMABLES.

READ THIS WARNING, PROTECT YOURSELF & OTHERS.

FUMES AND GASES can be dangerous.



- Keep your head out of fumes.
- Use ventilation or exhaust at the arc, or both, to keep fumes and gases from your breathing zone and general area.

WELDING SPARKS can cause fire or explosion.



- Do not weld near flammable material.
- Do not weld on containers which have held flammable material.

ARC RAYS can burn.



- Wear eye, ear, and body protection.

Observe additional guidelines detailed in the beginning of this manual.

The serviceability of a product or structure utilizing the LF-72™ wire feeder is and must be the sole responsibility of the builder/user. Many variables beyond the control of The Lincoln Electric Company affect the results obtained in using the LF-72™ wire feeder. These variables include, but are not limited to, welding procedure, plate chemistry and temperature, weldment design, fabrication methods and service requirements. The available range of the LF-72™ wire feeder may not be suitable for all applications, and the builder/user is and must be solely responsible for welding settings.

GRAPHIC SYMBOLS THAT APPEAR ON THIS MACHINE OR IN THIS MANUAL



COLD FEED



POSITIVE OUTPUT



NEGATIVE OUTPUT



PROTECTIVE GROUND



WARNING OR CAUTION



DANGEROUS VOLTAGE



SHOCK HAZARD



WELDING FUMES



EXPLOSION



GAS INPUT



WORK CONNECTION

COMMON WELDING ABBREVIATIONS

WFS

- Wire Feed Speed

CV

- Constant Voltage

GMAW (MIG)

- Gas Metal Arc Welding

FCAW (Cable Innershield or Outershield)

- Flux Core Arc Welding

PRODUCT DESCRIPTION

General Physical Description

The LF-72™ is optimized for .035 through .045 (0.9mm through 1.2mm) GMAW welding. The powerful 2 roll drive, heavy duty enclosure and wire reel stand combine to make an easy to install, easy to use wire feeder for everyday welding. Powering the wire drive is a high performance motor gearbox. A heavy duty hinged door opens easily, which provides an ample amount of room for assembling precision drive components and the welding gun. Also under the door is a convenient storage tray for contact tips and tools.

Three packages are available. The basic unit consists of the wire drive box housing. The standard duty bench model targets users of 12" (305 mm) diameter spools. The heavy duty bench model satisfies the needs of customers using 60 lb (27.2 kg) spools.

General Functional Description

- The LF-72™ is a highly versatile and economical choice of industrial feeders. Easy to use features are a calibrated WFS knob, cold-feed/ gas purge switch and trigger interlock.
- Several kits are available to expand the LF-72's welding capability. The timer kit allows adjustment of burn-back and postflow times. The remote voltage control kit includes a 0 to 10 dial for setting the welding voltage at the wire feeder. The swivel kit mounts to the lift bail of a power source and lets the feeder freely rotate so the gun cable stays straight.

RECOMMENDED PROCESSES

- GMAW .023-1/16 (0.6 - 1.6 mm) steel electrodes.
- FCAW .035 -5/64 (0.9 - 2.0mm) cored electrodes

PROCESS LIMITATIONS

- Rated for up to 1/16(1.6 mm) solid electrode and 5/64 (2.0 mm) cored electrode.
- The maximum WFS is 800 in/min (20.3 M/min).
- The LF-72™ is not recommended for GMAW-Pulse (synergic), GTAW, GTAW-Pulse, SAW, CAG, SMAW.
- Do not use push-pull equipment with the LF-72.
- For K2327-2 Bench model, std. duty: Maximum spool size = 44 lb. (20 kg); 12 inch (300mm) diameter; 4 inch (100mm)
- For K2327-3 Bench model, heavy duty: Maximum spool size = 60 lb. (27.2 kg)

REQUIRED EQUIPMENT

Lincoln's LF-72™ is designed for use with the CV and DC family of power sources. These include:

- CV-305
- CV-400
- CV-655
- DC-400
- DC-600
- Invertec™ V350
- Invertec™ V450

EQUIPMENT LIMITATIONS

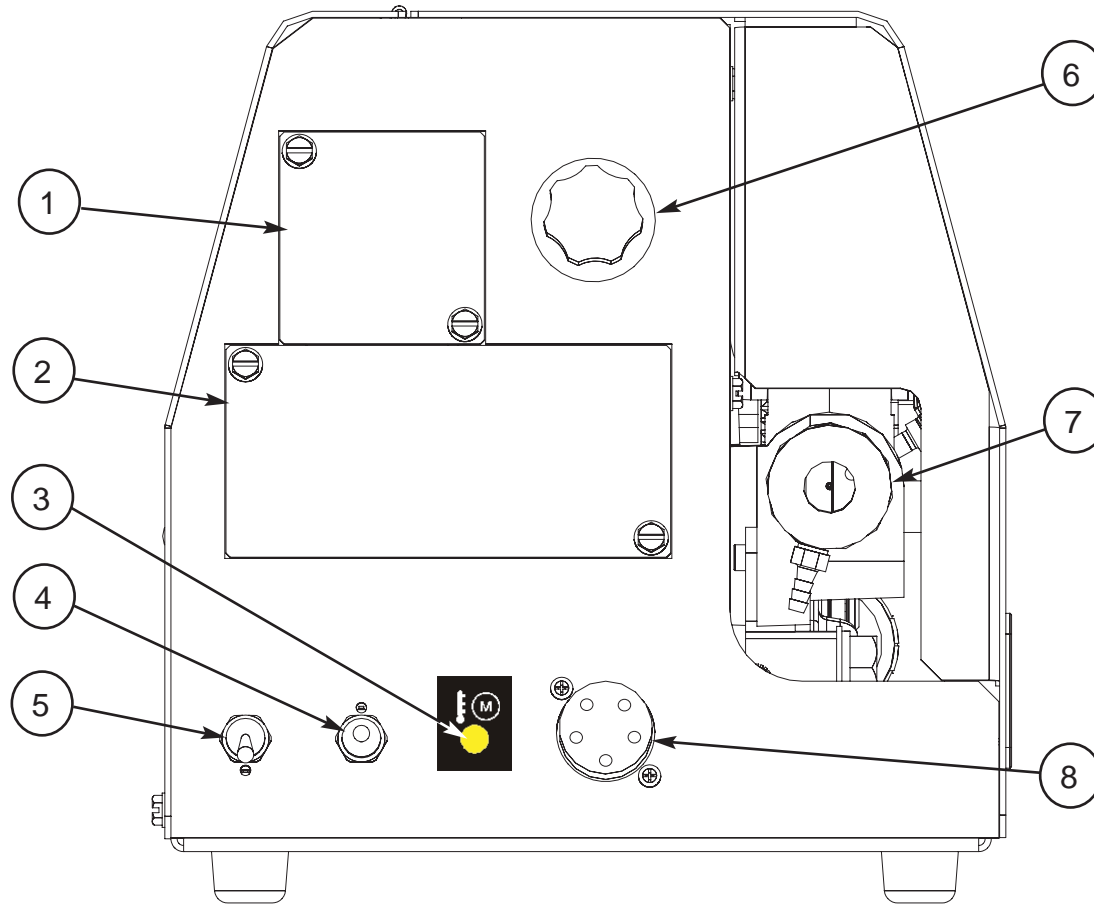
- Maximum gun length =25 ft. (7.6m)
- Maximum conduit length = 30 ft. (9.1m)
- Maximum total control cable length = 100ft (31m)
- The LF-72™ operates on 42VAC and not 115 VAC
- The K1733-1 wire straightener may not be used with the LF-72
- Gun bushings are required for welding guns that do not have a Magnum (Tweco #2-#4 compatible) back end.
- The LF-72™ does not attach to K303 wire reel stands.

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FRONT PANEL CONTROLS AND CONNECTIONS

FIGURE B.1 CASE FRONT CONTROLS



ITEM	DESCRIPTION
1	Location for Optional Remote Voltage Control (See Accessory Section For Kit Number) .
2	Location for Optional Burnback and Postflow Timer Kit (See Accessory Section For Kit Number) .
3	Thermal LED, Motor Overload.
4	Cold Feed - Gas Purge Switch, press the switch up to feed wire with weld output off. Press the switch down for gas flow with weld output off.
5	2 step - Trigger Interlock switch.
6	Wire Feed Speed Knob.
7	Gun Receiver Bushing.
8	Trigger Connector 5-pin amphenol for connecting the MIG gun trigger. See Installation Section for detail.

1. REMOTE VOLTAGE CONTROL KIT

The **optional** remote voltage control kit adjusts the arc voltage from the minimum to the maximum voltage of the welding power source. Rotate the knob counterclockwise to reduce the arc voltage and rotate the knob clockwise to raise the arc voltage.



2. BURNBACK AND POSTFLOW TIMER KIT

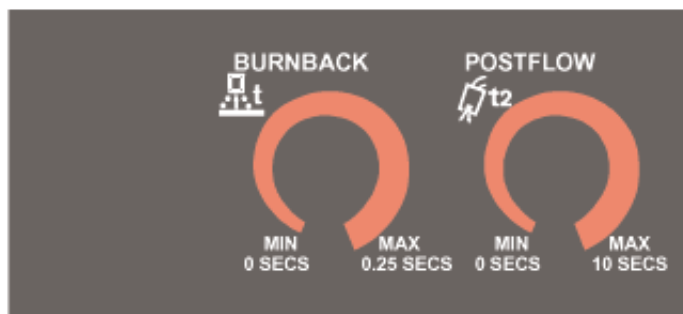
The **optional** Burnback and Postflow Timer Kit gives control over the shielding gas at the end of the weld and prepares the end of the wire for the next arc start. Additional shielding gas protection is often required when welding aluminum, stainless steel or exotic alloys.

When stitch welding, set the postflow time to maximum for best results.

Burnback Timer

The burnback timer range is OFF to 0.25 seconds. The burnback timer controls the additional amount of time the power source output remains ON after the wire drive has stopped feeding wire. Burnback adjustment prevents the wire from sticking to the weld at the end of a weld and helps to condition the wire for the next weld.

To set the burnback time, adjust the knob to approximately 0.03 seconds and then decrease or increase the time as desired.



Postflow Timer

The postflow timer range is OFF to 10 seconds. Postflow is the time from when the power source output turns OFF until the postflow timer expires. Use postflow to protect the weld while the weld cools.

3. THERMAL LED, MOTOR OVERLOAD

The thermal light illuminates when the wire drive motor draws too much current. If the thermal light illuminates, the wire drive will automatically shutdown for up to 30 seconds to allow the motor to cool. To start welding again, release the gun trigger, inspect the gun cable, liner (and conduit). Clean and make repairs as necessary. Start welding again when the problem has been safely resolved.

For best results, keep the gun cable and conduit as straight as possible. Perform regular maintenance and cleaning on the gun liner, conduit and gun. Always use quality electrode, such as L-50 or L-56 from Lincoln Electric.

4. COLD FEED/GAS PURGE SWITCH

Cold Feed and Gas Purge are combined into a single spring centered toggle switch.

To activate Cold Feeding, hold the switch in the UP position. The wire drive will feed electrode but neither the power source nor the gas solenoid will be energized. Adjust the speed of cold feeding by rotating the WFS knob. Cold feeding, or "cold inching" the electrode is useful for threading the electrode through the gun.



Hold with toggle switch in the DOWN position to activate Gas Purge and let the shielding gas flow. The gas solenoid valve will energize but neither the power source output nor the drive motor will be turned on. The Gas Purge switch is useful for setting the proper flow rate of shielding gas. Flow meters should always be adjusted while the shielding gas is flowing.

5. 2 STEP - TRIGGER INTERLOCK SWITCH

The 2 Step - Trigger Interlock switch changes the function of the gun trigger. 2 Step trigger operation turns welding on and off in direct response to the trigger. Trigger Interlock operation allows welding to continue when the trigger is released for comfort on long welds.



Place the toggle switch in the DOWN position for 2 Step operation or in the UP position for Trigger Interlock operation.

2 Step Trigger

2 Step trigger operation is the most common. When the gun trigger is pulled, the welding power source energizes the electrode output and the wire feeder feeds wire for welding. The power source and wire feeder continue welding until the trigger is released.

Trigger Interlock

Trigger Interlock operation provides for operator comfort when making long welds. When the gun trigger is first pulled, the welding power source energizes the output and the wire feeder feeds wire for welding. The gun trigger is then released while the weld is made. To stop welding, the gun trigger is pulled again, and when it is released the welding power source output turns off and the wire feeder stops feeding wire.



CAUTION



- If the arc goes out while welding with trigger interlock operation, the electrode output from the welding power source remains energized and the wire feeder will continue to feed wire until the gun trigger is again pulled and then released.

6. WIRE FEED SPEED KNOB

The large, calibrated wire feed speed knob makes for easy and accurate adjustment of the wire feed speed. The knob rotates 3/4 turn. Turn the knob clockwise to increase the wire feed speed, and counter clockwise to reduce the wire feed speed.

The wire feed speed range is 50 to 800 in/min (1.27 - 20.3 m/min).

7. GUN RECEIVER BUSHING (K1500-2)

(K1500-2 bushing is standard on all LF-72's)

This Gun Receiver Bushing is used with Lincoln gun connectors, also with Magnum 200/300/400 guns and compatible with Tweco® #4).

8. TRIGGER CONNECTOR 5-PIN AMPHENOL

This is used for connecting the MIG gun trigger. See *Installation Section* for detail.

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OPTIONAL KITS:

K2329-1	Remote Voltage Control Kit.	Includes: 10k potentiometer, harness, knob and decal with a 0-10 scale and mounting hardware.	
K2330-1	Timer Kit.	Includes: Panel and harness for adjusting burnback and postflow times.	
K2328-1	Standard Duty Wire Reel Stand.	Includes: Wire Reel Stand for up to 44 lbs (20 kg) spools, Spindle and mounting hardware.	
K2331-1	Lift Bail Kit.	Includes: Insulated lift bail and hardware.	
K2332-1	Swivel Kit. (for use with Standard Duty Bench Models)	Includes: Swivel adapter and mounting hardware for attaching to a power source lift bale.	
K1796-xx	Co-Axial Power Cable.	Includes: Coaxial weld cable of length "xx". Ends of the weld cable have lug connections. Use for Pulse or STT welding.	
K1803-1	Work and Feeder Cables Package.	Includes: Twist-Mate to Lug 2/0 cable 14' (1.2m) long with Ground Clamp, and Twist-Mate to Lug 2/0 Cable 9' (2.7m) long.	
K1840-xx	Weld Power Cable, Twist-Mate to Lug.	Includes: Twist-Mate to Lug, 1/0 cable of length "xx".	
K1841-xx	Weld Power Cable, Twist-Mate to Twist-Mate.	Includes: Twist-Mate to Twist-Mate, 1/0 Cable for 25' (7.6m) cables. Includes: Twist-Mate to Twist-Mate, 2/0 Cable for 50' (15.2m) cables.	
K1842-xx	Weld Power Cable, Lug to Lug.	Includes: Lug to Lug, 3/0 Cable of length "xx" for lengths up to 60' (18.3m). Lug to Lug, 4/0 Cable of length "xx" for lengths greater than 60' (18.3m).	

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OPTIONAL KITS:

K1797-xx	Control Cable.	Includes: 14 pin to 14 pin wire feeder to power source control cable.	
K2335-1	Adapter for Miller Power Sources.	Includes: Adapter control cable for connecting a Lincoln 42 VAC wire feeder to a 24 VAC Miller power source.	
K1520-1	42 Volt Transformer Kit.	Includes: One transformer kit for operating a 42 VAC wire feeder on a power source supplying only 115 VAC.	
K1798	Adapter Cable for Control Cable to Terminal Strip Power Sources.	Includes:	
K910-1	Ground Clamp.	Includes: One 300 Amp Ground Clamp.	
K910-2	Ground Clamp.	Includes: One 500 Amp Ground Clamp.	
K1500-1	Gun Receiver Bushing (for guns with K466-1 Lincoln gun connectors; Innershield and Subarc guns.)	Includes: Gun receiver bushing, set screw and hex key wrench.	
K1500-2 (standard on all LF-72's)	Gun Receiver Bushing (for guns with K466-2, K466-10 Lincoln gun connectors; Magnum 200/300/400 guns and compatible with Tweco® #4.)	Includes: Gun receiver bushing with hose nipple, set screw and hex key wrench.	
K1500-3	Gun Receiver Bushing (for guns with K613-7 Lincoln gun connectors; Magnum 550 guns and compatible with Tweco® #5.)	Includes: Gun receiver bushing with hose nipple, set screw and hex key wrench.	
K1500-4	Gun Receiver Bushing (for gun with K466-3 Lincoln gun connectors; compatible with Miller® guns.)	Includes: Gun receiver bushing with hose nipple, set screw and hex key wrench.	
K1500-5	Gun Receiver Bushing (compatible with Oxo® guns.)	Includes: Gun receiver bushing with hose nipple, 4 guide tubes, set screw and hex key wrench.	

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OPTIONAL KITS:

K489-7	Gun Receiver Bushing (for Lincoln Fast-Mate guns.)	Includes: Gun receiver bushing with trigger connector.	
K466-2	Magnum 200/300/400 to K1500-2 Adapter.	Includes: Gun adapter, cotter pin, hex key wrench, wrench.	
K613-7	Magnum 550 to K1500-3 Adapter Lincoln Conduit.	Includes: Trigger adapter, gun adapter and hex key wrench.	
K1546-1	Incoming Bushing, for Lincoln Conduit .025- 1/16" (0.6 - 1.6mm) wire.	Includes: Incoming bushing and hex key wrench.	
K1546-2	Incoming Bushing, for Lincoln Conduit 1/16-1/8" (1.6 - 3.2 mm) wire.	Includes: Incoming bushing and hex key wrench.	
K435	Spindle Adapter, for mounting 14 lb. (6.4 kg) Innershield Coils on 2 in (51 mm) spindles.	Includes: Spindle Adapter made from 2 coil retainers. (Electrode not included.)	
K468	Spindle Adapter, for mounting 8in (203mm) diameter spools on 2 in (51 mm) spindles.	Includes: Spindle Adapter.	
K363P	Readi-Reel Adapter, for mounting 23-30 lb. (10.4 - 13.6 kg) reels to 2 in (51 mm) spindles.	Includes: Readi-Reel spool adapter. (Spool of electrode not included.)	
K438	Readi-Reel Adapter, for mounting 50-60 lb. (22.7 - 27.2 kg) reels to 2 in (51 mm) spindles. For use with Heavy Duty Bench models.	Includes: Readi-Reel spool adapter. (Spool of electrode not included.)	
K1504-1	Coil Adapter, for mounting 50-60 lb. (22.7 - 27.2 kg) coils to 2 in (51 mm) spindles. For use with heavy Duty Bench	Includes: 50-60 lb. (22.7 - 27.2 kg) coil adapter.	

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OPTIONAL KITS:

K1634-1	Plastic Wire Cover for 30-44 lb. (13.6 - 20.0 kg) Wire packages. (For use with Standard Duty Bench Models and Heavy Duty Bench Models.)	Includes: Cover, backing plate, wire conduit, incoming bushing for .025 - 1/16" (0.6 - 1.6 mm) wire, incoming bushing for 1/16" - 1/8" (1.6 - 3.2 mm) wire, thumb screw, mounting hardware and hex key.	
K1634-2	Plastic Wire Cover for up to 60 lb. (27.2kg) Wire packages. (For use with Heavy Duty Bench Models.)		
K659-1	Gas Guard Regulator	Includes: Gas Guard Regulator and adjustment key.	
3000290	Adjustable Gas Regulator	Includes: Gas Regulator for Mixed Gases and 10' (3.0m) Hose.	
K586-1	Deluxe Adjustable Gas Regulator	Includes: Deluxe Gas Regulator for Mixed Gases, Adapter for CO2 and 10' (3.0m) Hose.	
K1524-3	Heavy Duty Universal Wire Reel Stand. For spools up to 60 lb. (27.2kg)	Includes: Heavy Duty Wire Reel Stand.	
K163	4 Wheeled Wire Feeder Undercarriage (For use with Standard Duty Bench Models and Heavy Duty Bench Models.)	Includes: Undercarriage with 8" (203mm) rear wheels, 4" (102mm) casters.	
K1557-1	Swivel Platform (for use with Heavy Duty Bench Models)	Includes: Swivel Platform and Tray.	
K1556-1	Light Duty Caster Kit (for use with Heavy Duty Bench Models)	Includes: 2 Swivel Casters, 2 Fixed Casters, brackets and mounting hardware.	
K1555-1	Insulated Lift Bail (for use with Heavy Duty Bench Models)	Includes: Insulated Lift Bail and mounting hardware.	

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MAINTENANCE

Safety Precautions

⚠ WARNING



ELECTRIC SHOCK can kill.

- Do not touch electrically live parts such as output terminals or internal wiring.
- When inching with gun trigger, electrode and drive mechanism are "hot" to work and ground and could remain energized several seconds after the gun trigger is released.
- Turn OFF input power at welding power source before installation or changing drive roll and/or guide tubes.
- Welding power source must be connected to system ground per the National Electrical Code or any applicable local codes.
- Only qualified personnel should perform maintenance work.

Observe all additional Safety Guidelines detailed throughout this manual.

ROUTINE MAINTENANCE

- Clean and tighten all weld terminals.
- Inspect all weld cables, control cables, gun cables and shielding gas hoses. Repair or replace as necessary.

PERIODIC MAINTENANCE

- Clean drive roll grooves.
- Blow out or vacuum the inside of the feeder.

CALIBRATION SPECIFICATION

⚠ WARNING



ELECTRIC SHOCK can kill.

- Do not touch electrically live parts.
- When inching with the gun trigger, electrode, wire drive motor and drive mechanism are "hot" to work and ground and could remain energized several seconds after the gun trigger is released.
- Welding power source must be connected to system ground per the National Electrical Code or any applicable local codes.
- Only qualified personnel should perform maintenance work.

Calibration of the LF-72 may be required when the p.c. board, potentiometer or motor is replaced or serviced. Calibration matches the scale on the name plate to the actual wire feed speed.

To verify if calibration is necessary:

1. Turn off power to the LF-72.
2. Assemble .045 drive rolls, inner guide and the outer guide into the drive. Remove the gun from the wire feeder if assembled.
3. Load .045 wire into the drive. Cut the wire flush with the end of the gun bushing.
4. Set the WFS knob to 300 ipm.
5. Using the COLD FEED switch, feed wire for 10 seconds.
6. Cut the wire flush with the end of the gun bushing. Measure the length of the wire. If the wire measures 50 ± 2.5 inches then calibration is not required.

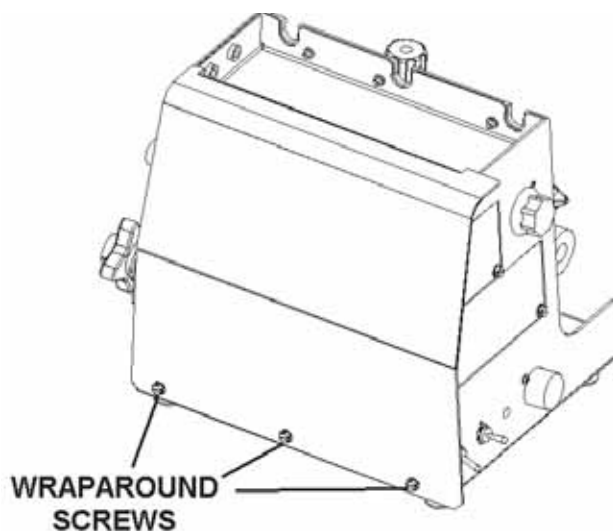
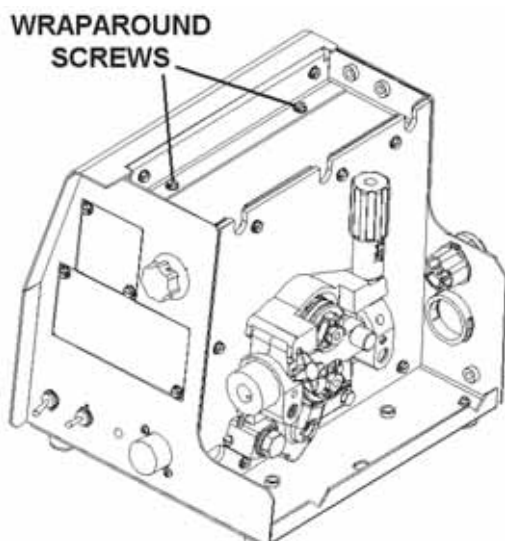
Tools required applies to all codes that follow:

- 5/16" nut driver
- 3/4" open end wrench
- WFS meter or RPM meter
- Shorting plug. The shorting plug shorts pins 1 & 5 of connector J2 on the p.c. board. J2 is a 6 pin molex connector.

To calibrate the LF-72 for Codes 11075 thru 11293:

1. Turn off power to the LF-72.
2. Disconnect the electrode lead from the feed plate and from the welding power source.
3. Remove the 5 screws securing the wraparound. (The door is not shown for clarity. See **Figure D.1**)
4. Open the idle arm.
5. Turn power on to the LF-72.

FIGURE D.1



6. Adjust the WFS knob to 300 ipm. Center the knob pointer with the name plate graphics. Activate the gun trigger.
7. Insert the shorting plug into connector J2 on the p.c. board. The shorting plug shorts pins 1 & 5. **(See Figure D.2)**
8. Remove the shorting plug. Set aside.

(For Codes below 11289 use 9 thru 17)

9. Adjust the WFS knob to minimum.
10. Insert the shorting plug into connector J2.
11. Adjust the WFS knob until the motor measures 51 ± 5.5 ipm. (9.5 ± 1.0 rpm).
12. Remove the shorting plug.
13. Adjust the WFS knob to maximum.
14. Insert the shorting plug into connector J2.
15. Adjust the WFS until the motor measures 793 ± 5.5 ipm (146.7 ± 1.0 rpm.)
16. Remove the shorting plug.
17. Release the gun trigger.

(For Codes above 11290 use 18 thru 20)

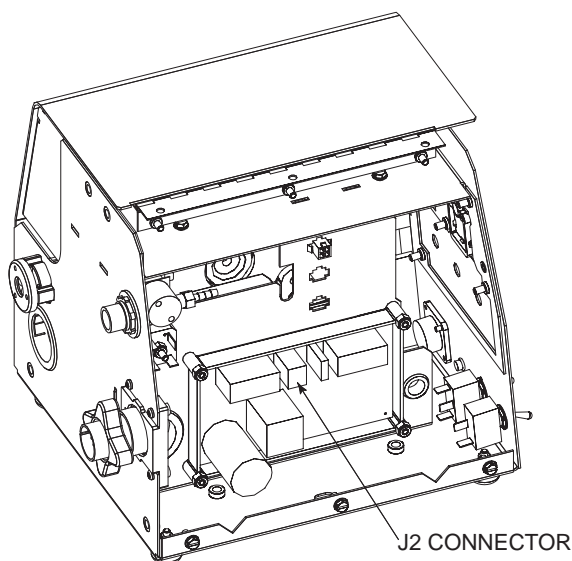
18. Replace P2 from the harness into connector J2.
19. Turn off power.
20. Secure the wraparound to the LF-72 with 5 screws.

To calibrate the LF-72 for Codes 11606 and above:

1. Turn off power to the LF-72 and welding power source.
2. Disconnect the electrode lead from the feed plate and from the welding power source.
3. Remove the wraparound from the LF-72, See **Figure D.1**.
4. Set WFS Knob to 50 IPM and trigger the machine.
5. Measure drive role RPM. If reading is 8.9 to 9.2 RPM proceed to step 6 otherwise insert the shorting plug into the control p.c. board J2 (shorts pins 1 and 5.) See Figure D.2 and adjust WFS Knob to get 9.05 ± 0.15 RPM and then remove shorting plug.

6. Set WFS Knob to 300 IPM.
7. Measure drive role RPM. If reading is 54.8 to 56.0 RPM proceed to step 8 otherwise insert the shorting plug into the control p.c. board J2 (shorts pins 1 and 5.) **See Figure D.2** and adjust WFS Knob to get 55.4 ± 0.6 RPM and then remove the shorting plug.
8. Set WFS Knob to 800 IPM.
9. Measure drive role RPM. If reading is 146.4 to 148.4 RPM calibration is complete otherwise insert the shorting plug into the control p.c. board J2. (shorts pins 1 and 5.) **See Figure D.2** and adjust WFS Knob to get 147.4 ± 1.0 RPM and then remove the shorting plug. Release the Gun Trigger, connect J2 of the harness to p.c. board.

FIGURE D.2

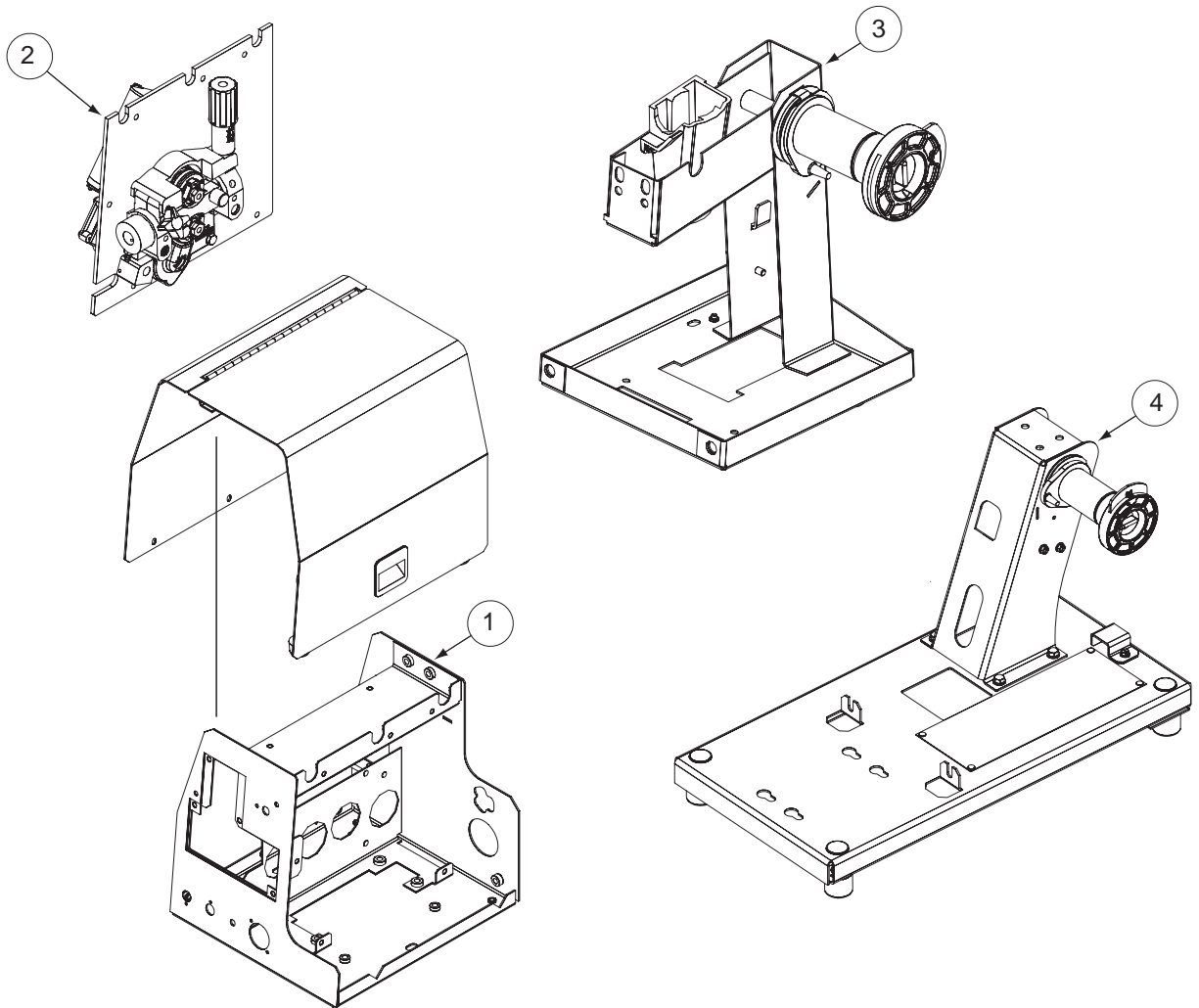


LF-72™ & LF-74™

LINCOLN®
ELECTRIC

- 1. Center Assembly
- 2. Wire Drive Assembly
- 3. Wire Reel Stand LF-72
- 4. Wire Reel Stand LF-74

FIGURE D.3 - MAJOR COMPONENT LOCATION



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TECHNICAL SPECIFICATIONS: LF-74™ Wire Feeder

SPEC.#	TYPE	WIRE FEED SPEED RANGE					
		Model	Gearing	GMAW		FCAW	
				WFS Range	Wire Sizes	WFS Range	Wire Sizes
K2426-1	Normal Speed	K2426-4	100 – 800 ipm (2.5-20.3 m/min.)	.023 – 1/16" (0.6 – 1.6mm)	100 – 800 ipm (2.5-20.3 m/min.)	.030 - 5/64" (0.8 - 2.0mm)	
50 – 800 ipm (1.27-20.3 m/min.)			50 – 800 ipm (1.27-20.3 m/min.)				
K2426-2	Normal Speed	K2426-5	100 – 800 ipm (2.5-20.3 m/min.)	.023 – 1/16" (0.6 – 1.6mm)	100 – 800 ipm (2.5-20.3 m/min.)	.030 – 5/64" (0.8 – 2.0mm)	
50 – 800 ipm (1.27-20.3 m/min.)			50 – 800 ipm (1.27-20.3 m/min.)				
K2426-3	Extra Torque		50 – 400 ipm (1.3 – 10.4m/min)	.023 – 1/16" (0.6 – 1.6mm)	50 – 400 ipm (1.3 – 10.4m/min)	.030 – 3/32" (0.8 - 2.4mm)	

CONTROL BOX, WIRE DRIVE AND COMPLETE UNITS								
SPEC.#	TYPE	INPUT POWER	PHYSICAL SIZE*			Weight	TEMPERATURE RATING	
			Height	Width	Depth		Operating	Storage
K2426-1 K2426-4	LF-74™ Base Model	24-42VAC 9 AMPS 50/60 Hz	Dimensions			46 Lbs. (20.9 Kg.)	14°F to 104°F (-10°C to 40°C)	-40°F to 185°F (-40°C to 85°C)
K2426-2 K2426-5	LF-74™ Bench Heavy Duty		Dimensions Δ					
K2426-3	LF-74™ Bench Heavy Duty Extra Torque		Dimensions Δ					
			Height	Width	Depth	Weight		
			11.1" (282 mm)	10.2" (259 mm)	12.9" (328 mm)			
			Height	Width	Depth	Weight		
			15.3" (389 mm)	13.0" (330 mm)	27.7" (704 mm)	70.5 Lbs. (32.0 Kg.)		
			Height	Width	Depth	Weight		
			15.3" (389 mm)	13.0" (330 mm)	27.7" (704 mm)	70.5 Lbs. (32.0 Kg.)		

WELDING CAPACITY RATING	
Amp Rating	Duty Cycle
600 A	60%

Δ Dimensions do not include wire reel.

ITEMS INCLUDED WITH EACH PRODUCT					
Model	Description	Wire Feeder	Wire Reel Stand	Drive Roll Kit	Control Cable
K2426-1 K2426-4	Base Model	LF-74™	-----	.035, .045 Combo (0.9, 1.2mm)	10Ft. (3m)
K2426-2 K2426-5	Bench Model with Heavy Duty Wire Stand		Heavy Duty, up to 60lb. (27.k kg) Coils		
K2426-3	Extra Torque Model with Heavy Duty Wire Stand				

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SAFETY PRECAUTION



ELECTRIC SHOCK can kill.

- Turn the input power OFF at the welding power source before installation or changing drive rolls and/or guides.

- Do not touch electrically live parts.
- When inching with the gun trigger, electrode and drive mechanism are "hot" to work and ground and could remain energized several seconds after the gun trigger is released.
- Welding power source must be connected to system ground per the National Electrical Code or any applicable local codes.
- Only qualified personnel should perform maintenance work.

LOCATION

The LF-74 may be placed on a bench, mounted on top of a welding power source or assembled to an appropriate boom.

Place the LF-74 in a clean and dry location.

Do not stack the LF-74.

MOUNTING

For location and size, **LF-74 Bench Model Rear Mounting Holes** (See Figure AA.1) and for **Bottom Mounting Holes** (See Figure AA.2).

FIGURE AA.1

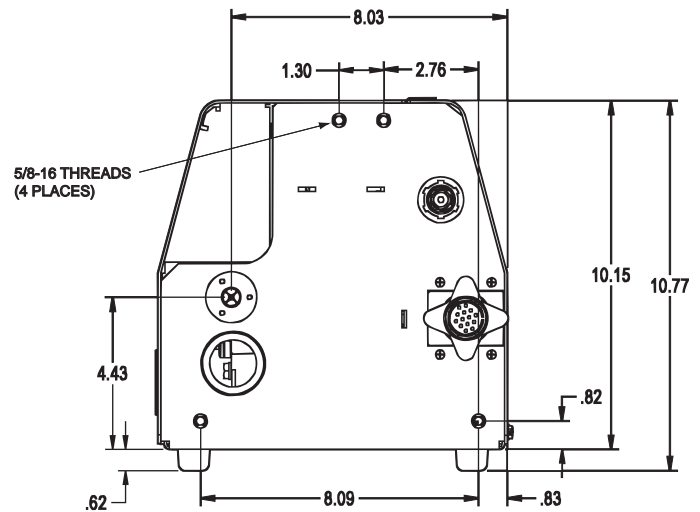
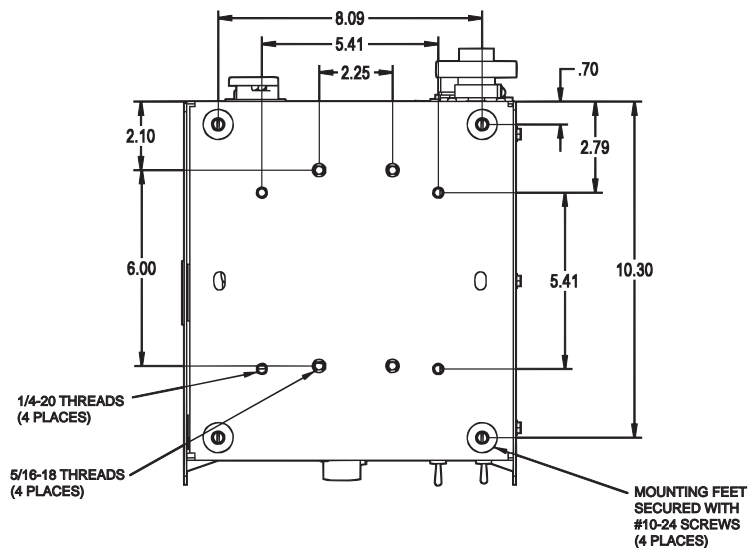


FIGURE AA.2



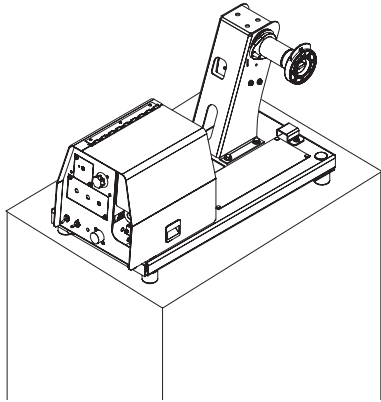
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BENCH MOUNT

The LF-74 mounts in a variety of configurations. As shipped from the factory, the LF-74 is suitable for bench mounting or placing directly on top of the welding power source (CV-xxx and DC-xxx product family only).

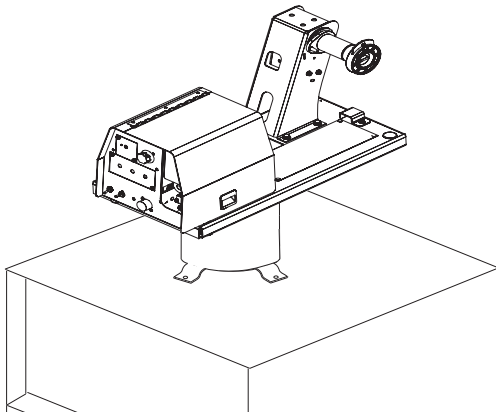
Bench Mount



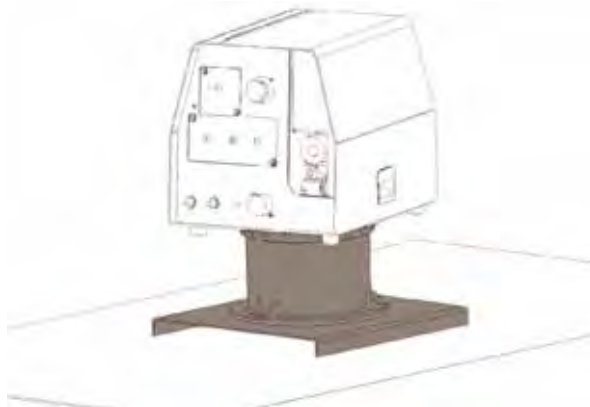
SWIVEL MOUNT

The base model and heavy duty bench models may be mounted onto a swivel when a top a welding power source.

K1557-1 Swivel Kit and Bench Model, with Heavy Duty Wire Reel Stand.

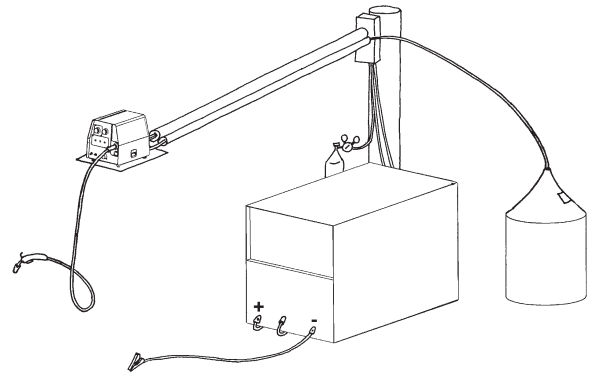


K2332-1 Swivel Kit and Base Model LF-74



BOOM MOUNT

When boom mounting, remove the wire reel stand (if assembled) and secure the wire feeder directly to the desired surface.



SUSPENDED

Only suspend the wire feeder by the handle/lift bail of the portability kit.

K2426-1 shown with K2328-1 Standard Duty Wire Reel Stand and K2331-1 Lift Bail



! WARNING

Alternative methods for hanging the wire feeder must not be used unless insulation is provided between the wire feeder enclosure and the hanging device.

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SAFETY PRECAUTION

**ELECTRIC SHOCK can kill.**

- Only qualified personnel should perform this installation.
- Turn off the input power to the power source at the disconnect switch or fuse box before working on this equipment. Turn off the input power to any other equipment connected to the welding system at the disconnect switch or fuse box before working on this equipment.
- Do not touch electrically hot parts.

WELD CABLE SIZES

Table A.1 has the copper cable sizes recommended for different currents and duty cycles. Lengths stipulated are the distance from the welder to work and back to the welder again. Cable sizes are increased for greater lengths primarily for the purpose of minimizing voltage in the welding circuit.

TABLE AA.1

RECOMMENDED CABLE SIZES (RUBBER COVERED COPPER - RATED 75°C)**						
Amperes	Percent Duty Cycle	CABLE SIZES FOR COMBINED LENGTHS OF ELECTRODE AND WORK CABLES				
		0 to 50 Ft. 0 to 15 m	50 to 100Ft. 15 to 31 m	100 to 150 Ft. 31 to 48 m	150 to 200 Ft. 48 to 61 m	200 to 250 Ft. 61 to 76 m
200	60	2	2	2	1	1/0
200	100	2	2	2	1	1/0
225	20	4 or 5	3	2	1	1/0
225	40 & 30	3	3	2	1	1/0
250	30	3	3	2	1	1/0
250	40	2	2	1	1	1/0
250	60	1	1	1	1	1/0
250	100	1	1	1	1	1/0
300	60	1	1	1	1/0	2/0
325	100	2/0	2/0	2/0	2/0	3/0
350	60	1/0	1/0	2/0	2/0	3/0
400	60	2/0	2/0	2/0	3/0	4/0
400	100	3/0	3/0	3/0	3/0	4/0
500	60	2/0	2/0	3/0	3/0	4/0

** Tabled values are for operation at ambient temperatures of 40°C and below. Applications above 40°C may require cables larger than recommended, or cables rated higher than 75°C.

COAXIAL WELD CABLES

Coaxial welding cables are specially designed welding cables for pulse welding welding. Coaxial weld cables feature low inductance, allowing fast changes in the weld current. Regular cables have a higher inductance which may distort the pulse wave shape. Inductance becomes more severe as the weld cables become longer.

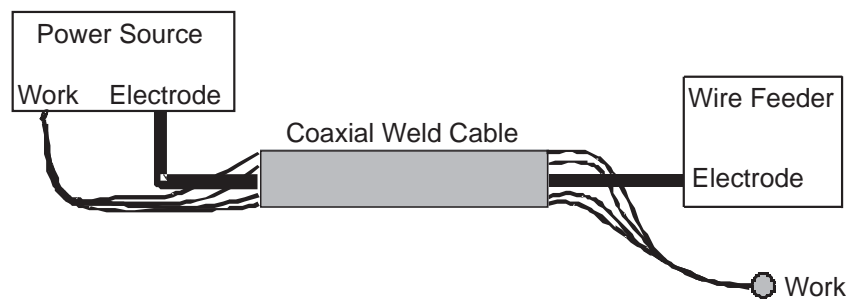
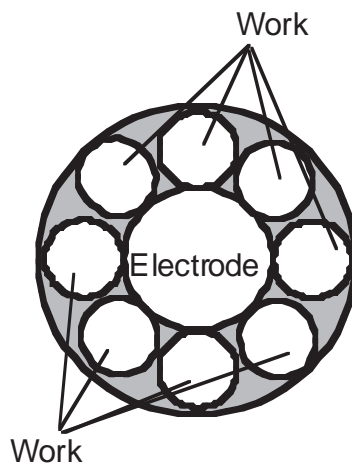
Coaxial weld cables are recommended for all pulse welding, especially when the total weld cable length (electrode cable + work cable) exceeds 50 feet (7.6m).

A coaxial weld cable is constructed by 8 small leads wrapped around one large lead. The large inner lead connects to the electrode stud on the power source and the electrode connection on the wire feeder. The small leads combine together to form the work lead, one end attached to the power source and the other end to the work piece. (See Coaxial weld Cable below.)

WELD CABLE CONNECTION

Connect a work lead of sufficient size between the proper output stud on the power source and the work. Be sure the connection to the work makes tight metal to metal electrical contact. Poor work lead connections can result in poor welding performance.

Coaxial Weld Cable



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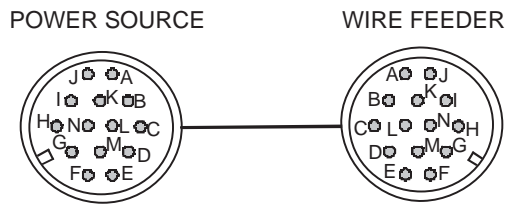
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ANALOG CONTROL CABLE CONTROL CABLE CONNECTIONS

K1797-xx

The control cable connecting the wire feeder to the power source is specially made for the welding environment.

The wire feeder power requires overcurrent protection. Connect the wire feeder only to power sources with overcurrent protection of no more than 15 amps.



PIN	FUNCTION	LEAD#
A	Reserved	-----
B	Reserved	-----
C	Welding Output Control (trigger from feeder)	2
D	Welding Output Control (trigger from feeder)	4
E	Remote Voltage Control ("+" supply from feeder or remote)	77
F	Remote Voltage Control (control signal from feeder or remote)	76
G	Remote Voltage Control ("-" supply from feeder or remote)	75
H	Reserved	
I	42 VAC	41
J	Reserved	
K	42 VAC	42
L	Reserved	
M	Reserved	-----
N	Electrode voltage from feeder	67

Do not use more than 100 ft (30.5 m) of control cable between the wire feeder and power source.

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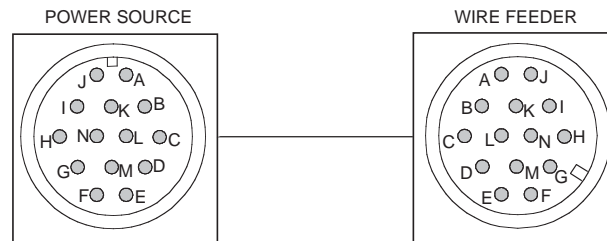
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ANALOG MILLER CONTROL CABLE ADAPTER K2335-1

This Lincoln Electric wire feeder may be mounted to a limited number of Miller Electric power sources. The Miller power source must have the circular connector pin definition shown in the table below for proper operation of the wire feeder. Be sure the Miller power source provides 24 VAC to the wire feeder and has overcurrent protection of no more than 15 amps. The power source must not exceed 113VDC peak.

Operation of Lincoln wire feeders on Miller power sources may result in lack of high wire feed speeds or reduced pull force at high wire feed speeds. Approximate maximum WFS for Lincoln wire feeders operating with 24 VAC:

LF-72	720 ipm
LF-74	720 ipm
LF-74, extra torque	360 ipm



MILLER POWER SOURCE		LINCOLN WIRE FEEDER	
Pin	Function	Pin	Function
A	24 VAC to feeder	I	42 VAC feeder
B	Welding Output Control	D	Welding Output Control
C	+10VDC to feeder for remote control	C	Welding Output Control
D	Remote control common	E	Remote Voltage Control ("+" supply, from power source)
E	0-10VDC from feeder for remote control.	G	Remote Voltage Control ("- " supply, from power source)
F	Current feedback to feeder. Scaled 0-10V. 1 V = 100 amps. Referenced to pin D.	F	Remote Voltage Control (control signal from feeder or remote.)
G	24 VAC common.	J	Reserved for future use.
H	Arc Voltage feedback to feeder. Scaled 0-10V. 1 V = 10 Arc volts. Referenced to pin D.	K	42 VAC to feeder
		L	Reserved for future use.
N		N	Electrode voltage to power source (67)

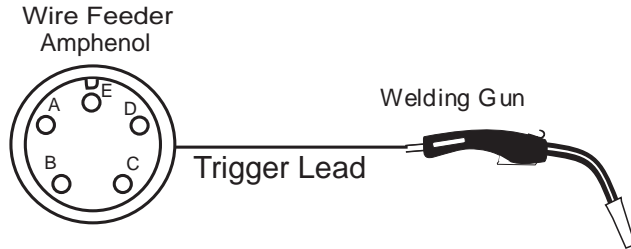
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WELDING GUN/WIRE FEEDER TRIGGER CONNECTOR



Wire Feeder

Pin	Function
A	Gun Trigger
B	-
C	Common
D	-
E	-

HIGH FREQUENCY PROTECTION

Locate the LF-74 away from radio controlled machinery. The normal operation of the LF-74 may adversely affect the operation of RF controlled equipment, which may result in bodily injury or damage to the equipment.

REMOTE SENSE LEAD SPECIFICATIONS

Refer to the power source instruction manual for instructions for connecting the wire feeder for STT welding.

WIRE DRIVE SYSTEMS

Drive Roll Kits, Steel Wires

Includes: 4 Smooth V groove drive rolls and inner wire guide.

KP1505-030S	.023-.030 (0.6-0.8mm)
KP1505-035S	.035 (0.9mm)
KP1505-045S	.045 (1.2mm)
KP1505-052S	.052 (1.4mm)
KP1505-1/16S	1/16 (1.6mm)

Drive Roll Kits, Cored Wires

Includes: 4 Knurled drive rolls and inner wire guide.

KP1505-035C	.030-.035" (0.8-0.9mm)
KP1505-045C	.040-.045" (1.0-1.2mm)
KP1505-052C	.052" (1.4mm)
KP1505-1/16C	1/16" (1.6mm)

Drive Roll Kits, Steel or Cored Wires

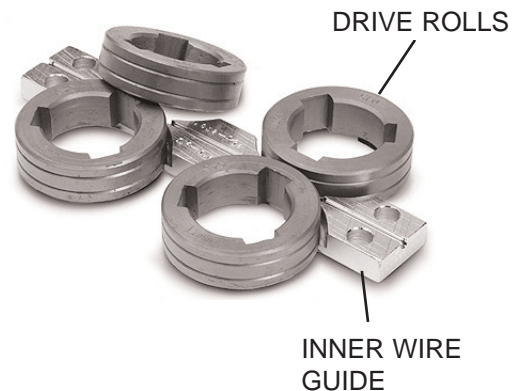
Includes: 4 Knurled drive rolls and inner wire guide.

KP1505-068	.068-.072" (1.8mm)
KP1505-5/64	5/64" (2.0mm)
KP1505-3/32	3/32" (2.4mm)

Drive Roll Kits, Aluminum Wire

Includes: 4 polished U groove drive rolls, outer wire guide and inner wire guide.

KP1507-035A	.035" (0.9 mm)
KP1507-040A	.040" (1.0mm)
KP1507-3/64A	3/64" (1.2mm)
KP1507-1/16A	1/16" (1.6mm)



WELDING GUNS, TORCHES AND ACCESSORIES

GUN RECEIVER BUSHING

The LF-74 wire feeder comes with a K1500-2 gun receiver bushing.

MAGNUM GUN AND CABLE ASSEMBLIES

The LF-74 wire feeder model will accept a number of optional gun and cable assemblies. An example of installing the Gun and Cable is shown in **Figure AA.3** with a 15 ft. (4.6m) long **Magnum 400** gun and cable. **Figure AA.3a** with a 15 ft. (4.6m) long **Magnum Pro 350** gun and cable.

1. Turn off power at the welding power source.
2. Unscrew Thumb screw on Wire Drive Unit, until tip of screw no longer protrudes into gun bushing hole as seen from the front of machine.

Figure AA.3

Figure AA.3a

FIGURE A.3 for Codes 11195, 11196, 11197

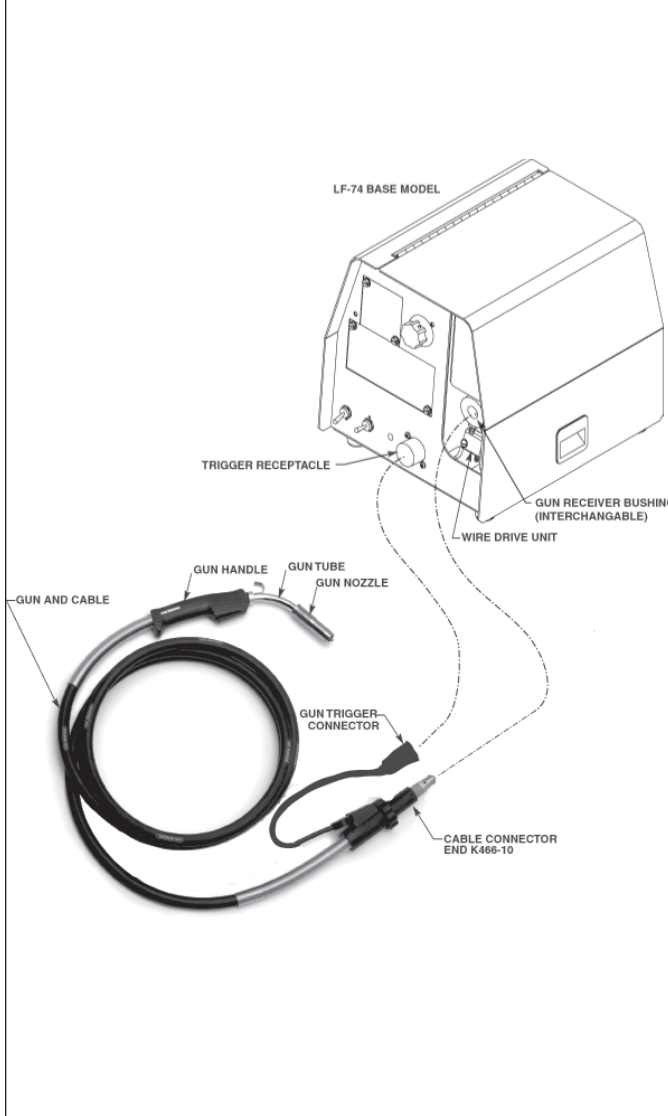
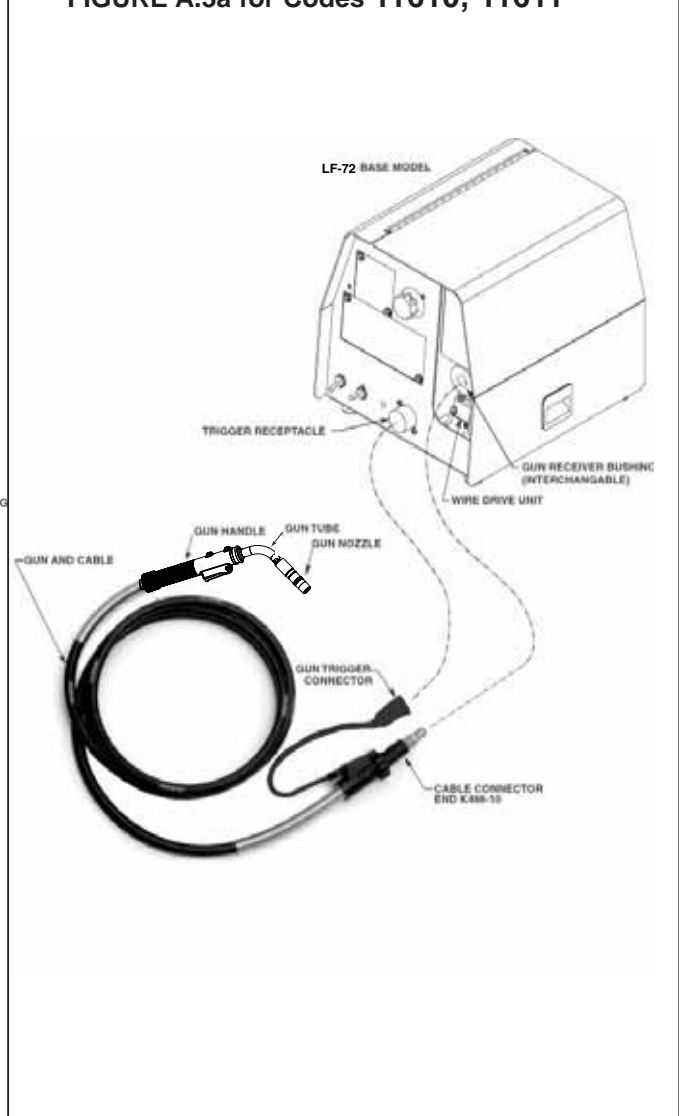


FIGURE A.3a for Codes 11610, 11611



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WIRE DRIVE CONFIGURATION

(See Figure AA.5)

Changing the Gun Receiver Bushing



WARNING



ELECTRIC SHOCK can kill.

- Turn the input power **OFF** at the welding power source before installation or changing drive rolls and/or guides.
 - Do not touch electrically live parts.
- When inching with the gun trigger, electrode and drive mechanism are "hot" to work and ground and could remain energized several seconds after the gun trigger is released.
 - Only qualified personnel should perform maintenance work.

Tools required:

- 1/4" hex key wrench

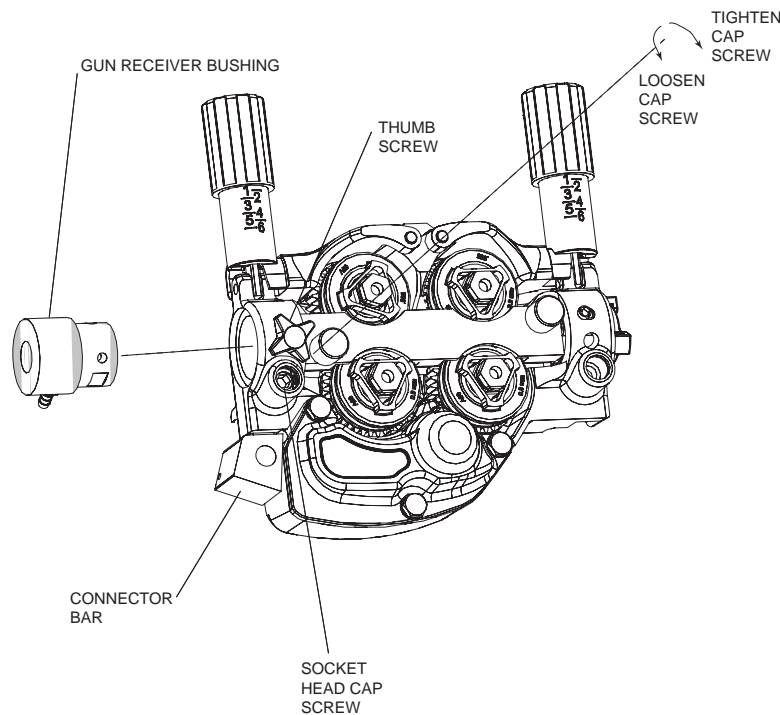
Note: Some gun bushings do not require the use of the thumb screw.

1. Turn power off at the welding power source.
2. Remove the welding wire from the wire drive.
3. Remove the thumb screw from the wire drive.
4. Remove the welding gun from the wire drive.
5. Loosen the socket head cap screw that holds the connector bar against the gun bushing. **Important: Do not attempt to completely remove the socket head cap screw.**
6. Remove the outer wire guide, and push the gun bushing out of the wire drive. Because of the precision fit, light tapping may be required to remove the gun bushing.

7. Disconnect the shielding gas hose from the gun bushing, if required.
8. Connect the shielding gas hose to the new gun bushing, if required.
9. Rotate the gun bushing until the thumb screw hole aligns with the thumb screw hole in the feed plate. Slide the gun receiver bushing into the wire drive and verify the thumb screw holes are aligned.
10. Tighten the socket head cap screw.
11. Insert the welding gun into the gun bushing and tighten the thumb screw.

Gun Receiver Bushing	For use With
K1500-1	K466-1 Lincoln gun connectors; Innershield and Subarc guns)
K1500-2	K466-2, K466-10 Lincoln gun connectors; Magnum 200/300/400 guns and compatible with Tweco® #2 - #4)
K1500-3	K1637-7 Lincoln gun connectors; Magnum 550 guns and compatible with Tweco® #5)
K1500-4	K466-3 Lincoln gun connectors; compatible with Miller® guns.)
K1500-5	(Compatible with Oxo® guns.)
K489-7	(Lincoln Fast-Mate guns.)

FIGURE AA.5



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ASSEMBLY OF DRIVE ROLLS AND WIRE GUIDES



WARNING



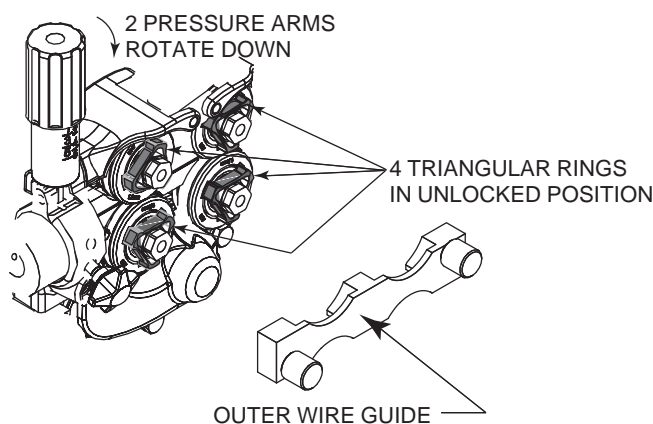
ELECTRIC SHOCK can kill.

- Turn the input power OFF at the welding power source before installation or changing drive rolls and/or guides.
- Do not touch electrically live parts.
- When inching with the gun trigger, electrode and drive mechanism are "hot" to work and ground and could remain energized several seconds after the gun trigger is released.
- Only qualified personnel should perform maintenance work.

To remove drive rolls and wire guides: (See Figure AA.6)

1. Turn power off at the welding power source.
2. Remove the outer wire guide.
3. Rotate 4 triangular rings to the unlocked position.
4. Open the pressure arms.
5. Remove the drive rolls and inner wire guide.

FIGURE AA.6



To install drive rolls and wire guides: (See Figure AA.7 and AA.7a)

1. Turn off power at the welding power source.
2. Open pressure arms.
3. Assemble the inner wire guide.
4. Slide the drive rolls onto the drive hubs.
(See figure AA.7)
5. Close the pressure arms.
6. Rotate 4 triangular rings to the locked position. (See figure AA.7a)
7. Assemble the outer wire guide.
8. Adjust the pressure arms to the recommended setting.

FIGURE AA.7

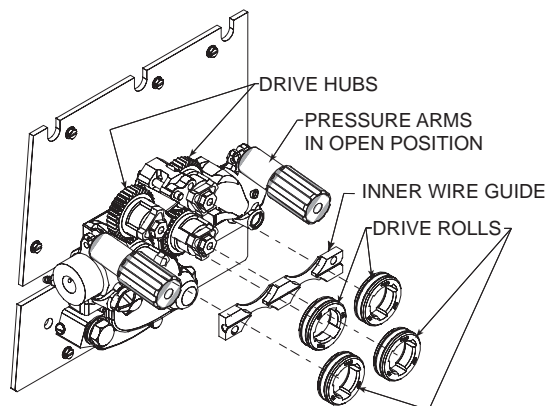
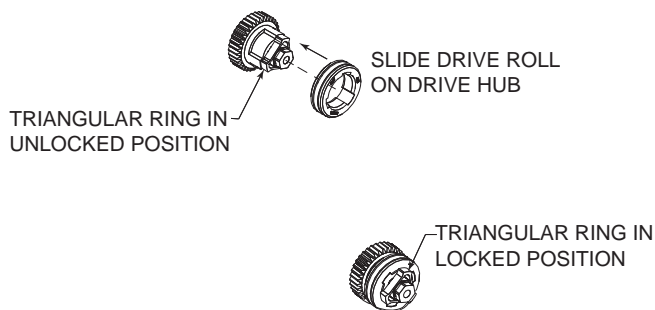


FIGURE AA.7a



PRESSURE ARM ADJUSTMENT

**WARNING**

ELECTRIC SHOCK can kill.

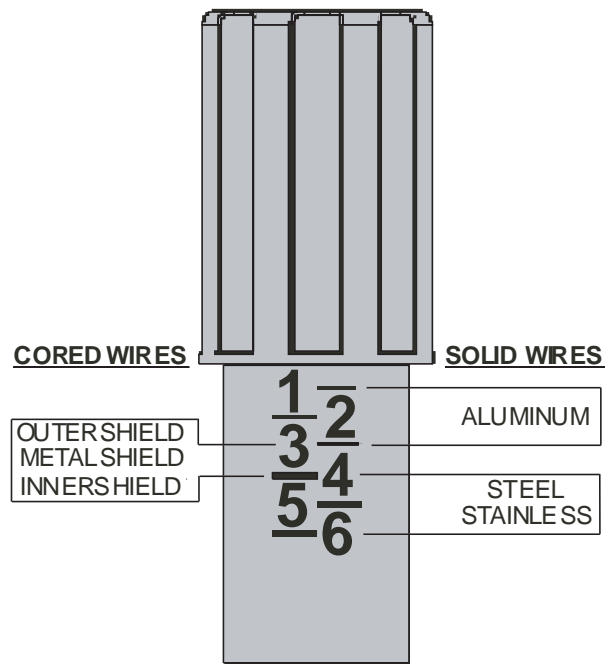
- Turn the input power OFF at the welding power source before installation or changing drive rolls and/or guides.
- Do not touch electrically live parts.
- When inching with the gun trigger, electrode and drive mechanism are "hot" to work and ground and could remain energized several seconds after the gun trigger is released.
- Only qualified personnel should perform maintenance work.

The pressure arm controls the amount of force the drive rolls exert on the wire. Proper adjustment of both pressure arm gives the best welding performance. For best results, set both pressure arms to the same value.

Set the pressure arm as follows (See Figure AA.8):

Aluminum wires	between 1 and 3
Cored wires	between 3 and 4
Steel, Stainless wires	between 4 and 6

FIGURE AA.8



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SHIELDING GAS CONNECTION

CYLINDER may explode if damaged.



- Keep cylinder upright and chained to support.
- Keep cylinder away from areas where it may be damaged.
- Never lift welder with cylinder attached.
- Never allow welding electrode to touch cylinder.
- Keep cylinder away from welding or other live electrical circuits.



BUILD-UP OF SHIELDING GAS may harm health or kill.

- Shut off shielding gas supply when not in use.

SEE AMERICAN NATIONAL STANDARD Z-49.1, "SAFETY IN WELDING AND CUTTING" PUBLISHED BY THE AMERICAN WELDING SOCIETY.

Maximum inlet pressure is 100 psi. (6.9 bar.)

Install the shielding gas supply as follows:

1. Secure the cylinder to prevent it from falling.
2. Remove the cylinder cap. Inspect the cylinder valves and regulator for damaged threads, dirt, dust, oil or grease. Remove dust and dirt with a clean cloth. **DO NOT ATTACH THE REGULATOR IF OIL, GREASE OR DAMAGE IS PRESENT!** Inform your gas supplier of this condition. Oil or grease in the presence of high pressure oxygen is explosive.
3. Stand to one side away from the outlet and open the cylinder valve for an instant. This blows away any dust or dirt which may have accumulated in the valve outlet.
4. Attach the flow regulator to the cylinder valve and tighten the union nut(s) securely with a wrench. Note: if connecting to 100% CO₂ cylinder, insert regulator adapter between regulator and cylinder valve. If adapter is equipped with a plastic washer, be sure it is seated for connection to the CO₂ cylinder.
5. Attach one end of the inlet hose to the outlet fitting of the flow regulator. Attach the other end to the welding system shielding gas inlet. Tighten the union nuts with a wrench.

6. Before opening the cylinder valve, turn the regulator adjusting knob counterclockwise until the adjusting spring pressure is released.
7. Standing to one side, open the cylinder valve slowly a fraction of a turn. When the cylinder pressure gage stops moving, open the valve fully.
8. The flow regulator is adjustable. Adjust it to the flow rate recommended for the procedure and process being used before making a weld.

WIRE REEL LOADING

⚠ WARNING

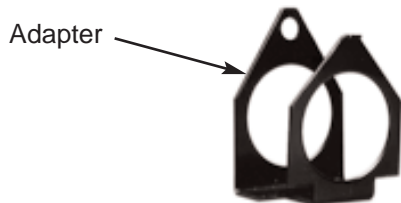
- Keep hands, hair, clothing and tools away from rotating equipment.
- Do not wear gloves when threading wire or changing wire spool.
- Only qualified personnel should install, use or service this equipment.

Loading 10 to 15 lb. (4.5 – 6.8kg) Spools

A K468 spindle adapter is required for loading 2" wide spools on 2" (51mm) spindles. Use a K468-1 spindle adapter for loading 2-1/2" (64mm) wide spools. (See figure AA.9 and figure AA.10)

1. Squeeze the release bar on the retaining collar and remove it from the spindle.
2. Place the spindle adapter on the spindle, aligning the spindle brake pin with the hole in the adapter.
3. Place the spool on the spindle and align the adapter brake tab with one of the holes in the back side of the spool. An indicator mark on the end of the spindle shows the orientation of the brake tab. Be certain the wire feeds off of the spool in the proper direction.
4. Re-install the retaining collar. Make sure that the release bar snaps out and that the retaining collar fully engages the groove on the spindle.

FIGURE AA.9



Spindle Placement

The wire reel stand provides two mounting locations for the spindle. Each mounting location consists of a tube in the center of the mast and locating slots.

Loading 16 to 44 lb. (7.3 – 20kg) Spools (See *Figure AA.8*)

1. Squeeze the release bar on the retaining collar and remove it from the spindle.
2. Place the spool on the spindle, aligning the spindle brake pin with one of the holes in the back side of the spool. An indicator mark on the end of the spindle shows the orientation of the brake holding pin. Be certain the wire feeds off of the spool in the proper direction.

3. Re-install the retaining collar. Make sure that the release bar snaps out and that the retaining collar fully engages the groove on the spindle.

FIGURE AA.10



Loading 30 lb. (13.6 kg) Readi-Reels (See *Figure AA.11*)

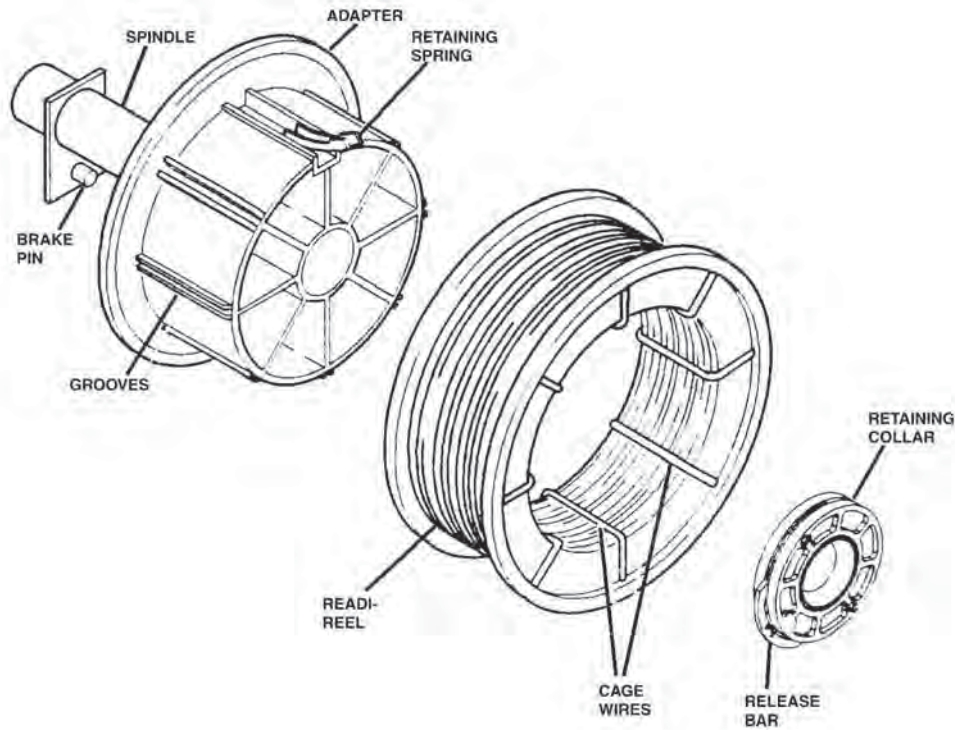
A K363-P Readi-Reel adapter is required for loading these spools on 2" (51mm) spindles.

1. Squeeze the release bar on the retaining collar and remove it from the spindle.
2. Place the Readi-Reel adapter on the spindle, aligning the spindle brake pin with one of the holes in the adapter.
3. Re-install the retaining collar. Make sure that the release bar snaps out and that the retaining collar fully engages the groove on the spindle.
4. Rotate the spindle and adapter until the retaining spring is at the 12 o'clock position.
5. Position the Readi-Reel so that electrode de-reels in the proper direction.
6. Set one of the Readi-Reel inside cage wires on the slot in the retaining spring.
7. Lower the Read-Reel to depress the retaining spring and align the other inside cage wires with the grooves in the adapter.
8. Slide the cage all way onto the adapter until the retaining spring "pops up" fully.

Removing a Readi-Reel

1. To remove a Readi-Reel from the an adapter, depress the retaining spring with a thumb while pulling the Readi-Reel cage from the adapter with both hands. Do not remove the adapter from the spindle.

FIGURE AA.11



WELD WIRE ROUTING

The electrode supply may be either from reels, Read-Reels, spools, or bulk packaged drums or reels. Observe the following precautions:

- a) The electrode must be routed to the wire drive unit so that the bends in the wire are at a minimum, and also that the force required to pull the wire from the reel into the wire drive unit is kept at a minimum.
- b) The electrode is "hot" when the gun trigger is pressed and must be insulated from the boom and structure.
- c) If more than one wire feed unit shares the same boom and are not sharing the same power source output stud, their wire and reels must be insulated from each other as well as insulated from their mounting structure.

INSTALLING ELECTRODE CONDUIT KITS

⚠ WARNING



ELECTRIC SHOCK can kill.

- Turn the input power OFF at the disconnect switch before working on this equipment.
- Do not touch electrically hot parts.

Electrode conduit is used when feeding from wire drums, boxes or large reels. For best feeding results, use the shortest conduit length possible and avoid sharp bends.

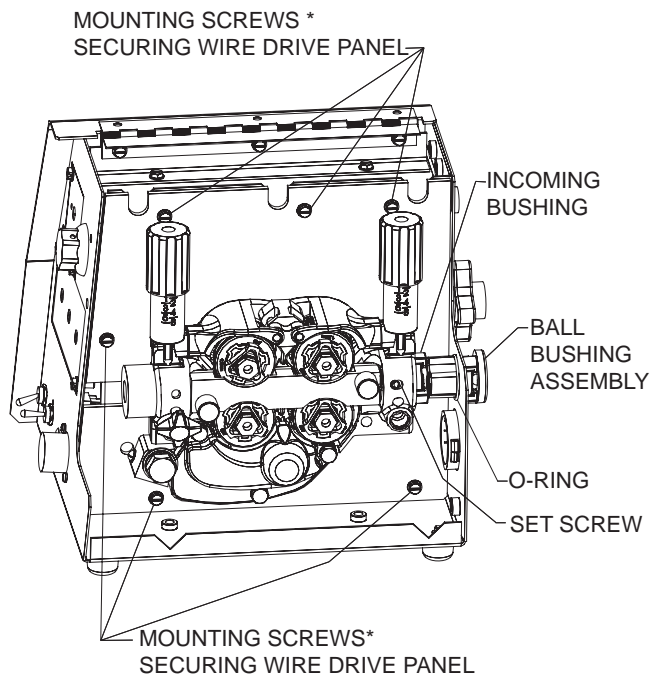
Tools required:

- 1/8" Hex key wrench
- 5/16" Nut Driver

To install Lincoln conduit:

1. Turn off power at the welding power source.

FIGURE AA.12

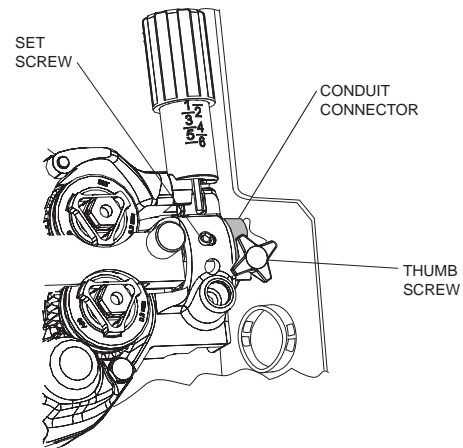


*REMOVE 6 MOUNTING SCREWS

2. Remove the o-ring holding the ball bushing assembly to the back of the wire feeder. Remove the ball bushing assembly.
3. Remove the six screws securing the wire drive panel to the sheet metal housing.

4. Loosen the set screw on the feed plate and remove the incoming bushing.

FIGURE AA.12a



5. Insert the conduit connector into the feed plate and secure with the set screw. Rotate the conduit connector so the thumb screw does not interfere with the idle arm or door.
6. Mount the wire drive panel to the sheet metal housing with the six screws.
7. Insert conduit through the sheet metal of the LF-74 and into the conduit connector. Secure with the thumb screw.

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ALUMINUM WIRE PREPARATIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- Turn the input power OFF at the disconnect switch before working on this equipment.
- Do not touch electrically hot parts.

Welding with aluminum filler wires requires extra care. Aluminum wire is softer and not as stiff as steel wires, it is important to keep aluminum wire free of dirt and scratches. Limit gun length to 10 Ft.(3.0 m) for best results and use a spool cover if feeding from a spool.

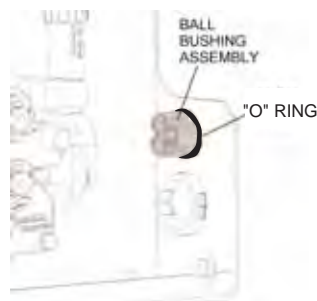
To prevent scratching of the aluminum wire, remove the ball bearings from the ball housing as follows.

Tools required: (See Figure AA.12b)

- 9/64" Hex key wrench

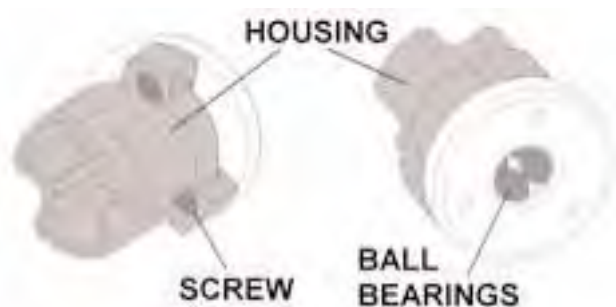
1. Turn off power at the welding power source.
2. Remove the o-ring holding the ball bushing assembly to the back of the wire feeder. Remove the ball bushing assembly.

FIGURE AA.12b



3. Remove the three socket head cap screws from the ball bushing assembly. **Caution: as the screws are being loosened, the balls may fall free from the assembly.** Remove the balls and the steel washer.

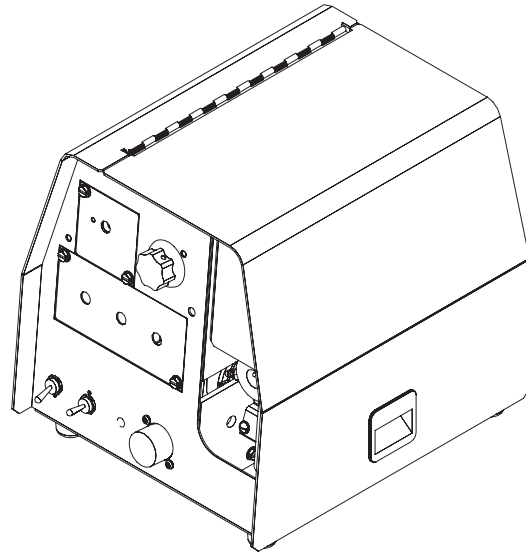
FIGURE AA.13



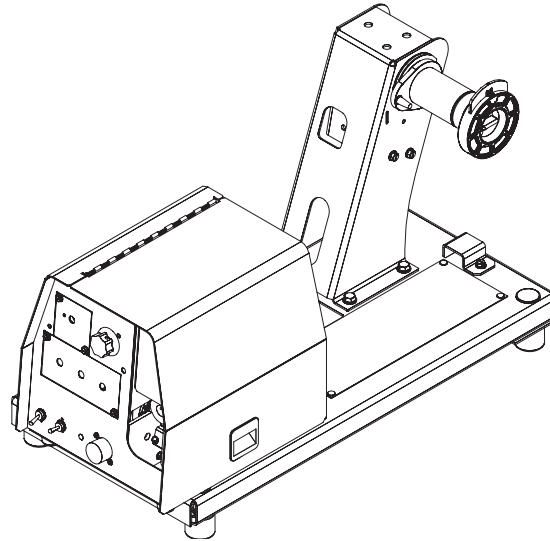
4. Place the ball bushing housing into the wire feeder case and secure with the "O" ring.

INSTALLATION

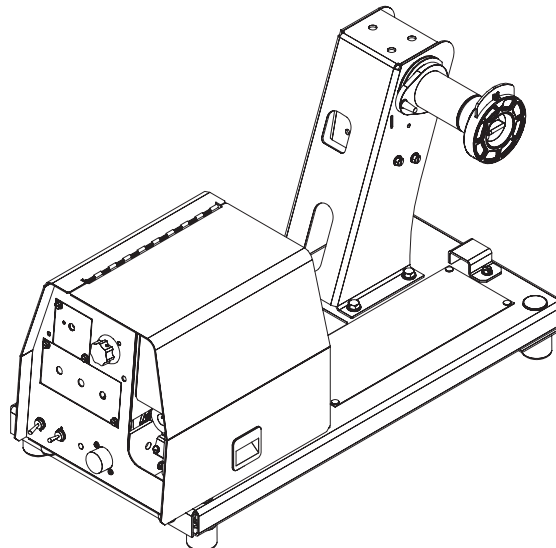
BASE MODEL (K2426-1)



BENCH MODEL WITH HEAVY DUTY WIRE STAND (K2426-2)



EXTRA TORQUE BENCH MODEL WITH HEAVY DUTY WIRE STAND (K2426-3)



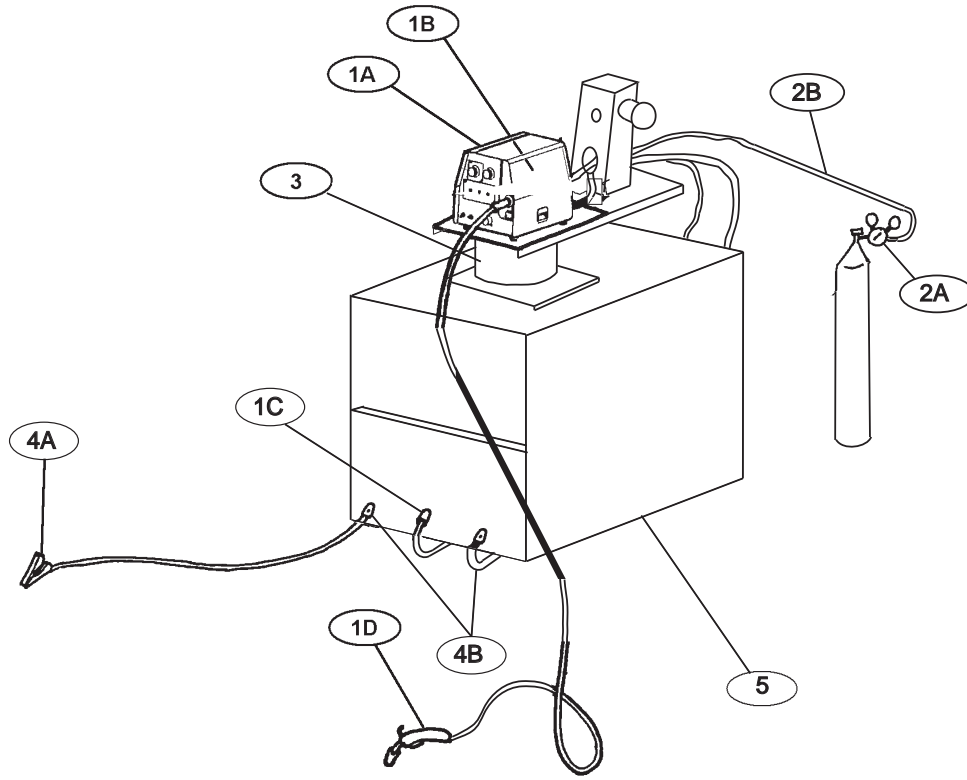
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COMMON EQUIPMENT SET-UPS

FIGURE AA.14 GENERAL FABRICATION



Item	K#	Description
1A	K2426-2	LF-74 Bench Model with Heavy Duty Wire Reel Stand
1B		.035, .045 (0.9mm, 1.2mm) Drive Roll Kit
1C		10' (3m) Control Cable
1D	See welding gun literature	Magnum Gun
2A	K586-1	Deluxe Regulator for Mixed Shielding Gases
2B		Shielding Gas Hose
3	K1557-1	Swivel Kit
4A	K1803-1	Ground Clamp
4B		Weld Power Cables, Twist-Mate to Lug (2 included)
5	K2400-1	CV-305

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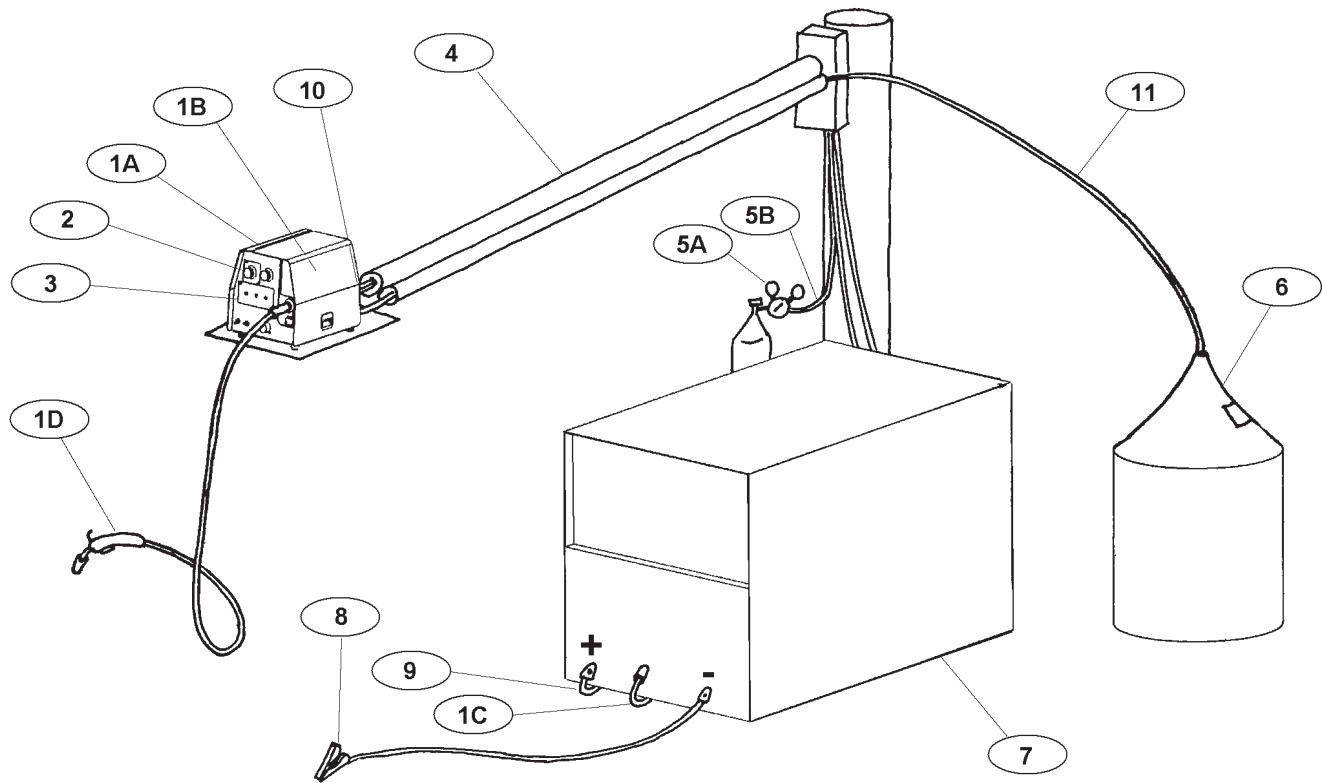
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FIGURE AA.15 HIGH VOLUME PRODUCTION

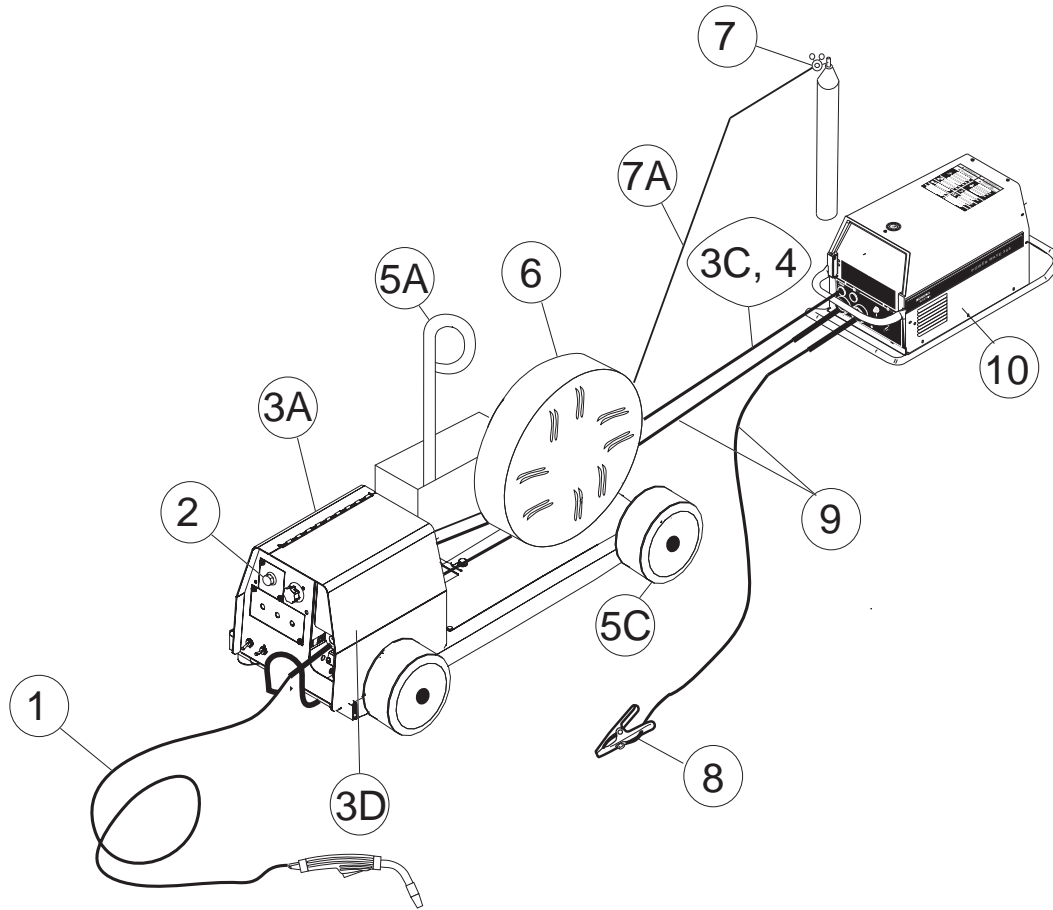


Item	K#	Description
1A		LF-74, Base Model
1B	K2426-1	.035, .045 (0.9, .1.2mm) Drive Roll Kit
1C		10' (3m) Control Cable.
-	K1797-xx	Control Cable Extension
1D	See Welding Gun Literature	Welding Gun
2	K2329-1	Remote Voltage Control Kit
3	K2330-1	Timer Kit
4	See Welding Arm Literature	Welding Arm
5A	K586-1	Deluxe Gas Regulator for Mixed Gases
5B		Shielding Gas Hose
6	K884-xx	Accu-Trak Drum Payoff Kit (Round)
	K2175-xx	Accu-Pak Box Payoff Kit (Square)
7	K1346-13	CV-400
8	K910-xx	Ground Clamp
9	K1842-xx	Weld Power Cable, Lug to Lug
10	K1546-1	Incoming Bushing, .035-1/16 (0.9 - 1.6 mm)
11		Conduit

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FIGURE AA.16 PORTABLE WELDING



Item	K#	Description
1	See Welding Gun Literature	Lincoln InnerShield Gun.
2	K2329-1	Remote Voltage Control Kit.
3A	K2426-3	LF-74 Extra Torque Bench Model with Heavy Duty Wire Reel Stand
3C		10' (3m) Control Cable.
3D	KPxxx	.035, .045 (0.9, 1.2mm) Drive roll Kit
4	K1797-xx	Control Cable Extension. Add cables to extend up to 110' (30m)
5A	K2331-1	Insulated Lift Bail Kit
5C	K163	4 Wheeled Undercarriage
6	K1634-2	Plastic Wire Cover for 50-60lb. Wire Packages
7		Deluxe Gas Regulator
7A	K586-1	Shielding Gas Hose
8		Ground Clamp
9	K1803-1	Weld Power Cables, Twist Mate to Lug
10	See Power Source or Engine Drive Literature	Welding Power Source

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 8. Trigger Connector 5-Pin AmphenolBB-6

SAFETY PRECAUTIONS

Read this entire section of operating instructions before operating the machine.

WARNING



ELECTRIC SHOCK can kill.

- Unless using cold feed feature, when feeding with the gun trigger, the electrode and drive mechanism are always electrically energized and could remain energized several seconds after welding ceases.
- Do not touch electrically live parts or electrodes with your skin or wet clothing.
- Insulate yourself from the work and ground.
- Always wear dry insulating gloves.

ONLY QUALIFIED PERSONS SHOULD INSTALL, USE OR SERVICE THIS EQUIPMENT. READ AND FOLLOW THE MANUFACTURER'S INSTRUCTIONS, EMPLOYER'S SAFETY PRACTICES AND MATERIAL SAFETY DATA SHEETS (MSDS) FOR CONSUMABLES.

READ THIS WARNING, PROTECT YOURSELF & OTHERS.

FUMES AND GASES can be dangerous.



- Keep your head out of fumes.
- Use ventilation or exhaust at the arc, or both, to keep fumes and gases from your breathing zone and general area.

WELDING SPARKS can cause fire or explosion.



- Do not weld near flammable material.
- Do not weld on containers which have held flammable material.

ARC RAYS can burn.



- Wear eye, ear, and body protection.

Observe additional guidelines detailed in the beginning of this manual.

GRAPHIC SYMBOLS THAT APPEAR ON THIS MACHINE OR IN THIS MANUAL



COLD FEED



POSITIVE OUTPUT



NEGATIVE OUTPUT



PROTECTIVE GROUND



WARNING OR CAUTION



DANGEROUS VOLTAGE



SHOCK HAZARD



WELDING FUMES



EXPLOSION



GAS INPUT



WORK CONNECTION

COMMON WELDING ABBREVIATIONS

WFS

- Wire Feed Speed

CV

- Constant Voltage

GMAW (MIG)

- Gas Metal Arc Welding

FCAW (Innershield or Outershield)

- Flux Core Arc Welding

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PRODUCT DESCRIPTION

General Physical Description

The LF-74 is optimized for GMAW and FCAW welding. The powerful 4 roll MaxTrac™ drive, heavy duty enclosure and wire reel stand combine to make an easy to install, easy to use wire feeder for everyday welding. Powering the wire drive is a high performance motor gearbox. A heavy duty hinged door opens easily, which provides an ample amount of room for assembling precision drive components and the welding gun.

MaxTrac™ technology delivers great feeding because:

- Patent pending drive rolls improve traction.
- The precision machined, rigid aluminum alloy frame results in maximum drive roll clamping pressure.
- Drive hubs with steel inner cores have 3 ball bearings inside each hub.
- The drive hubs are supported by large, heat treated and ground shafts for maximum rigidity and accurate drive roll alignment.
- Patent pending dual spring pressure arms have sensitivity for feeding soft wires without crushing them, and have plenty of compression force for feeding solid or stiff wires.

Easy to configure, easy to service parts give MaxTrac™ drives the edge in productivity.

- Patented split wire guides fully support the wire and virtually eliminate birdnesting.
- No tools required to change the drive rolls and wire guides.
- Changeable gun bushings easily accept guns from many manufacturers.
- Brass-to-brass connections between the electrode connection and the gun minimize voltage drop variations, resulting in consistent arc performance all day, every day.

Three models of the LF-74 are available to satisfy many customer set-ups:

- The base model is enhanced for GMAW welding with consumables from bulk packages or when a boom mounting is required.
- The bench model with heavy duty wire reel stand targets operators performing GMAW or FCAW welding using consumables on spools.
- The high torque model features high ratio gearing for feeding larger diameter FCAW or GMAW wires.

All models use a high performance motor-gear box with an integrated tachometer.

General Functional Description

The LF-74 fulfills the need for an economical wire feeder with a high performance wire drive. Functional features included are those that offer the most value – a WFS knob with a calibrated printed scale, cold-feed/gas purge switch, trigger interlock switch and tachometer motor control.

RECOMMENDED PROCESSES

- GMAW
- FCAW

PROCESS LIMITATIONS

- The LF-74 is not recommended for GMAW-Pulse Synergic, GTAW, GTAW-Pulse, CAG, SMAW
- The LF-74 is not compatible with push-pull equipment.
- For the heavy duty bench models K2426-2 and K2426-3, the maximum spool size = 60 lb. (27.2 kg).

REQUIRED EQUIPMENT

Lincoln's LF-74 is designed for use with the CV and DC family of power sources. These include:

- CV-250
- CV-300
- CV-305
- CV-400
- CV-655
- DC-400
- DC-600
- DC-655
- Invertec V350

OTHER COMPATIBLE POWER SOURCES

- Ranger 250
- Ranger 305
- Commander 300
- Vantage 300
- Vantage 500
- Air Vantage 500

EQUIPMENT LIMITATIONS

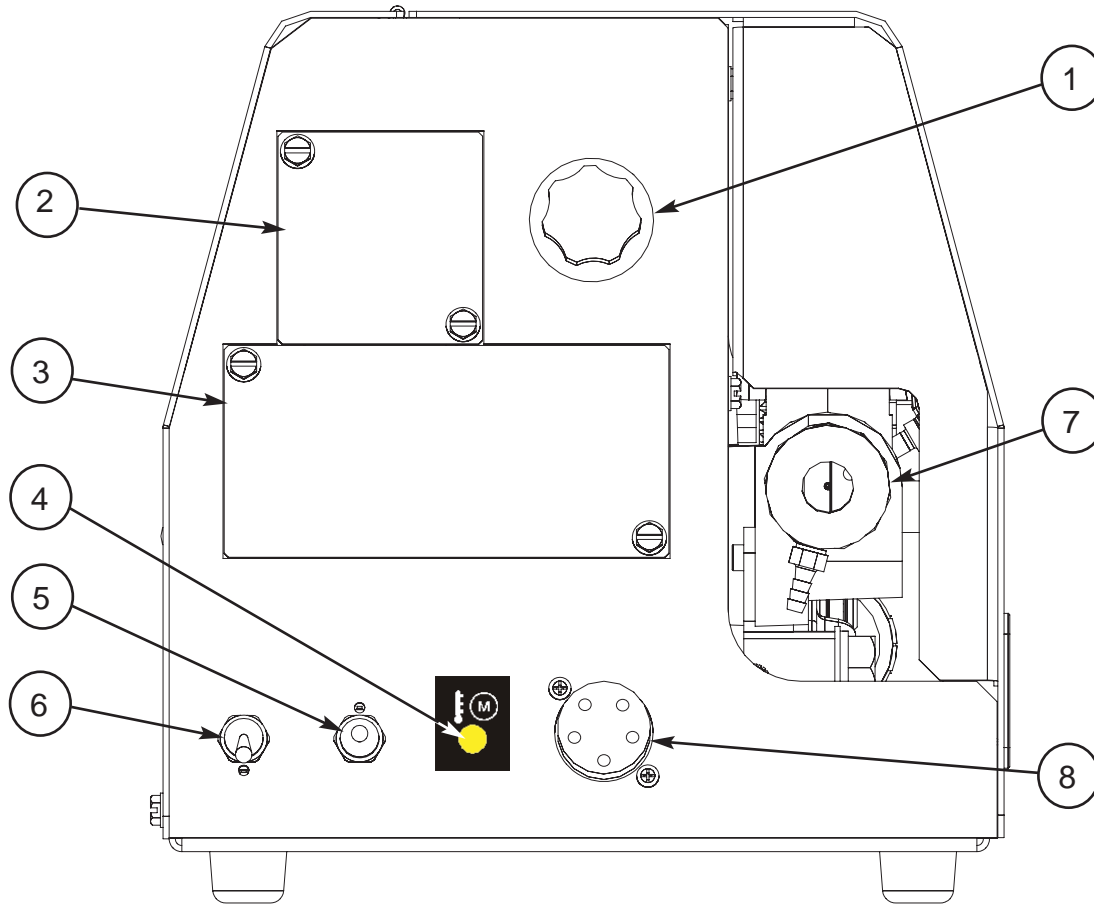
- Maximum GMAW gun length = 25' (7.6m)
- Maximum FCAW gun length = 15' (4.6m)
- Maximum conduit length = 30' (9.1m)
- Maximum total control cable length = 100ft (31m)
- The LF-74 operates on 24-42VAC and not 115 VAC
- The K1733-1 and K1733-3 wire straighteners are not compatible with the LF-74
- Gun bushings are required for welding guns that do not have a Magnum (Tweco #2-#4 compatible) back end.
- The LF-74 does not attach to K303 or K377 wire reel stands.

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FRONT PANEL CONTROLS AND CONNECTIONS

FIGURE BB.1 CASE FRONT CONTROLS



ITEM	DESCRIPTION
1	Wire Feed Speed Knob.
2	Location for Optional Remote Voltage Control (See Accessory Section For Kit Number).
3	Location for Optional Burnback and Postflow Timer Kit (See Accessory Section For Kit Number).
4	Thermal LED, Motor Overload.
5	Cold Feed - Gas Purge Switch, press the switch up to feed wire with weld output off. Press the switch down for gas flow with weld output off.
6	2 step - Trigger Interlock switch.
7	Gun Receiver Bushing.
8	Trigger Connector 5-pin amphenol for connecting the MIG gun trigger. See Installation Section for detail.

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1. WIRE FEED SPEED KNOB

The large, calibrated wire feed speed knob makes for easy and accurate adjustment of the wire feed speed. The knob rotates 3/4 turn. Turn the knob clockwise to increase the wire feed speed, and counter clockwise to reduce the wire feed speed.

K2426-1 and K2426-2 models:

These wire feeders are factory configured for normal speed operation.

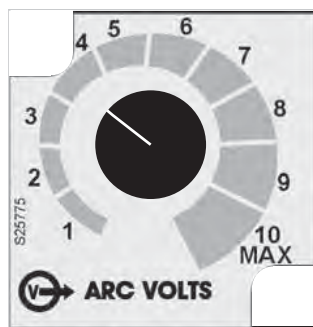
The normal wire feed speed range is 100 to 800 in/min (2.5 - 20.3 m/min).

K2426-3 model:

The wire feed speed range on the extra torque model is 50 to 400 in/min (1.3 – 10.2 m/min)

2. REMOTE VOLTAGE CONTROL KIT

The **optional** remote voltage control kit adjusts the arc voltage from the minimum to the maximum voltage of the welding power source. Rotate the knob counter-clockwise to reduce the arc voltage and rotate the knob clockwise to raise the arc voltage.



3. BURNBACK AND POSTFLOW TIMER KIT

The **optional** Burnback and Postflow Timer Kit gives control over the shielding gas at the end of the weld and prepares the end of the wire for the next arc start. Additional shielding gas protection is often required when welding aluminum, stainless steel or exotic alloys.

When stitch welding, set the postflow time to maximum for best results.

Burnback Timer

The burnback timer range is OFF to 0.25 seconds. The burnback timer controls the additional amount of time the power source output remains ON after the wire drive has stopped feeding wire. Burnback adjustment prevents the wire from sticking to the weld at the end of a weld and helps to condition the wire for the next weld.

To set the burnback time, adjust the knob to approximately 0.03 seconds and then decrease or increase the time as desired.



Postflow Timer

The postflow timer range is OFF to 10 seconds. Postflow is the time from when the power source output turns OFF until the postflow timer expires. Use postflow to protect the weld while the weld cools.

4. THERMAL LED, MOTOR OVERLOAD

The thermal light illuminates when the wire drive motor draws too much current. If the thermal light illuminates, the wire drive will automatically shutdown for up to 30 seconds to allow the motor to cool. To start welding again, release the gun trigger, inspect the gun cable, liner (and conduit). Clean and make repairs as necessary. Start welding again when the problem has been safely resolved.

For best results, keep the gun cable and conduit as straight as possible. Perform regular maintenance and cleaning on the gun liner, conduit and gun. Always use quality electrode, such as L-50 or L-56 from Lincoln Electric.

5. COLD FEED/GAS PURGE SWITCH

Cold Feed and Gas Purge are combined into a single spring centered toggle switch.

To activate Cold Feeding, hold the switch in the UP position. The wire drive will feed electrode but neither the power source nor the gas solenoid will be energized. Adjust the speed of cold feeding by rotating the WFS knob. Cold feeding, or "cold inching" the electrode is useful for threading the electrode through the gun.



Hold the toggle switch in the DOWN position to activate Gas Purge and let the shielding gas flow. The gas solenoid valve will energize but neither the power source output nor the drive motor will be turned on. The Gas Purge switch is useful for setting the proper flow rate of shielding gas. Flow meters should always be adjusted while the shielding gas is flowing.

6. 2 STEP - TRIGGER INTERLOCK SWITCH

The 2 Step - Trigger Interlock switch changes the function of the gun trigger. 2 Step trigger operation turns welding on and off in direct response to the trigger. Trigger Interlock operation allows welding to continue when the trigger is released for comfort on long welds.



Place the toggle switch in the DOWN position for 2 Step operation or in the UP position for Trigger Interlock operation.

2 Step Trigger

2 Step trigger operation is the most common. When the gun trigger is pulled, the welding power source energizes the electrode output and the wire feeder feeds wire for welding. The power source and wire feeder continue welding until the trigger is released.

Trigger Interlock

Trigger Interlock operation provides for operator comfort when making long welds. When the gun trigger is first pulled, the welding power source energizes the output and the wire feeder feeds wire for welding. The gun trigger is then released while the weld is made. To stop welding, the gun trigger is pulled again, and when it is released the welding power source output turns off and the wire feeder stops feeding wire.



CAUTION



- If the arc goes out while welding with trigger interlock operation, the electrode output from the welding power source remains energized and the wire feeder will continue to feed wire until the gun trigger is again pulled and then released.

7. GUN RECEIVER BUSHING (K1500-2)

(K1500-2 bushing is standard on all LF-74's)

This Gun Receiver Bushing is used with Lincoln gun connectors, also with Magnum 200/300/400 guns and compatible with Tweco® #2-#4).

8. TRIGGER CONNECTOR 5-PIN AMPHENOL

This is used for connecting the MIG gun trigger. See *Installation Section* for detail.

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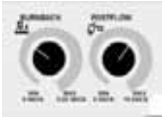



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OPTIONAL KITS:

K2329-1	Remote Voltage Control Kit.	Includes: 10k potentiometer, harness, knob and decal with a 0-10 scale and mounting hardware.	
K2330-1	Timer Kit.	Includes: Panel and harness for adjusting burnback and postflow times.	
K2328-1	Standard Duty Wire Reel Stand.	Includes: Wire Reel Stand for up to 44 lbs (20 kg) spools, Spindle and mounting hardware.	
K2331-1	Lift Bail Kit. for use with K2328-1	Includes: Insulated lift bail and hardware.	
K2332-1	Swivel Kit. (for use with K2328-1 Standard Duty Bench Models)	Includes: Swivel adapter and mounting hardware for attaching to a power source lift bale.	
K1796-xx	Co-Axial Power Cable.	Includes: Coaxial weld cable of length "xx". Ends of the weld cable have lug connections. Use for Pulse or STT welding.	
K1803-1	Work and Feeder Cables Package.	Includes: Twist-Mate to Lug 2/0 cable 14' (1.2m) long with Ground Clamp, and Twist-Mate to Lug 2/0 Cable 9' (2.7m) long.	
K1840-xx	Weld Power Cable, Twist-Mate to Lug.	Includes: Twist-Mate to Lug, 1/0 cable of length "xx".	
K1841-xx	Weld Power Cable, Twist-Mate to Twist-Mate.	Includes: Twist-Mate to Twist-Mate, 1/0 Cable for 25' (7.6m) cables. Includes: Twist-Mate to Twist-Mate, 2/0 Cable for 50' (15.2m) cables.	
K1842-xx	Weld Power Cable, Lug to Lug.	Includes: Lug to Lug, 3/0 Cable of length "xx" for lengths up to 60' (18.3m). Lug to Lug, 4/0 Cable of length "xx" for lengths greater than 60' (18.3m).	

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OPTIONAL KITS:

K1797-xx	Control Cable.	Includes: 14 pin to 14 pin wire feeder to power source control cable.	
K2335-1	Adapter for Miller Power Sources.	Includes: Adapter control cable for connecting a Lincoln 42 VAC wire feeder to a 24 VAC Miller power source.	
K1520-1	42 Volt Transformer Kit.	Includes: One transformer kit for operating a 42 VAC wire feeder on a power source supplying only 115 VAC.	
K1798	Adapter Cable for Control Cable to Terminal Strip Power Sources.	Includes:	
K910-1	Ground Clamp.	Includes: One 300 Amp Ground Clamp.	
K910-2	Ground Clamp.	Includes: One 500 Amp Ground Clamp.	
K1500-1	Gun Receiver Bushing (for guns with K466-1 Lincoln gun connectors; Innershield and Subarc guns.)	Includes: Gun receiver bushing, set screw and hex key wrench.	
K1500-2 (standard on all LF-74's)	Gun Receiver Bushing (for guns with K466-2, K466-10 Lincoln gun connectors; Magnum 200/300/400 guns and compatible with Tweco® #2-#4.)	Includes: Gun receiver bushing with hose nipple, set screw and hex key wrench.	
K1500-3	Gun Receiver Bushing (for guns with K613-7 Lincoln gun connectors; Magnum 550 guns and compatible with Tweco® #5.)	Includes: Gun receiver bushing with hose nipple, set screw and hex key wrench.	
K1500-4	Gun Receiver Bushing (for gun with K466-3 Lincoln gun connectors; compatible with Miller® guns.)	Includes: Gun receiver bushing with hose nipple, set screw and hex key wrench.	
K1500-5	Gun Receiver Bushing (compatible with Oxo® guns.)	Includes: Gun receiver bushing with hose nipple, 4 guide tubes, set screw and hex key wrench.	

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OPTIONAL KITS:

K489-7	Gun Receiver Bushing (for Lincoln Fast-Mate guns.)	Includes: Gun receiver bushing with trigger connector.	
K466-2	Magnum 200/300/400 to K1500-2 Adapter.	Includes: Gun adapter, cotter pin, hex key wrench, wrench.	
K613-7	Magnum 550 to K1500-3 Adapter Lincoln Conduit.	Includes: Trigger adapter, gun adapter and hex key wrench.	
K1546-1	Incoming Bushing, for Lincoln Conduit .025- 1/16" (0.6 - 1.6mm) wire.	Includes: Incoming bushing and hex key wrench.	
K1546-2	Incoming Bushing, for Lincoln Conduit 1/16-1/8" (1.6 - 3.2 mm) wire.	Includes: Incoming bushing and hex key wrench.	
K435	Spindle Adapter, for mounting 14 lb. (6.4 kg) Innershield Coils on 2 in (51 mm) spindles.	Includes: Spindle Adapter made from 2 coil retainers. (Electrode not included.)	
K468	Spindle Adapter, for mounting 8in (203mm) diameter spools on 2 in (51 mm) spindles.	Includes: Spindle Adapter.	
K468-1	Spindle Adapter, for mounting 2.5 in (64mm) diameter spools on 2 in (51 mm) spindles.	Includes: Spindle Adapter.	
K363P	Readi-Reel Adapter, for mounting 23-30 lb. (10.4 - 13.6 kg) reels to 2 in (51 mm) spindles.	Includes: Readi-Reel spool adapter. (Spool of electrode not included.)	
K438	Readi-Reel Adapter, for mounting 50-60 lb. (22.7 - 27.2 kg) reels to 2 in (51 mm) spindles. For use with Heavy Duty Bench models.	Includes: Readi-Reel spool adapter. (Spool of electrode not included.)	
K1504-1	Coil Adapter, for mounting 50-60 lb. (22.7 - 27.2 kg) coils to 2 in (51 mm) spindles. For use with heavy Duty Bench models.	Includes: 50-60 lb. (22.7 - 27.2 kg) coil adapter.	

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OPTIONAL KITS:

K1634-1	Plastic Wire Cover for 30-44 lb. (13.6 - 20.0 kg) Wire packages. (For use with Standard Duty Bench Models and Heavy Duty Bench Models.)	Includes: Cover, backing plate, wire conduit, incoming bushing for .025 - 1/16" (0.6 - 1.6 mm) wire, incoming bushing for 1/16" - 1/8" (1.6 - 3.2 mm) wire, thumb screw, mounting hardware and hex key.	
K1634-2	Plastic Wire Cover for up to 60 lb. (27.2kg) Wire packages. (For use with Heavy Duty Bench Models.)		
K659-1	Gas Guard Regulator	Includes: Gas Guard Regulator and adjustment key.	
3000290	Adjustable Gas Regulator	Includes: Gas Regulator for Mixed Gases and 10' (3.0m) Hose.	
K586-1	Deluxe Adjustable Gas Regulator	Includes: Deluxe Gas Regulator for Mixed Gases, Adapter for CO2 and 10' (3.0m) Hose.	
K1524-3	Heavy Duty Universal Wire Reel Stand. For spools up to 60 lb. (27.2kg)	Includes: Heavy Duty Wire Reel Stand.	
K163	4 Wheeled Wire Feeder Undercarriage (For use with Standard Duty Bench Models and Heavy Duty Bench Models.)	Includes: Undercarriage with 8" (203mm) rear wheels, 4" (102mm) casters.	
K1557-1	Swivel Platform (for use with Heavy Duty Bench Models)	Includes: Swivel Platform and Tray.	
K1556-1	Light Duty Caster Kit (for use with Heavy Duty Bench Models)	Includes: 2 Swivel Casters, 2 Fixed Casters, brackets and mounting hardware.	
K1555-1	Insulated Lift Bail (for use with Heavy Duty Bench Models)	Includes: Insulated Lift Bail and mounting hardware.	

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MAINTENANCE

Safety Precautions

⚠ WARNING

ELECTRIC SHOCK can kill.



- Do not touch electrically live parts such as output terminals or internal wiring.

- When inching with gun trigger, electrode and drive mechanism are "hot" to work and ground and could remain energized several seconds after the gun trigger is released.
- Turn OFF input power at welding power source before installation or changing drive roll and/or guide tubes.
- Welding power source must be connected to system ground per the National Electrical Code or any applicable local codes.
- Only qualified personnel should perform maintenance work.

Observe all additional Safety Guidelines detailed throughout this manual.

ROUTINE MAINTENANCE

- Clean and tighten all weld terminals.
- Inspect all weld cables, control cables, gun cables and shielding gas hoses. Repair or replace as necessary.

PERIODIC MAINTENANCE

- Clean drive roll grooves.
- Blow out or vacuum the inside of the feeder.

CALIBRATION SPECIFICATION

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch electrically live parts.
 - When inching with the gun trigger, electrode, wire drive motor and drive mechanism are "hot" to work and ground and could remain energized several seconds after the gun trigger is released.
 - Welding power source must be connected to system ground per the National Electrical Code or any applicable local codes.
- Only qualified personnel should perform maintenance work.



Calibration of the LF-74 may be required when the p.c. board, potentiometer or motor is replaced or serviced. Calibration matches the scale on the name plate to the actual wire feed speed.

To verify the wire feed speed,

1. Assemble a .045 (1.2 mm) drive roll kit to the feeder.
2. Load .045 (1.2 mm) steel wire into the feeder.
3. Trim the wire to the end of the contact tip of the gun.
4. Adjust the WFS knob per the Table DD.1.

TABLE DD.1

MODEL	WFS knob setting
K2426-1, K2426-2	400
K2426-4, K2426-5	300
K2426-3	200

5. Activate and hold the COLD FEED switch for 10 seconds.
6. Measure the length of wire extending from the contact tip. The wire length shown in Table DD.2.

TABLE DD.2

MODEL	WIRE LENGTH
K2426-1, K2426-2	50 inches ± 5 inches (1270 mm ± 127.25mm)
K2426-4, K2426-5	
K2426-3	25 inches ± 2.5 inches (635 mm ± 64 mm)

To calibrate the wire feed speed for Codes 11195, 11196 and 11197.

Tools required:

- 5/16" nut driver
- 3/4" open end wrench
- WFS meter or RPM meter
- Shorting plug. The shorting plug shorts pins 1 and 5 of connector J2 on the p.c. board. J2 is a 6 pin molex.

1. Turn off power to the LF-74 and welding power source.
2. Disconnect the electrode lead from the feed plate and from the welding power source.
3. Remove the wraparound from the LF-74, See **Figure DD.1**.
4. Turn on power to the LF-74 and welding power source.
5. Adjust the WFS knob per the Table DD.1.
6. Insert the shorting plug into the control p.c. board J2. (shorts pins 1 and 5.) See **Figure DD.2**.
7. Wait a minimum of 1 second.
8. Remove the shorting plug.
9. Connect J2 of the harness to p.c. board.
10. Turn off power to the LF-74 and welding power source.
11. Assemble the wraparound.
12. Connect the electrode lead.

To calibrate the wire feed speed for Codes 11610, 11611.

Tools required:

- 5/16" nut driver
- 3/4" open end wrench
- WFS meter or RPM meter
- Shorting plug. The shorting plug shorts pins 1 and 5 of connector J2 on the p.c. board. J2 is a 6 pin molex.

1. Turn off power to the LF-74 and welding power source.
2. Disconnect the electrode lead from the feed plate and from the welding power source.
3. Remove the wraparound from the LF-74, See Figure DD.1.
4. Set WFS Knob to 50 IPM and trigger the machine.
5. Measure drive role RPM. If reading is 8.9 to 9.2 RPM proceed to step 6 otherwise insert the shorting plug into the control p.c. board J2 (shorts pins 1 and 5.) See Figure DD.2 and adjust WFS Knob to get 9.05 +/- 0.15 RPM and then remove shorting plug.
6. Set WFS Knob to 300 IPM.

7. Measure drive role RPM. If reading is 54.8 to 56.0 RPM proceed to step 8 otherwise insert the shorting plug into the control p.c. board J2 (shorts pins 1 and 5.) See Figure DD.2 and adjust WFS Knob to get 55.4 +/- 0.6 RPM and then remove the shorting plug.
8. Set WFS Knob to 800 IPM.
9. Measure drive role RPM. If reading is 146.4 to 148.4 RPM calibration is complete otherwise insert the shorting plug into the control p.c. board J2. (shorts pins 1 and 5.) See Figure DD.2 and adjust WFS Knob to get 147.4 +/- 1.0 RPM and then remove the shorting plug. Release the gun trigger, connect J2 of the harness to the p.c. board.

FIGURE DD.1

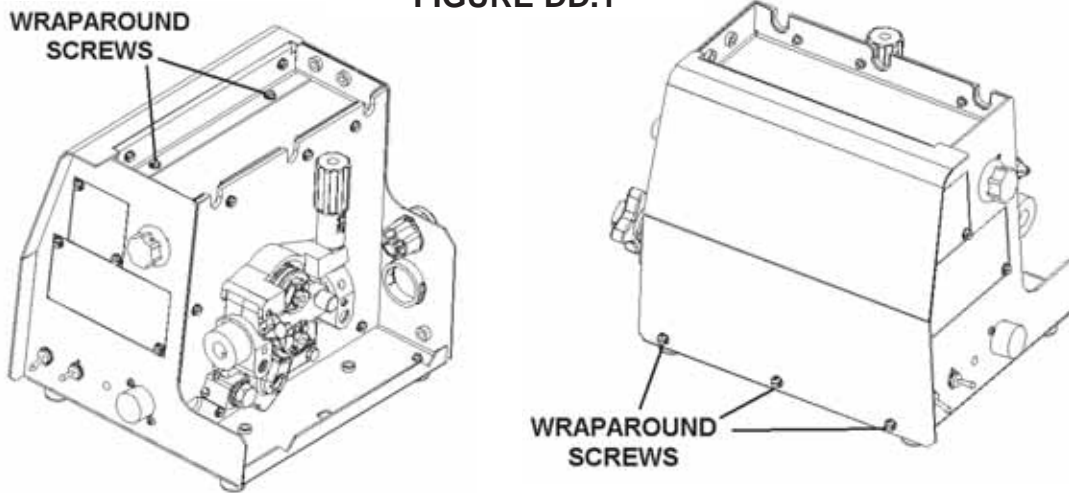
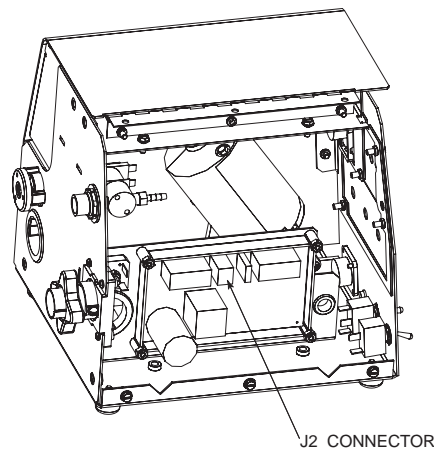


FIGURE DD.2

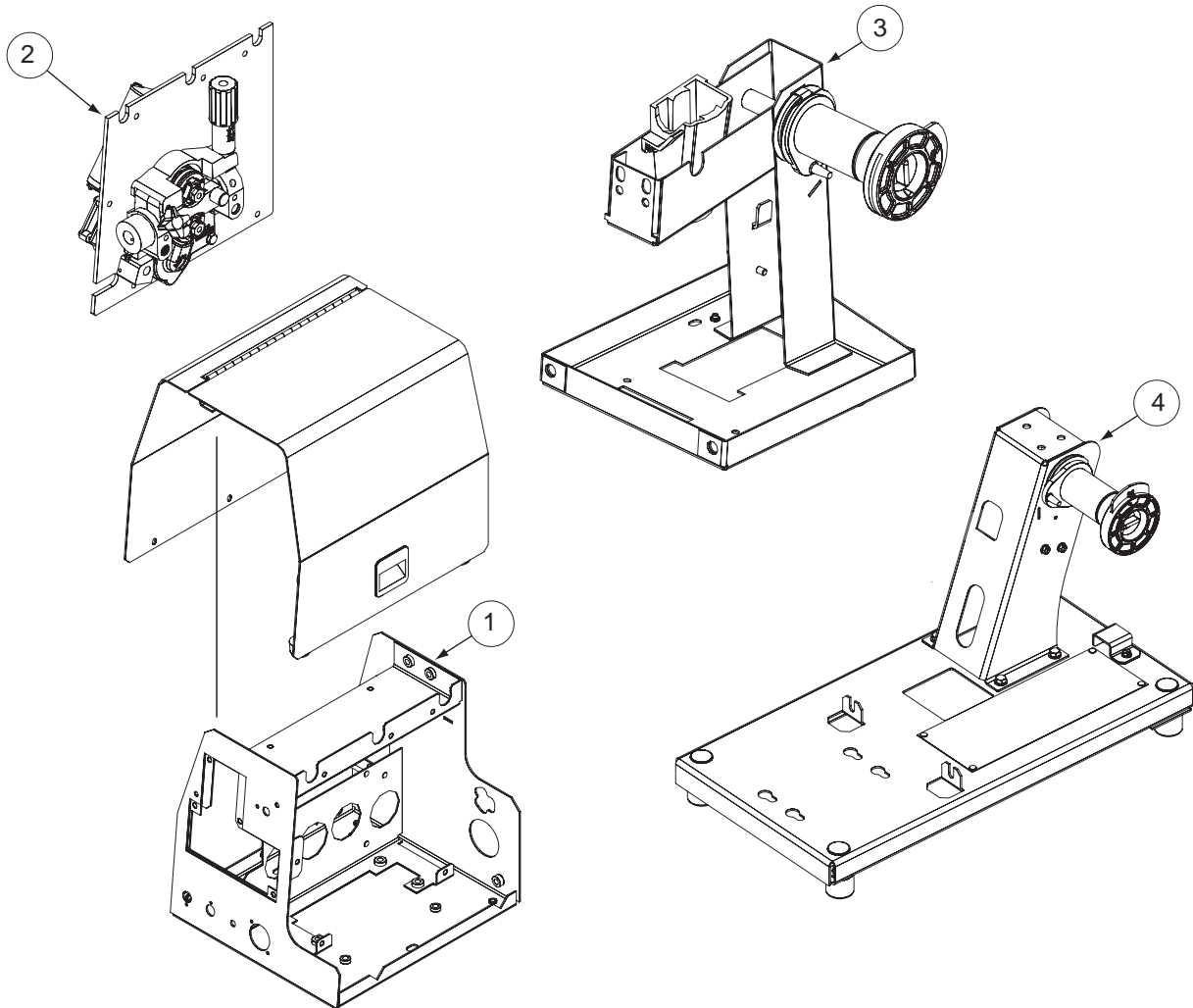


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- 1. Center Assembly
- 2. Wire Drive Assembly
- 3. Wire Reel Stand LF-72
- 4. Wire Reel Stand LF-74

FIGURE DD.3 - MAJOR COMPONENT LOCATION



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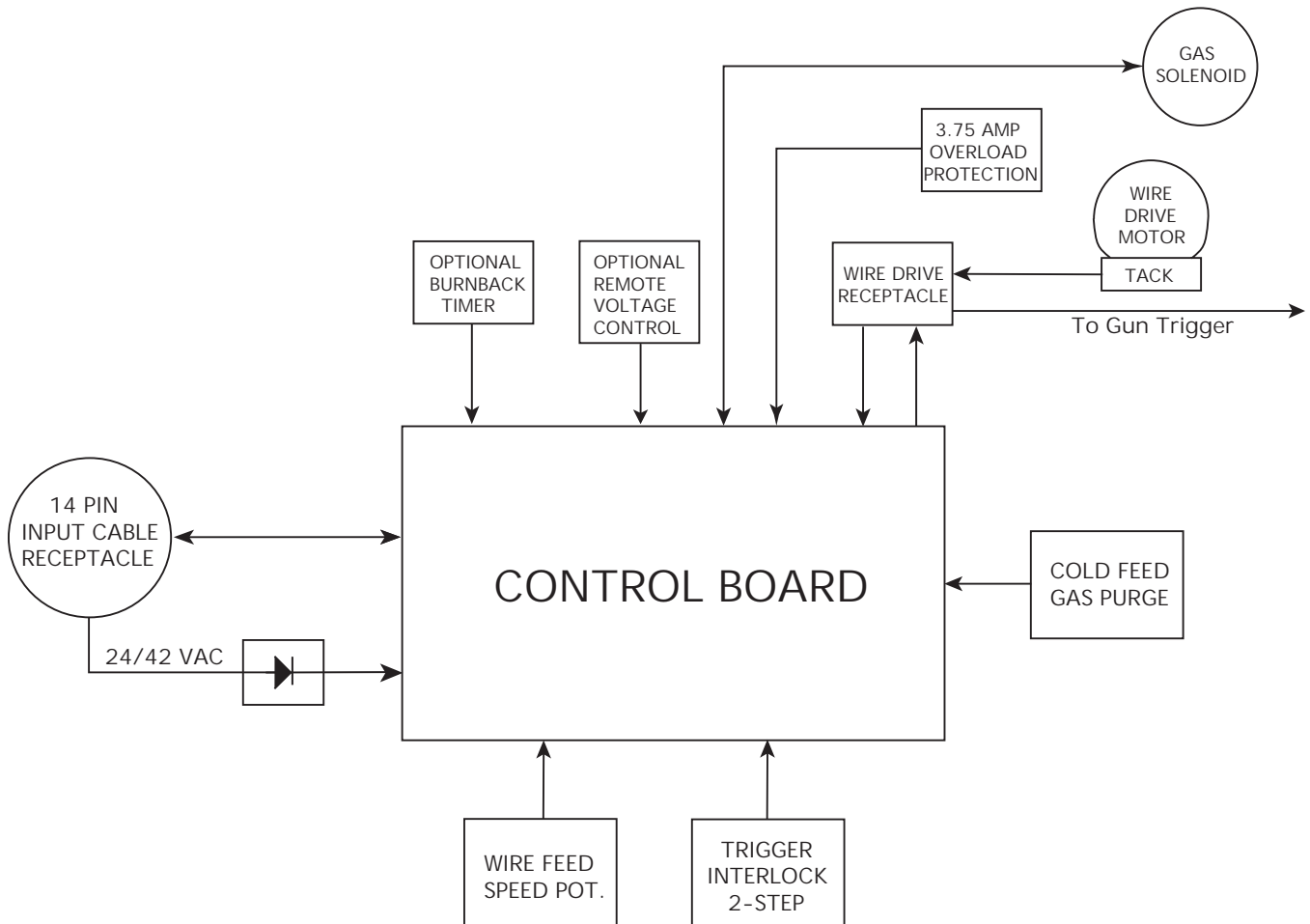
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FIGURE E.1 – LF-72™ & LF-74™ BLOCK LOGIC DIAGRAM

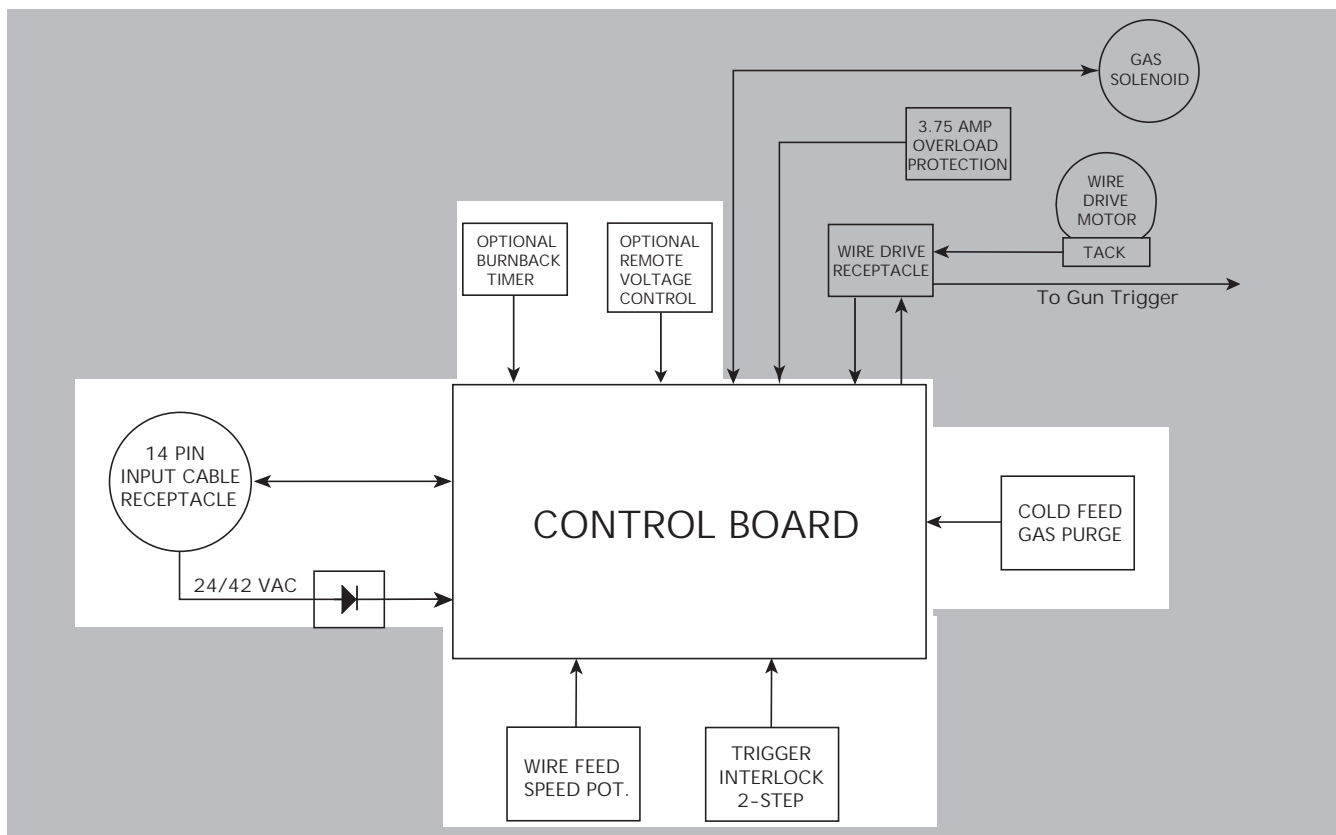


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FIGURE E.2

GENERAL DESCRIPTION & INPUT RECEPTACLE, CONTROL BOARD AND OPERATOR CONTROLS



GENERAL DESCRIPTION

The LF72 and LF74 are single head, 24vac or 42vac input, 2 roll (LF72) or 4 roll (LF74) wire feeders. They have a single calibrated control for wire feed speed WFS and an optional K2339-1 remote voltage control kit to be used in conjunction with a Lincoln constant voltage (CV) direct current DC power source.

The LF72 and LF74 offer the user 3 individual features Cold feed, trigger interlock 2 step trigger control and gas purge. Presettable burnback and postflow timers are also available with an optional K2330-1 timer kit.

The motor is equipped with a 3.75amp current overdraw protection circuit, which is indicated by a THERMAL LED located on the case front.

INPUT RECEPTACLE, CONTROL BOARD AND OPERATOR CONTROLS

The 24 or 42-volt input is applied to the LF72 or LF74 through the 14 pin amphenol type connector. The remote trigger leads are accessed through 14 pin receptacle. The input voltage is rectified by a full wave bridge and is sent to a switching power supply in the control board where it is filtered. This filtered DC voltage is applied to a switching power supply. The switching power supply manufactures +15vdc and +5vdc regulated supplies for the control board circuitry.

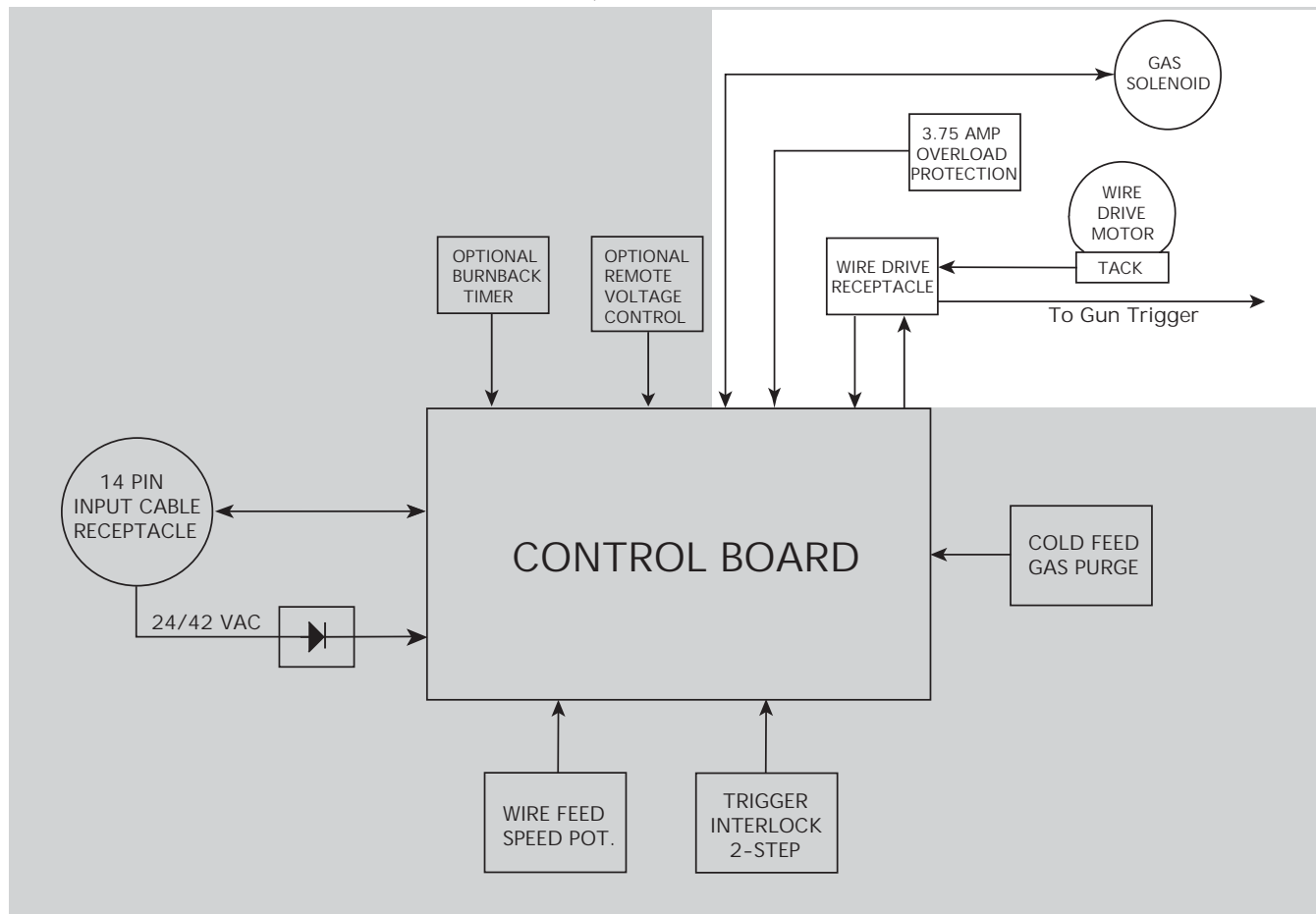
The control board receives commands from the user operated controls for the wire feed speed WFS pot, the optional timer kit and the optional voltage remote control kit. It compares this feedback information with the user command signals and generates appropriate signals to control wire feed speed, arc voltage and gas flow.

The control board is also responsible for the operation of the trigger interlock, 2-step, cold feed and the gas purge features of the LF72 and the LF74.

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FIGURE E.3 – DRIVE MOTOR, TACH FEEDBACK AND GAS SOLENOID



DRIVE MOTOR, TACH FEEDBACK AND GAS SOLENOID

The leads to the drive motor, gas solenoid and the tach (hall effect device LF-74 and LF-72™ above codes 11290) are brought into the control box via the 14 pin receptacle. This 14 pin receptacle also houses the gun trigger leads and the voltage sense leads. When the gun trigger is activated the control board energizes the gas solenoid, the wire drive motor and the welding power source. The control board receives a tach feedback signal and adjusts the motor armature voltage to match the preset wire feed speed.

The control board also monitors the drive motor amperage and will shut down the wire drive for 30 to 60 seconds to allow the motor to cool if the amperage exceeds 3.75 amps for an extended time.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion.

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HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

Service and Repair should only be performed by Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM (SYMPTOM).

Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting. Symptoms are grouped into the following categories: output problems, function problems, wire feeding problems, and welding problems.

Step 2. PERFORM EXTERNAL TESTS.

The second column labeled "POSSIBLE AREAS OF MISADJUSTMENT(S)" lists the obvious external possibilities that may contribute to the machine symptom. Perform these tests/checks in the order listed. In general, these tests can be conducted without removing the case wrap-around cover.

Step 3. RECOMMENDED COURSE OF ACTION

The last column labeled "Recommended Course of Action" lists the most likely components that may have failed in your machine. It also specifies the appropriate test procedure to verify that the subject component is either good or bad. If there are a number of possible components, check the components in the order listed to eliminate one possibility at a time until you locate the cause of your problem.

All of the referenced test procedures referred to in the Troubleshooting Guide are described in detail at the end of this chapter. Refer to the Troubleshooting and Repair Table of Contents to locate each specific Test Procedure. All of the specified test points, components, terminal strips, etc. can be found on the referenced electrical wiring diagrams and schematics. Refer to the Electrical Diagrams Section Table of Contents to locate the appropriate diagram.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

PC BOARD TROUBLESHOOTING PROCEDURES

⚠ WARNING**ELECTRIC SHOCK
can kill.**

- Have an electrician install and service this equipment. Turn the input power OFF at the fuse box before working on equipment. Do not touch electrically hot parts.

⚠ CAUTION

Sometimes machine failures appear to be due to PC board failures. These problems can sometimes be traced to poor electrical connections. To avoid problems when troubleshooting and replacing PC boards, please use the following procedure:

1. Determine to the best of your technical ability that the PC board is the most likely component causing the failure symptom.
2. Check for loose connections at the PC board to assure that the PC board is properly connected.
3. If the problem persists, replace the suspect PC board using standard practices to avoid static electrical damage and electrical shock. Read the warning inside the static resistant bag and perform the following procedures:

PC board can be damaged by static electricity.

**ATTENTION
Static-Sensitive
Devices
Handle only at
Static-Safe
Workstations**

- Remove your body's static charge before opening the static-shielding bag. Wear an anti-static wrist strap. For safety, use a 1 Meg ohm resistive cord connected to a grounded part of the equipment frame.

- If you don't have a wrist strap, touch an un-painted, grounded, part of the equipment frame. Keep touching the frame to prevent static build-up. Be sure not to touch any electrically live parts at the same time.

- Tools which come in contact with the PC board must be either conductive, anti-static or static-dissipative.

- Remove the PC board from the static-shielding bag and place it directly into the equipment. Don't set the PC board on or near paper, plastic or cloth which could have a static charge. If the PC board can't be installed immediately, put it back in the static-shielding bag.

- If the PC board uses protective shorting jumpers, don't remove them until installation is complete.

- If you return a PC board to The Lincoln Electric Company for credit, it must be in the static-shielding bag. This will prevent further damage and allow proper failure analysis.

4. Test the machine to determine if the failure symptom has been corrected by the replacement PC board.

NOTE: It is desirable to have a spare (known good) PC board available for PC board troubleshooting.

NOTE: Allow the machine to heat up so that all electrical components can reach their operating temperature.

5. Remove the replacement PC board and substitute it with the original PC board to recreate the original problem.

- a. If the original problem does not reappear by substituting the original board, then the PC board was not the problem. Continue to look for bad connections in the control wiring harness, junction blocks, and terminal strips.

- b. If the original problem is recreated by the substitution of the original board, then the PC board was the problem. Reinstall the replacement PC board and test the machine.

6. Always indicate that this procedure was followed when warranty reports are to be submitted.

NOTE: Following this procedure and writing on the warranty report, "INSTALLED AND SWITCHED PC BOARDS TO VERIFY PROBLEM," will help avoid denial of legitimate PC board warranty claims.

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Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
The wire drive does not feed wire and the drive rolls do not spin	<ol style="list-style-type: none"> 1. Power source not on 2. Possible tripped breaker 3. Faulty gun trigger 4. Possible faulty control cable 	<ol style="list-style-type: none"> 1. Verify the power source is on. Verify power is being applied to the wire feeder. 2. Verify the circuit breaker of the wire feeder or the power source has not tripped. 3. Check to see if the gun trigger is working properly. 4. Check for cable continuity, and for broken or bent pins.
The wire feeds erratically, or the motor LED lights.	<ol style="list-style-type: none"> 1. Wrong drive rolls installed. 2. Possible problem with gun 3. Pressure arm or brake tension too tight. 4. Examine the contact tip for wear or proper size 	<ol style="list-style-type: none"> 1. Verify the correct drive rolls and inner wire guides are installed in the wire drive. 2. Check for sharp bends in gun liner. <p>Check gun liner. The welding electrode should slide easily through the gun. Verify proper gun liner is installed.</p> <ol style="list-style-type: none"> 3. Adjust brake tension. Adjust pressure arm see FIGURE A.6 4. Replace if necessary 5. If using wire conduit, verify that the wire slides easily through the conduit. 6. Perform the DRIVE MOTOR TEST. Perform TACH FEED-BACK TEST.
The wire continues to feed when the gun trigger is released.	<ol style="list-style-type: none"> 1. Trigger interlock switch in wrong position. 2. Gun trigger shorted or stuck 	<ol style="list-style-type: none"> 1. Check if the 2 step/ trigger interlock switch is in the TRIGGER INTERLOCK position. 2. Verify operation of the gun trigger. Check for shorted trigger leads.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

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Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS (Continued)		
No shielding gas.	<ol style="list-style-type: none"> 1. No gas supply, or gas supply interrupted. 2. Solenoid not functioning. 	<ol style="list-style-type: none"> 1. Verify cylinder is not empty and is turned on. Check the hose for cuts or kinks. Make sure it is not crushed. Verify the hose is connected to the gun bushing or welding gun. 2. Perform the GAS SOLENOID TEST.
Variable or hunting arc.	<ol style="list-style-type: none"> 1. Bad contact tip 2. Possible loose connection in current carrying cables. 3. Set up not correct. 4. Problem with shielding gas. 	<ol style="list-style-type: none"> 1. Check for proper size contact tip. Make sure tip is not worn, and is free of spatter. 2. Clean and tighten all electrode and work connections. Verify the gun bushing is tightly mounted to the wire drive. Verify the gun is tightly mounted to the gun bushing. 3. Verify the proper polarity is being used for the weld procedure. Make sure the proper electrode stick-out is being maintained. 4. Check the gas flow rate and mixture. 5. Control board may be faulty.
When the trigger is pulled, the drive rolls spin but no arc voltage	<ol style="list-style-type: none"> 1. Possible bad gun or faulty connections in the heavy current carrying leads. 2. Possible faulty control cable. 3. Possible defective power source. 	<ol style="list-style-type: none"> 1. Check all electrode and work connections. Verify the the gun bushing is tight to the wire drive. Verify gun is tightly mounted to the bushing. 2. Check the control cable and connectors for continuity, cuts, or broken pins. 3. Verify the power source is operating properly.
The arc burns back to the tip.	<ol style="list-style-type: none"> 1. If timer kit is installed, reduce the amount of burnback time. 	
The gas continues to flow for a long time after the weld.	<ol style="list-style-type: none"> 2. If the timer kit is installed, reduce the amount of post flow time. 	

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

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Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS (Continued)		
<p>The motor (L12081) failed when a load (6 N m) was applied to the wire drive.</p>	<p>When testing the wire drives for feeding problems (“inconsistent feeding”, “grinding noises from the gearbox”, “jumping drive rolls”) the wire drive should be tested under load.</p>	<p>This can be done by loading a spool of wire, setting the spindle brake to maximum and then feeding wire.</p>
Empty cell	Empty cell	Empty cell

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

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DRIVE MOTOR AND TACH FEEDBACK TEST



WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test / repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will help determine if the wire drive motor is receiving the correct voltage and is capable of running properly. It will also determine if the tach sensor is receiving the correct input from the control board, and is sending back the correct signal.

MATERIALS NEEDED

5/16 in. nut driver

32 VDC @ 1 amp variable power source

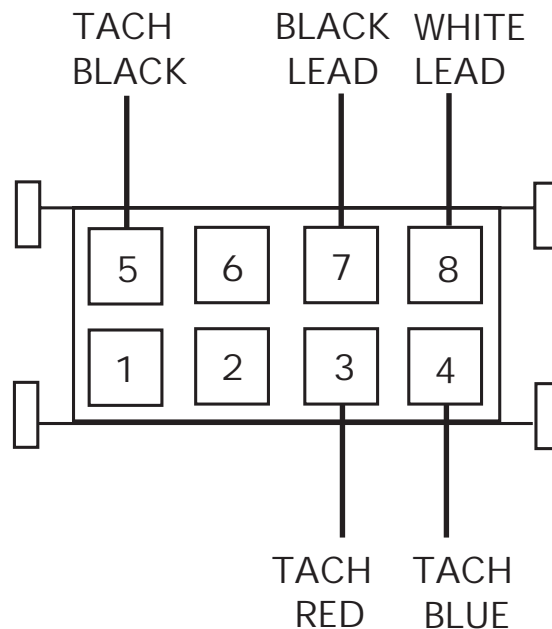
Volt-Ohm Meter

DRIVE MOTOR AND TACH FEEDBACK TEST *(continued)*

TEST PROCEDURE

1. Remove power from the LF72/LF74 wire drive unit.
2. Using a 5/16 nut driver remove the 5 screws holding the case.
3. Locate the two motor leads and the tach leads See Figure F.1.
4. Apply the correct input voltage (42VAC) to the unit.
5. With the trigger activated and the motor running check for 1VDC min. (210HZ) to 31VDC (1.75KHZ)max. between the black and white motor leads (pins 7 and 8).
6. Check for between 1 and 2 ohms of resistance between the above mentioned leads. Also make sure there is at least 500k ohms of resistance between both leads and the motor shell.
7. With the trigger activated and the motor running check for 5VDC input on the black and red tach leads. Check for .7 VDC to .85 VDC on the black and blue return leads.
8. For further testing on the drive motor you can use an isolated power source and apply between 1 and 31VDC to the leads.
9. If the armature voltage is not present (step 5) and the motor operates normally when an isolated power source is applied (step 8) Control board may be faulty.

FIGURE F.1 – TACH LEAD LOCATION



GAS SOLENOID TEST



WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test / repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will determine if the gas solenoid is receiving the correct voltage and if the solenoid is functional.

MATERIALS NEEDED

5/16 in. nut driver
12 VDC @ 1 amp power source
Volt-Ohmmeter

GAS SOLENOID TEST

(continued)

FIGURE F.2 - GAS SOLENOID

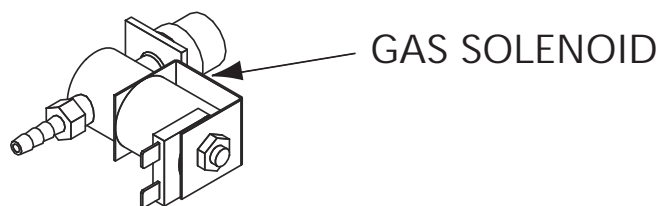
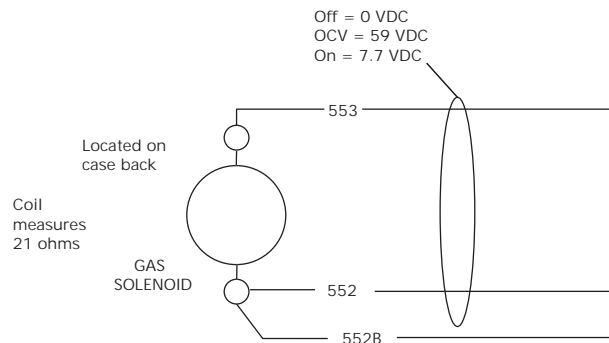


FIGURE F.3 - LEADS 552, 552B & 553

**TEST PROCEDURE**

1. Remove the input power from the LF72/LF74 unit.
2. Using the 5/16 nut driver, remove the 5 screws holding the cover.
3. Locate the gas solenoid (FIG F.2) on the back of the feeder.
4. Apply the correct (42VAC) input voltage to the unit.
5. While pressing the gas purge button or activating the gun trigger, check for approximately 8VDC at the solenoid leads (FIG F.3). If the 8VDC is present the solenoid should activate. If the 8VDC is present but the solenoid does not activate the solenoid may be faulty.
6. If the 8VDC is missing or low, check the leads and connections between the solenoid and the control board. See the wiring diagram. If the leads and connections are ok, the control board may be faulty.
7. Normal solenoid coil resistance is 21 ohms.
8. The solenoid can be further checked by disconnecting the leads and applying 12VDC directly to the terminals. If the solenoid does not activate the solenoid is faulty.
9. Reconnect the leads and replace the cover.

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DIODE BRIDGE TEST



WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test / repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will help determine if the diode bridge is receiving the power AC input voltages and is converting them to the correct DC output voltages.

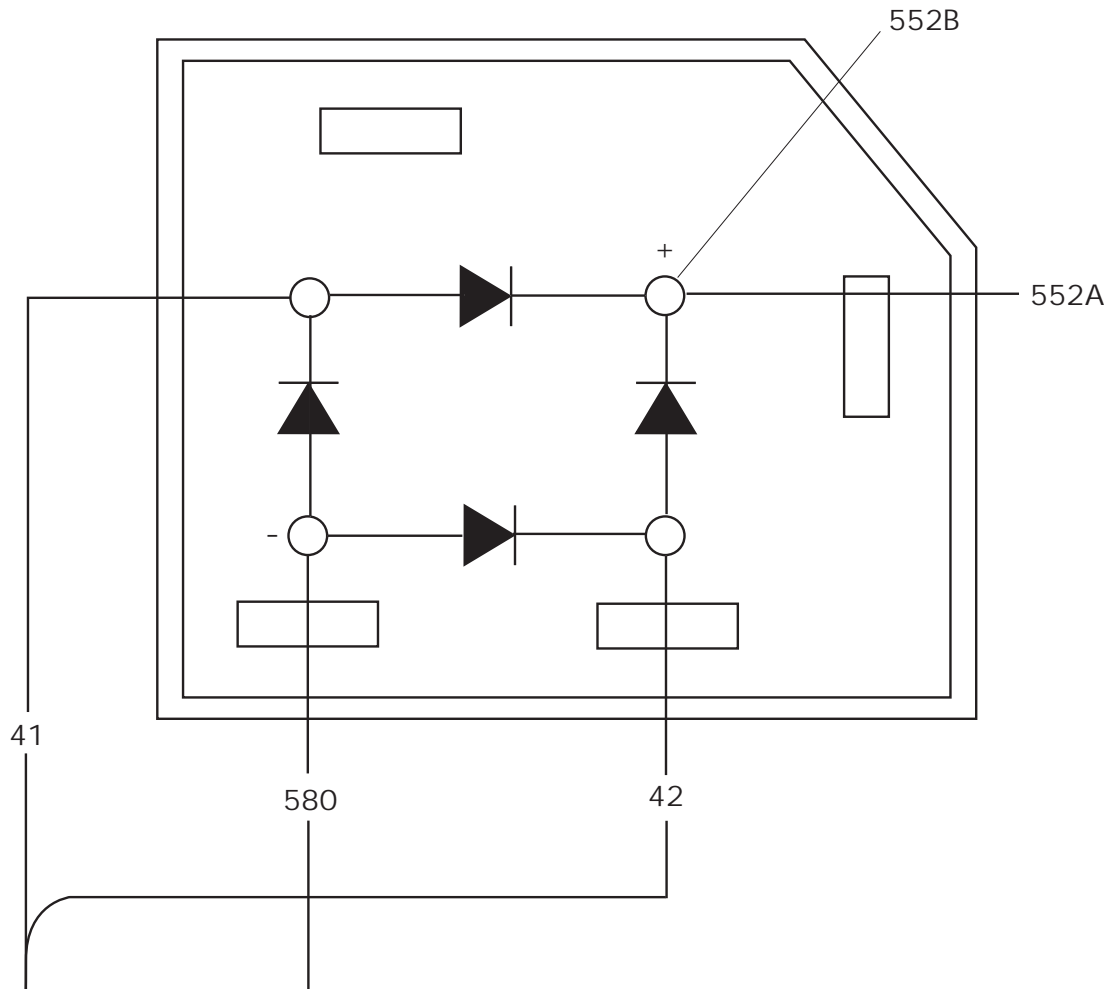
MATERIALS NEEDED

5/16 in. nut driver
42VAC power supply
Volt-Ohmmeter

DIODE BRIDGE TEST

(continued)

FIGURE F.4 – CONTACTOR



TEST PROCEDURE

1. Remove the input power from the unit.
2. Using a 5/16 nut driver remove the 5 screws holding the cover.
3. Apply the correct input voltage (42VAC) to the LF72/LF74 unit.
4. Check for the correct input voltage at leads 41 and 42 on the bridge. If the input voltage is not there check the wiring back to the receptacle assembly pins I and K.
5. Check for the proper output on leads 580 negative and 522 positive. The voltage should be 59VDC. If you are only reading 38VDC the control circuit is open. Check the wiring and the connections back to your control board.

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WIRE SPEED POTENTIOMETER TEST



WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test / repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

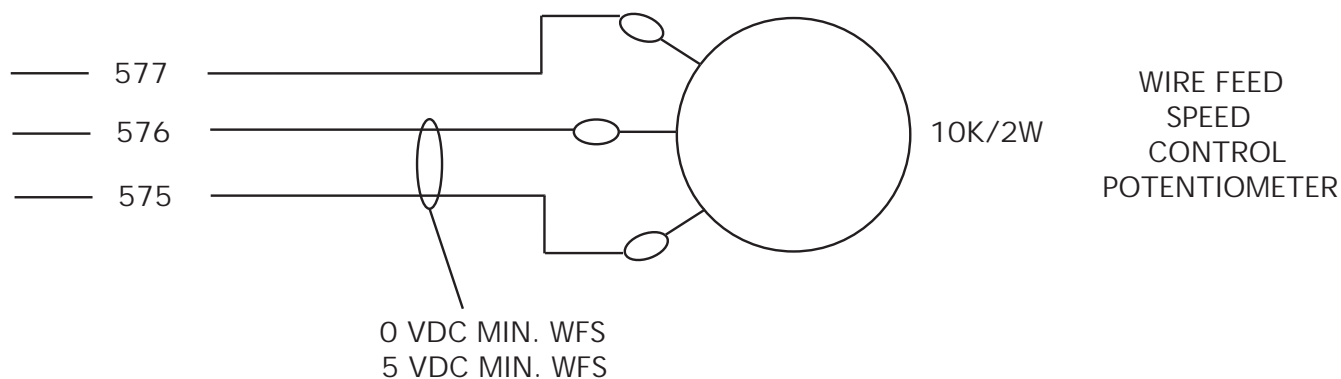
This test will help determine if the wire speed potentiometer is receiving and sending the correct voltages..

MATERIALS NEEDED

5/16 in. nut driver
42VAC power supply
Volt-Ohmmeter

WIRE SPEED POTENTIOMETER TEST (*Continued*)

Figure F.5

**TEST PROCEDURE**

1. Remove the input power from the unit.
2. Using 5/16 nut driver remove the 5 screws holding the cover.
3. Apply the correct input voltage (42VAC) to the LF72/LF74 unit.
4. Locate the P8 plug (see wiring diagram) going to the potentiometer.
5. Check for 0VDC minimum to 5VDC maximum between wires 575 and 576. If the voltage is not there, check the wires for continuity back to the control board. If the wiring checks out good, the control board may be faulty.
6. The potentiometer can also be checked by unplugging the P8 connection (see wiring diagram), and checking for 0 to 10k ohms between leads 575 and 576 (as pot is located).
7. Reconnect the disconnected leads and reassemble the cover.

LF-72™ & LF-74™



CONTROL PC BOARD REMOVAL AND REPLACEMENT PROCEDURE



WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test / repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the control pc board.

MATERIALS NEEDED

5/16 in. nut driver

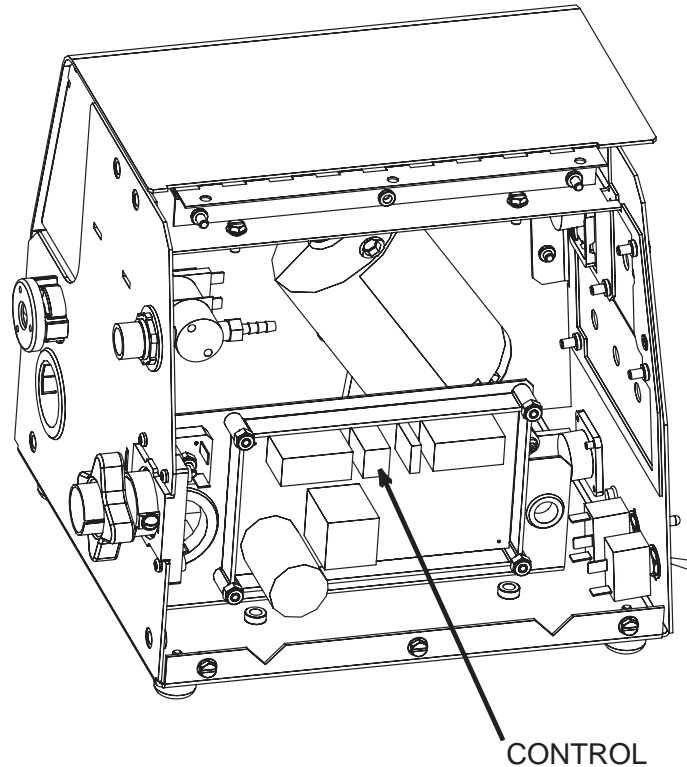
3/8 in. nut driver

Anti-static strap

CONTROL PC BOARD REMOVAL AND REPLACEMENT PROCEDURE

(Continued)

Figure F.6 - PC Board Location

**REMOVAL PROCEDURE**

1. Remove the input power (42VAC) from the LN72/LN74 unit.
2. Using the 5/16 nut driver remove the 5 screws holding the cover.
3. Locate the control board (see figure F.6) and remove the harness plugs on the control board. Observe static electricity precautions.
4. Remove the 4 nuts holding the board using the 3/8 inch nut driver, and remove the board.

REPLACEMENT PROCEDURE

1. Remove the new control board from the static bag and place it on the 4 studs.
2. Reassemble the 4 nuts and tighten hand tight.
3. Reassemble the harness plugs.
4. Reassemble the case.

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DRIVE MOTOR AND GEAR BOX REMOVAL AND REPLACEMENT PROCEDURE



WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test / repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

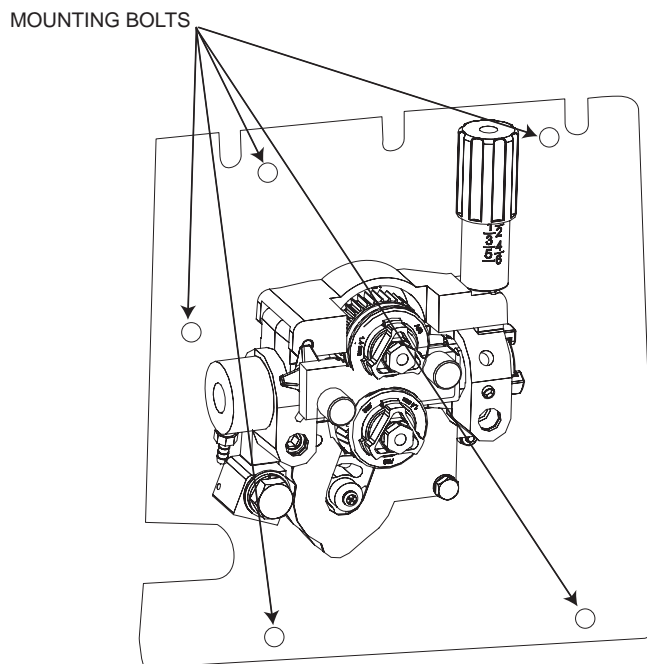
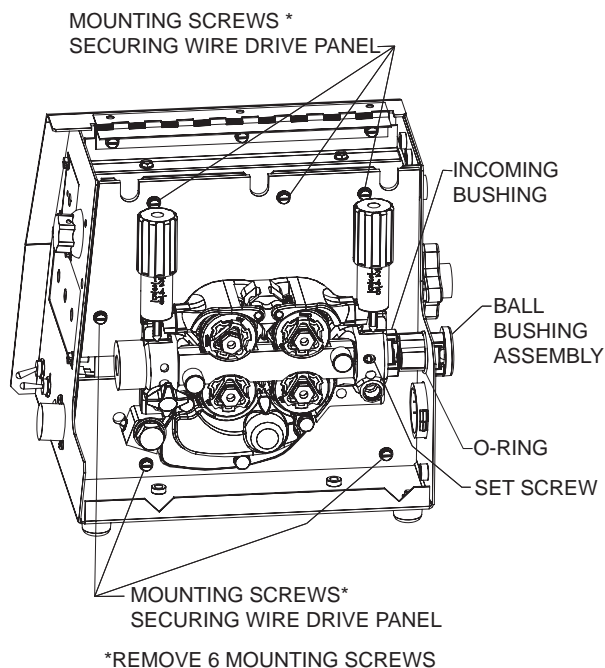
This procedure will aid the technician in the removal and replacement of either the drive motor or the gear box.

MATERIALS NEEDED

5/16 in. nut driver
7/16 in. socket wrench and extension
3/4 in. wrench
Phillips head screw driver
Pliers

DRIVE MOTOR AND GEAR BOX REMOVAL AND REPLACEMENT PROCEDURE (Continued)

Figure F.7 - Wire Drive Motor(s)



PROCEDURE

1. Remove the input power from the LF72/LF74 unit.
2. Remove the gun from the unit.
3. Using the 5/16 inch nut driver remove the 5 screws holding the cover.
4. Using the Phillips head screw driver remove the #67 electrode sense lead from the connection block.
5. Using the pliers remove the gas hose from the connection block. Be careful not to damage the hose.
6. Using the 3/4 inch wrench remove the electrode cable from the connector block.
7. Remove the tach and motor leads by disconnecting the P10 connector. See wiring diagram.
8. Using the 7/16 inch socket wrench and extension remove the six mounting bolts. See figure F.7. The motor, and gear box assembly can now be removed from the LF72/LF74 unit.

DRIVE MOTOR AND GEAR BOX REMOVAL AND REPLACEMENT PROCEDURE *(Continued)*

REMOVAL OF THE DRIVE MOTOR FROM THE GEAR BOX

1. Using the 7/16 in. wrench remove the cover from the gear box. **See Figure F.7.** note the LF72 only has one screw.
2. Loosen and remove the outer wire guide.
3. Loosen and remove the drive roll assembly. The LF72 has one while the LF74 has three.
4. Using the Phillips head screw driver remove the gear drive. **See Figure F.7.**
5. Using the phillips head screw driver remove the three screws holding the drive motor. **See Figure F.7.**

REMOVAL OF THE GEAR BOX FROM THE MOUNTING PANEL.

6. Follow the first five steps found in the drive motor removal.
7. Using the 7/16 wrench remove the four bolts holding the gear box to the panel.

DRIVE MOTOR AND GEAR BOX REMOVAL AND REPLACEMENT PROCEDURE *(Continued)*

REPLACEMENT PROCEDURES

1. Line up the gear box with the 4 holes on the panel. Replace and tighten the four 1/4-20 x 1/2 in. hex head bolts.
2. Insert the drive motor through the panel and gear box. Line up and tighten the three M6 x 1.00 in. Phillips pan head screws.
3. Replace the drive gear and secure in place using the screw and lock washer previously removed.
4. Replace the drive rolls and secure the secure locking rings.
5. Replace the gear box cover and secure with the 1/4-20 hex head screws.
6. Feed the gas hose, and the # 67 lead through the notch on the panel. Feed the P10 plug through the center panel. Align and mount and tighten the panel using the six lock washers and bolts previously removed.
7. Plug the P10 plug into the wiring harness.
8. Using the Phillips head screw driver connect the #67 electrode sense lead to the connector block.
9. Using the 3/4 in. wrench connect the electrode lead to the connector block.
10. Connect the gas hose.
11. Install the cover using the five screws.
12. Connect the gun.

RETEST AFTER REPAIR

Retest a machine:

- If it is rejected under test for any reason that requires you to remove any part which could affect the machine's electrical characteristics.

OR

- If you repair or replace any electrical components.

SET UP

1. Connect a supply of filtered compressed air at 80 psi to the gas inlet.
2. Supply 42VAC to the machine.
3. Connect the gun to the connector block.

OPERATION VERIFICATION

1. Close the idle arms and the pressure arms.
2. Activate the cold feed switch.
3. Verify the drive rolls are spinning in the forward direction.
4. Adjust the wire speed knob from min to max and verify the speed is changing.
5. Release the cold feed switch and verify that the drive rolls stop abruptly.
6. Activate the gas purge switch and verify that there is gas flow.
7. Release the gas purge switch and verify the gas flow stops.
8. Place the 2-step/trigger interlock switch in the trigger interlock position.
9. Activate the gun trigger and verify the drive rolls spin.
10. Release the gun trigger and verify the drive rolls continue to spin.
11. Activate and release the gun trigger and verify the drive rolls stop abruptly.
12. Place the 2-step/trigger interlock switch in the 2-step position.

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*** NOTE:** Many PC Board Assemblies are now totally encapsulated, surface mounted and or multi-layered and are therefore considered to be unserviceable. Assembly drawings of these boards are no longer provided.

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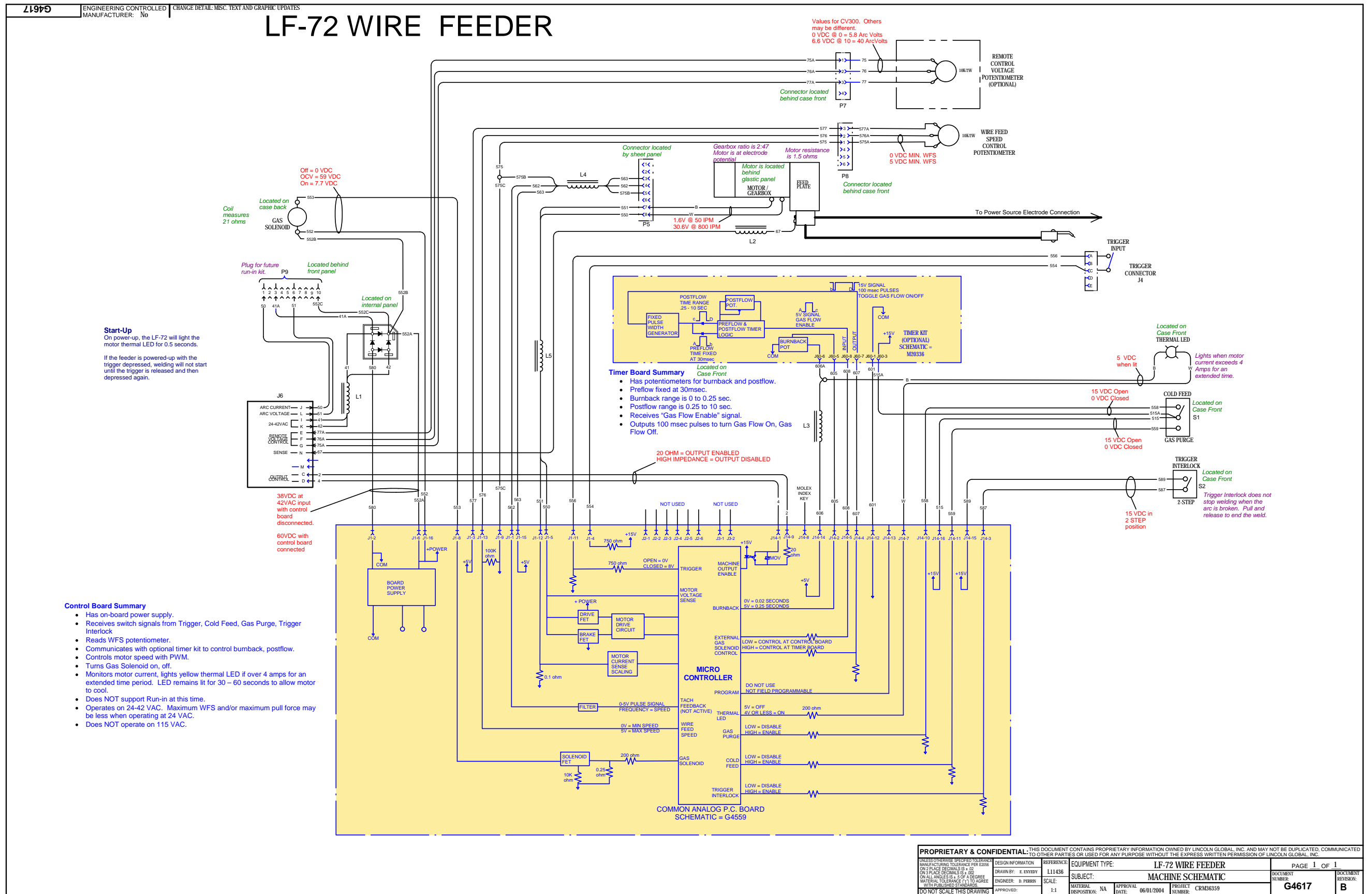
SCHEMATIC - ENTIRE MACHINE - CODE 11075, 11076, 11077 - (G4617) LF-72

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NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - ENTIRE MACHINE - CODE 11209, 11210, 11211, 11227 - (G4617-1) LF-72

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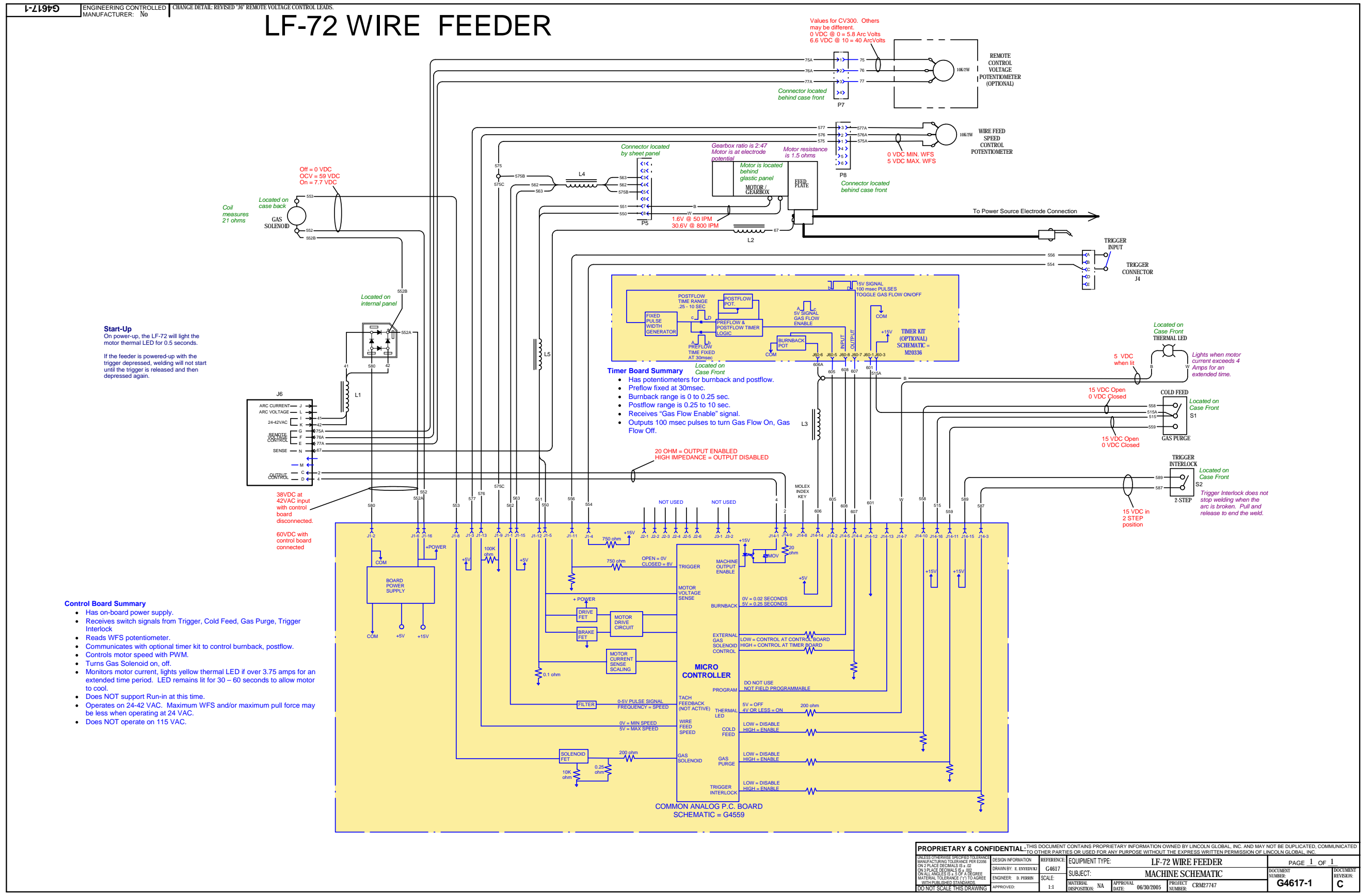
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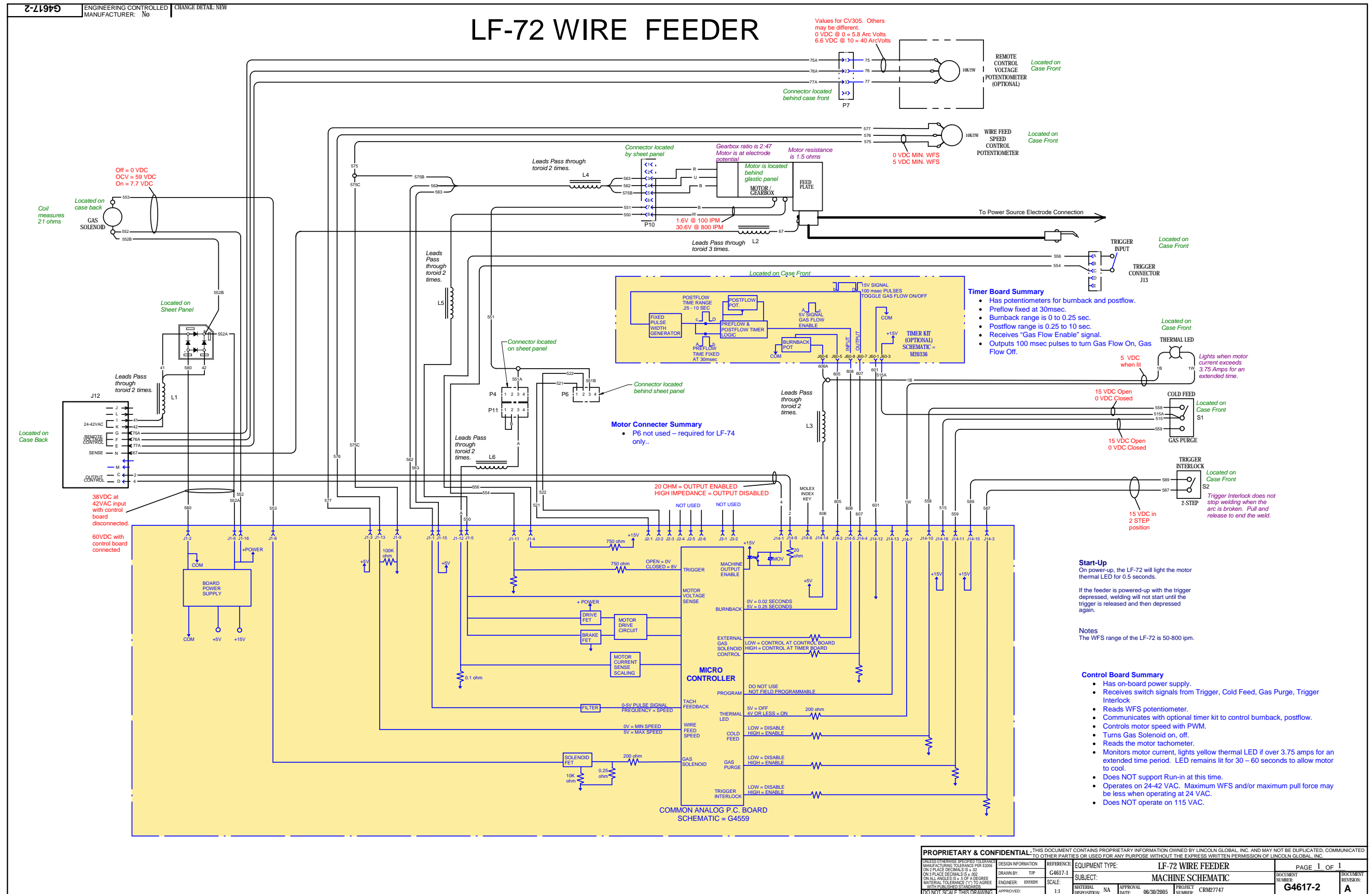
SCHEMATIC - ENTIRE MACHINE - CODE 11290, 11291, 11292, 11293 - (G4617-2) LF-72

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Return to Section TOC
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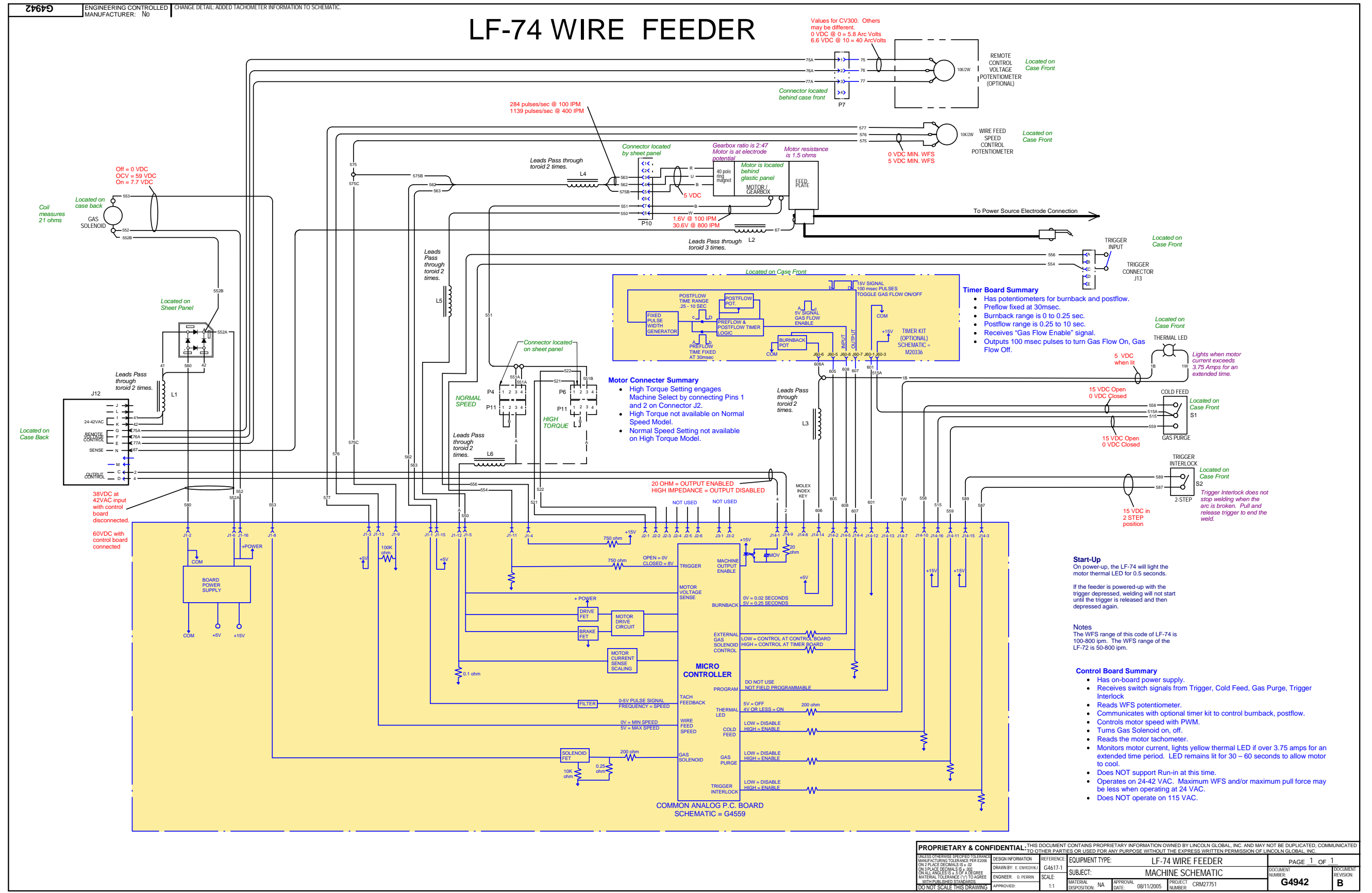
SCHEMATIC - ENTIRE MACHINE - CODE 11195, 11196, 11197 - (G4942) LF-74

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NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.



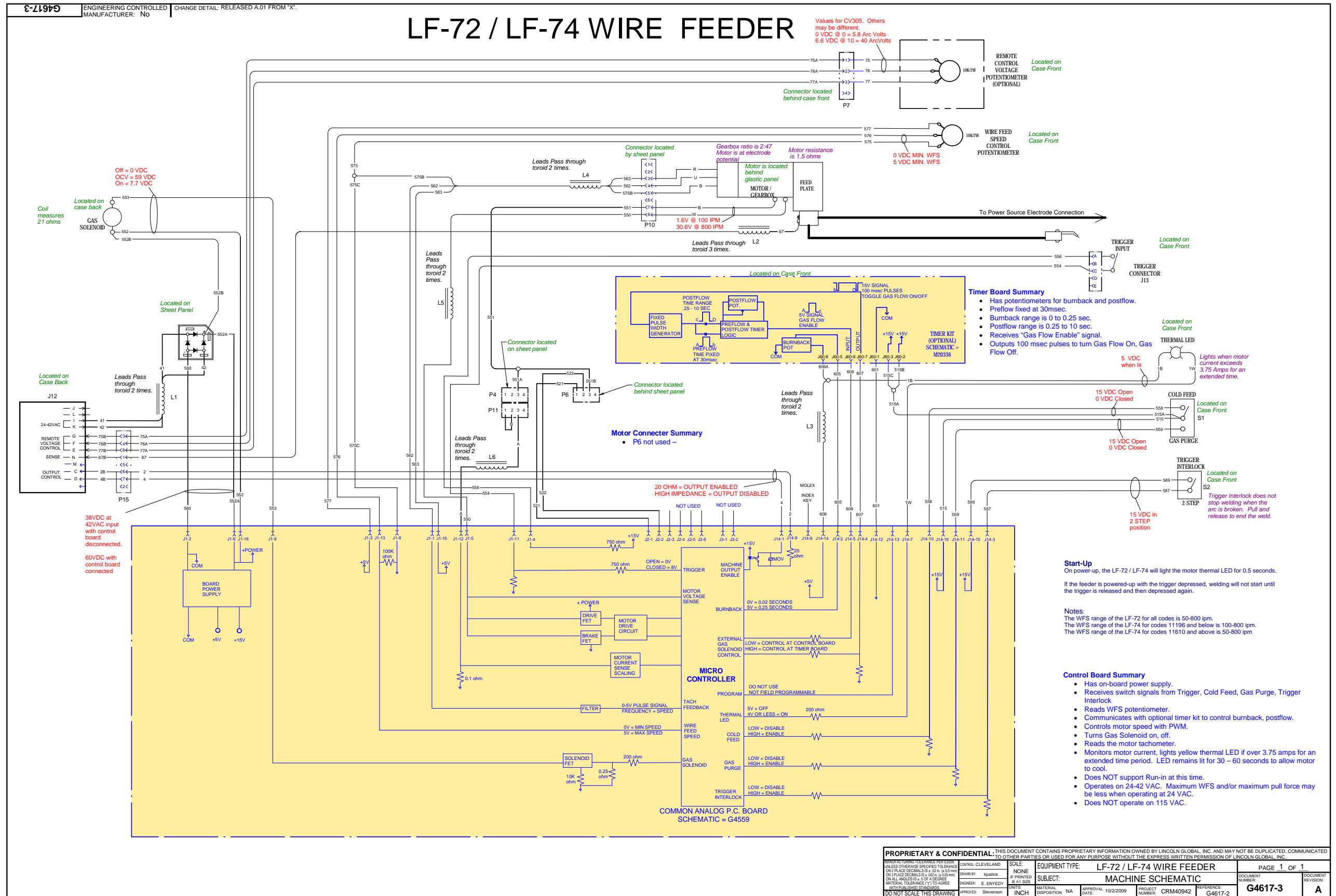
SCHEMATIC - ENTIRE MACHINE - CODE 11606 THRU 11713 - (G4617-3) LF-72 & LF-74

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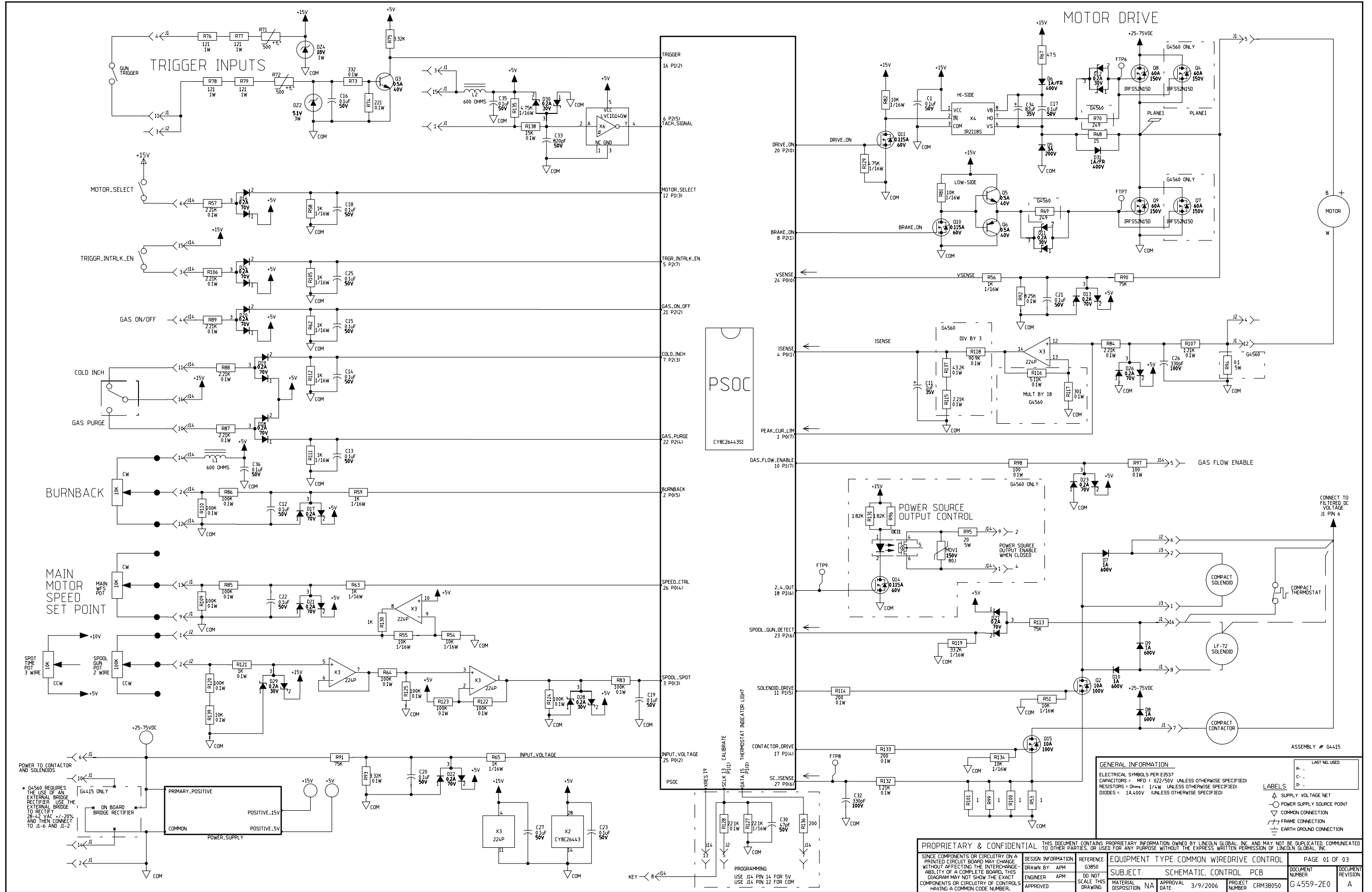
SCHEMATIC - COMMON ANALOG CONTROL PC BOARD - (G4559 PG 1)

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NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - COMMON ANALOG CONTROL PC BOARD - (G4559 PG 2)

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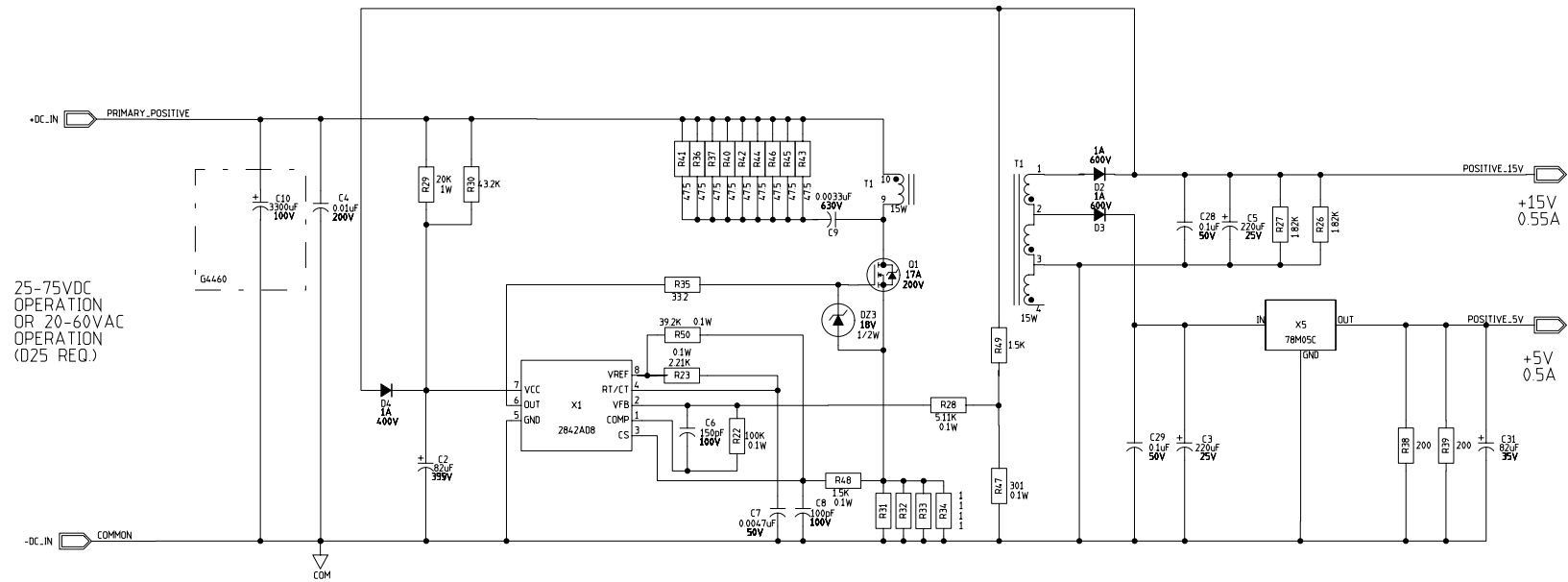
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25-75VDC OPERATION OR 20-60VAC OPERATION (D25 REQ.)

GENERAL INFORMATION		LAST NO. USED	
ELECTRICAL SYMBOLS PER E1937		R -	
CAPACITORS = MFD (0.22/50V UNLESS OTHERWISE SPECIFIED)		C -	
RESISTORS = Ohms (1/4W UNLESS OTHERWISE SPECIFIED)		D -	
DIODES = 1A400V (UNLESS OTHERWISE SPECIFIED)		LAST NO. USED	
△ SUPPLY VOLTAGE NET ○ POWER SUPPLY SOURCE POINT ▽ COMMON CONNECTION ▽ FRAME CONNECTION ⊕ EARTH GROUND CONNECTION		R - C - D -	

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DESIGN INFORMATION	REFERENCE	EQUIPMENT TYPE: COMMON WIREDRIVE CONTROL	PAGE 02 OF 03
DRAWN BY: APM	-----	SUBJECT: SCHEMATIC, CONTROL PCB	DOCUMENT NUMBER
ENGINEER: APM	DO NOT SCALE THIS DRAWING	MATERIAL DISPOSITION: NA	REVISION: A
APPROVED:		APPROVAL DATE: 3/9/2006	PROJECT NUMBER: CRM38050
			DOCUMENT REVISION: G4559-2E0

NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.



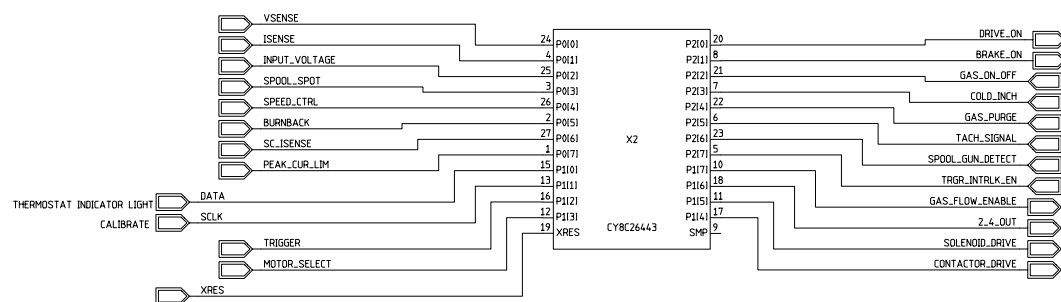
SCHEMATIC - COMMON ANALOG CONTROL PC BOARD - (G4559 PG 3)

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GENERAL INFORMATION		LAST NO. USED
ELECTRICAL SYMBOLS PER E1537		R -
CAPACITORS = MFD (.022/50V UNLESS OTHERWISE SPECIFIED)		C -
RESISTORS = Ohms (1/4W UNLESS OTHERWISE SPECIFIED)		D -
DIODES = 1A400V (UNLESS OTHERWISE SPECIFIED)		
▲ SUPPLY VOLTAGE NET ○ POWER SUPPLY SOURCE POINT ▽ COMMON CONNECTION ▽ FRAME CONNECTION ⊥ EARTH GROUND CONNECTION		

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DRAWN BY: APM	DO NOT SCALE THIS DRAWING	SUBJECT: SCHEMATIC, CONTROL PCB	DOCUMENT NUMBER	DOCUMENT REVISION:	
ENGINEER: APM	APPROVED:	MATERIAL DISPOSITION: NA	APPROVAL DATE: 3/9/2006	PROJECT NUMBER: CRM38050	G4559-2E0
					A

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